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E-mail: info@pp-msu.com.ua
https://pp-msu.com.ua

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Tetiana Shcherban*

Doctor of Psychology, Professor, Rector
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
https://orcid.org/0000-0002-3702-8029

Tyberiy Dolynay

Postgraduate Student
Mukachevo State University
89600, 26 Uzhhorodska Str., Mukachevo, Ukraine
https://orcid.org/0009-0008-3256-8932

Psychology of doctor-patient interaction in the context of medical specialist's communicative tolerance

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*Corresponding author

Abstract. The relevance of the study is due to the need to find ways to ensure high-quality interaction between a doctor and a patient in the context of a medical professional's communicative tolerance. The purpose of the study was to determine the psychological characteristics of the interpersonal relationship between a doctor and his/her patients. The basis of the theoretical and methodological approach was a qualitative combination of methods of structural and functional analysis of the problem of psychological training of medical professionals and analytical research on the formation of constructive relationships between doctor and patient. Several surveys were conducted on the tolerance of healthcare professionals and their emotional well-being in the context of individual psychological characteristics. The results are presented, which reflect the methods of doctor's influence on the psychological state of the patient and his/her family. The question of how trust in a doctor and his/her professional competences is formed is highlighted. The problem of ethical principles, professional motivation of medical professionals and the specifics of their communication in the team are revealed. The subjective feelings of doctors about the work they do are revealed. The issues of modernization of medical education and digitalization of services are revealed. The conditions, components, and approaches to effective interaction between doctor and patient in the healthcare system are identified. The problems of developing diagnostic tools for assessing the psychological state of a medical professional in his/her professional activity are detailed. An experiment was conducted to substantiate the need to implement programmes to improve the communication skills of healthcare professionals, including interns and nurses. The practical value of the results of the research work is the possibility of using the outlined approach to improve the methods of improving the communication competencies of doctors in their professional activities

Keywords: emotional stability; communicative tolerance; professional motivation; morality; medical ethics

INTRODUCTION

Communication culture plays an important role in human interaction. At the same time, tolerance and communication skills of each individual become a problem in relationships. This problem is especially acute in the communication between healthcare professionals and patients, where the paternalistic model of interaction between a doctor and a patient is replaced by a partnership model that involves the patient's active position in treatment, raising their awareness of their own health and searching for constructive sources of help. This also leads to increased requirements for a modern doctor, in particular, for his or her professional competencies, professional development, moral and ethical principles, as well as the ability to conduct organizational activities and the ability to use information and digital technologies in professional activities. The totality of these provisions determines the relevance of research on the psychology of doctor-patient interaction in the treatment process.

The transformation of political and economic processes indicates the need to introduce new approaches to the education of the younger generation, where the modernization of the educational system will contribute to the training of highly qualified and competitive international specialists. Studying the problem of professional training of public health specialists in medical educational institutions, M. Diachenko & T. Zakusilova (2020) note that the modern educational system needs to be modernized to support psychological and pedagogical conditions for the development of students' integrative thinking. In particular, the authors emphasize the need for the purposeful formation of professional qualities of future specialists, where specialized knowledge will be reflected in the personal and social development of a person. Similar conclusions were reached by I. Melnychuk (2021), studying the issue of an interdisciplinary approach to the training of medical specialists, the author points out that it is necessary to form a qualitatively new level of thinking in students, where the process of mastering the profession will be accompanied by interest and activity in studying the material, activation of mental activity and effective integration of theoretical knowledge into practical experience. In addition, according to K. Ivanova *et al.* (2022), the professional development of a future doctor should be based on the formation of the principles of bioethics. Studying the problem of professional activity of a doctor in the context of its bioethical essence, the authors note that the formation of professional competences of a healthcare professional should take place through the formation of a system of stable personal characteristics based on bioethical thinking and behaviour of an individual, as well as reflecting his/her readiness for professional interaction with patients.

In the period of rapid technological progress, it is important to develop communication competences in future doctors. L. Samburska (2022) points out that the accumulation of experience of communicative interaction in the educational process precedes the conscious use of psychological skills, which in the further professional activity of a doctor facilitate his/her communication with patients and colleagues. Studying the issue of developing the communication competences of future healthcare professionals, the author also notes that it is in the educational process that a person develops the ability to establish contact with others, where the development of internal resources precedes the construction of effective communication in interpersonal interaction. Similar conclusions can be traced in the study by O. Lazurenko & N. Smila (2022), who studied the problem of professional development of a doctor. The authors note that the accumulation of practical experience allows a doctor to pay more attention to psychological aspects in therapy, as well as to regulate the degree of their own emotional involvement in this process. Studying the deontological approach in the training of medical professionals, O. Rykachevskyi (2022) notes that in the modern world, there is a tendency to reduce the quality of communication among medical professionals, which also has a significant impact on the effectiveness of interaction between the doctor and his/her patients. The author notes that well-established interaction between colleagues, consistency, and coherence of work of all healthcare professionals affect the quality and timeliness of medical care provided to patients.

The main purpose of the research was to reveal the specifics of doctor's communication in the medical environment, in particular, the psychological aspects of his/her interaction with patients in the course of treatment. In addition, consideration of the theoretical foundations of the research topic allowed putting forward a hypothesis: the higher the level of psychological well-being of doctors, the higher the level of their tolerance in interacting with patients and colleagues.

MATERIALS AND METHODS

The conceptual approach to the research problem was based on the identification of key aspects of the development of professional skills of a medical specialist and his/her interaction with other people in practice. The implementation of this approach was facilitated by adherence to the principle of determinism in the development of future doctors' professional competence, which made it possible to identify the main principles of forming communication skills in medical professionals, the formation of their ethical values and morality in the learning process. At the same time, the methods of theoretical generalization and empirical comparison made it possible to determine the principles of building trust in a doctor and his/her professional opinion. In addition, the use of the pragmatic method and objective observation contributed to the disclosure of the peculiarities of psychological interaction between medical professionals, in particular, it allowed highlighting the peculiarities of interpersonal communication in the doctor-patient system. The use of the structuring method made it possible to systematize the world experience of studying the genesis of interpersonal interaction of people as a component of their successful social activity. This contributed to the analysis of the specifics of the development

of communicative tolerance of the individual and formed the basis for revealing the importance of the principles of the bioethical approach to treatment.

The empirical study was carried out on the basis of the Kyiv City Children's Clinical Hospital No. 1, a municipal non-profit enterprise (MNE). Medical staff of the general paediatrics, surgical and cardio-rheumatology departments in the number of 62 people, including 18 doctors, 12 interns and 32 nurses aged 20 to 56 years, were invited to participate in the study. Prior to the study, an organizational work programme was developed and implemented in cooperation with the hospital administration and the staff of the selected departments. The study participants were divided into three subgroups and made up the corresponding sample with groups of doctors (D-18), interns (I-12) and nurses (N-32), where the number represents the number of respondents in each group. The pilot study was conducted for seven months. In particular, a programme was implemented for healthcare workers to improve communication skills and reduce conflict in the team. The programme was implemented in the form of training meetings with strict adherence to the chain of command among employees. In general, the corrective psychological programme was designed to include one introductory meeting with group interviewing on communication problems with paediatric patients and their parents, 12 formative meetings and one final meeting, where respondents were given recommendations to reduce psychophysiological exhaustion in their work. Meetings with the respondents were held twice a month, with mandatory subordination. The survey of healthcare workers was conducted online, which helped to minimize the influence of external factors on the respondents' opinions. The questionnaires "Scale of subjective well-being" (n.d.) by G. Perué-Badou (adapted by M. Sokolova) and the Express questionnaire "Index of tolerance" (Soldatova *et al.*, n.d.) were used to diagnose the components of successful communicative tolerance of medical professionals. At the same time, in the course of the study, individual meetings and ongoing questionnaires were provided for medical staff, which helped to determine their personal attitude to work and communication with colleagues, emotional comfort and motivation in their professional activities.

During the pilot study, an anonymous online survey was also conducted among hospital patients, which was created on the basis of Google Forms software and distributed through printed advertisements with a QR code placed in the hospital (Assessment of the quality…, 2023). To track the dynamics of improving the communication skills of healthcare professionals, the responses of 74 people who visited the hospital repeatedly during the pilot study and filled out the survey form twice were taken into account and analysed. Technical devices (computer, tablet) were used to implement the experiment, including completing the survey, processing the data, and evaluating the results of the study. For the current interviews, questionnaires and observations, appropriate forms were developed. The hypothesis was tested using the statistical software "SPSS v. 16.0" and was based on the identification of correlations between the data obtained, which were calculated using the Pearson's parametric criterion. During the survey, the interviewer followed the European Commission's guidance note (2021) on ethics and data protection and the principles of the Helsinki Declaration (2013). All procedures conducted in research involving people complied with ethical standards, did not violate the honour and dignity of respondents, and were conducted with the results anonymous.

RESULTS

The modern approach to treatment involves a combination of three aspects of therapeutic influence, including psychological, biological, and social. In this case, the evaluation of the treatment process is subject to the criteria of recovery, improvement, deterioration, or unchanged condition. At the same time, the treatment process is accompanied by a number of psychological phenomena that are related to the personal characteristics of the patient, the doctor, and the treatment methods chosen by him/her. Modern research indicates that, for the most part, psychological interaction between a doctor and a patient occurs spontaneously, and their communication depends on a specific situation where there is a possibility of a lack of contact (trust) between them (Wang *et al.*, 2022; Lu *et al.*, 2023; Wang *et al.*, 2023). This has a negative impact on the information content of the patient's medical history and the outcome of treatment. It should also be borne in mind that a prerequisite for a positive doctor-patient relationship is the qualifications and experience of a medical professional. However, this is only a tool for proper treatment, while building trust in the doctor is a key point in this process.

A patient's willingness to cooperate with a doctor is subject to his or her previous experience, compliance with expectations regarding the doctor's appearance, professionalism, interest, emotionality, and motivation in providing care. The combination of these factors produces patient compliance, when the patient follows the doctor's recommendations (behaviour and responsibility in treatment). In general, in the analysed scientific publications, trust in the social life of citizens is divided into two types: interpersonal, as a result of the social order, and institutional, which is the result of economic codependence and professionalization of the individual (Rasiah *et al.*, 2020; Aremu *et al.*, 2022). This implies, on the one hand, adherence to common norms and values in social interaction between people, and on the other hand, integration of social ties through information, material, or psychological resources.

For the healthcare sector, the concept of trust is characterized by an indicator of support for transformation processes in the digitalization of the medical system and personal changes in people, where their behaviour in real-life situations of choice is formed (Swash, 2022). In addition, the understanding of trust as a key feature of doctor-patient interaction is based on a sociological approach, in which treatment involves not only determining its direction, but

also the patient's acceptance and use of healthcare services, including the ability to influence the patient's behaviour in the treatment process (Blendon & Benson, 2022). Despite the autonomy in making treatment decisions, the patient relies on the competence of the doctor and the correctness of the treatment methods determined by him/her, which also involves their joint actions to find and implement rational treatment methods (Keshavarzi *et al.*, 2022). The combination of personal qualities of a doctor in the context of his/her moral and ethical beliefs, proper professional training, professional skills, independence, and responsibility in decision-making, as well as the ability to adequately assess the patient's condition (psychological, physical), be understandable, attentive, accessible, communicative, and tolerant allows him/her to build a trusting relationship with the patient (Rasiah *et al.*, 2020).

In the course of treatment, the physician should pay special attention to the patient's family members, who should receive full information about the health status of their loved one. However, the key point in this matter is the dosage of information in situations of uncertainty (coma, severe injuries, etc.) or the inability to predict the outcome of treatment (oncology, surgery, etc.). At the same time, there are cases when the patient is unable to provide complete information about the disease (seizures, stroke) or its course, so the doctor needs to contact a third party (spouse, parents, children, neighbours, eyewitnesses) to clarify the information. The data obtained from third parties about the patient's health status will help to supplement the medical history (Eggleton *et al.*, 2022). The main principle of interaction between the doctor and the patient's relatives is based on practical mutual trust, where an individual approach to patient treatment promotes honest answers and conscientious compliance with treatment recommendations.

Communication with the patient's relatives is not just an exchange of information, but involves their involvement in the therapeutic process. In this case, the interaction between the doctor and relatives is based on support, understanding, respect, compassion, and cooperation. This is especially important in the context of communication with paediatric patients and their parents, as interaction with a child in a healthcare facility is different from interaction with adults. Examination and hospitalization of paediatric patients requires establishing confidentiality and trust with them and their parents (guardians), and involves creating an atmosphere of calm and appropriate communication with due regard for the child's age-related development. This necessitates the development of the doctor's knowledge of the psychological development of the individual from birth to puberty (Nuñez *et al.*, 2022). Communication with a child is determined by the conditions of his or her psychological state at the time of the first contact, when the doctor needs to determine the health status of the paediatric patient, the nature, and type of the disease, and the intensity of clinical symptoms.

The analysed scientific approaches to the psychology of interaction with children in the therapeutic process show that children's fear is associated with the fact of staying in hospital, in particular, due to unknown scenarios or painful diagnostic or treatment processes (Keshavarzi *et al.*, 2022; Eggleton *et al.*, 2022; Paley & Hajal, 2022). Healthcare professionals need to eliminate this fear at the stage of getting to know the child, as this will serve as a key to establishing a trusting relationship. This can be done through a friendly and calm tone, non-verbal communication, and engaging the child's attention in the therapeutic interview process through playful activities. It is also important to avoid talking about the child's illness with outsiders in the child's presence. At the same time, the specifics of the holistic concept of interaction with paediatric patients are based on communication with family members, which requires consistency, humanity, professional behaviour and listening skills from the doctor. For young children, interaction with the doctor takes place playfully using non-verbal communication through facial expressions, gestures, and palpation. Paediatric patients with hearing impairments, psychomotor disorders, and autism spectrum disorders require special interaction. The doctor needs to communicate with parents or guardians to take a medical history. At the same time, the information provided by the doctor to parents should be clear and understandable, taking into account their psycho-emotional state.

The empirical study was based on identifying the peculiarities of psychological interaction between healthcare professionals and patients. The first stage involved drawing up a plan and organizational work with the hospital management and its employees. The next step was to determine the current situation regarding the relationships of healthcare workers in teams, their emotional and physical condition, social behaviour, and level of tolerance. Given the data obtained, a psychological programme was developed to develop the communicative tolerance of healthcare workers, including improving their communication skills and reducing problem situations and disagreements in teams. Indicators of the overall level of subjective welfare of healthcare workers according to the "Scale of subjective well-being" (n.d.) before and after the experimental work are presented in Figure 1. The results of the study indicate an increase in the level of psychological well-being of healthcare workers after completing the correctional programme, which indicates the need for ongoing psychological support for healthcare workers. The current interviews revealed that seven doctors sought psychological help due to a loss of motivation in their professional activities. In particular, individual interviews with respondents indicate that along with experience comes professional exhaustion, when certain factors (low salaries, lack of social and legal security, workload) contribute to professional burnout and emotional imbalance. Many respondents value the support of their close environment, but a decrease in psychological stability leads to conflict behaviour, which eventually transforms into aggression.

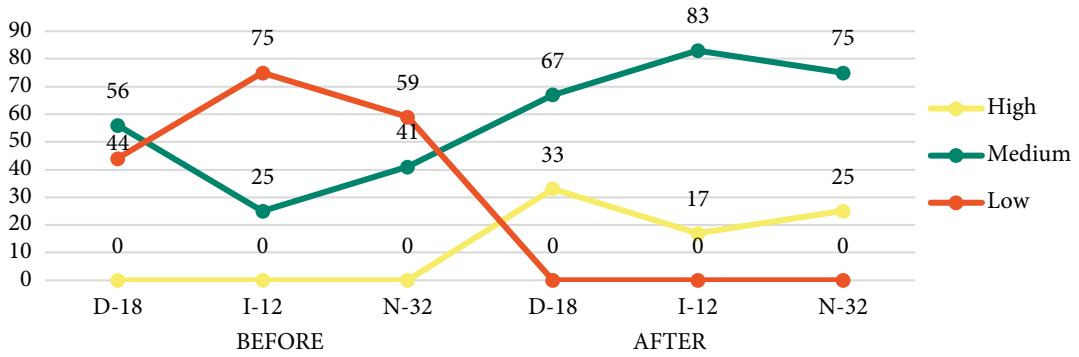

Figure 1. Analysis of the results of the level of psychological well-being of respondents before and after the implementation of the psychological programme

Source: compiled by the authors

The respondents noted that the feeling of loneliness in everyday life also affects their professional activities, in particular, in communication with patients. This problem is particularly acute when interacting with adolescents undergoing treatment and parents of younger patients. In addition, the assessment of each individual cluster using this methodology revealed that at the beginning of the pilot study, tensions in professional activities among respondents in groups I-12 and N-32 (interns and nurses) created a need to avoid any interaction with others. Interviews with respondents in these groups show that in their social life (outside of working hours) they sought to be alone and avoided communication with friends and relatives. In the course of the psychological programme, these indicators changed. The highest resilience of psychological and physical health was recorded among doctors, while the indicators of interns and nurses were in some points opposite. A more visual analysis of the results by the criteria of the subjective well-being assessment scales is presented in Table 1.

Table 1. Analysis of the results of respondents' psychological well-being by clusters (scales) before and after the experiment

Cluster		Tension and sensitivity, %			Psychiatric symptoms, %			Mood changes, %			Importance of the social environment, %			Self-assessment of health, %			Satisfaction with everyday activities, %		
	Group	D-18	I-12	N-32	D-18	I-12	N-32	D-18	I-12	N-32	D-18	I-12	N-32	D-18	I-12	N-32	D-18	I-12	N-32
Before	Low	17	0	0	33	0	3	33	0	6	44	50	63	33	67	56	39	83	47
	Medium	28	33	25	44	17	47	56	67	69	33	33	31	22	25	31	56	17	44
	High	56	67	75	22	83	50	11	33	25	22	17	6	11	8	13	6	0	9
After	Low	22	0	6	78	8	9	67	33	38	6	0	0	11	8	6	11	8	9
	Medium	72	83	81	22	83	75	33	67	63	44	67	63	33	75	81	56	67	75
	High	6	17	13	0	8	16	0	0	0	50	33	38	22	17	13	33	25	16

Source: compiled by the authors

The diagnostics carried out using the method of subjective assessment of psychological well-being shows that the emotional and physical state of healthcare workers affects their professional activity. However, it is still important to understand the level of tolerance of medical professionals. To diagnose the degree of tolerance of doctors, a survey was conducted using the Express questionnaire "Index of tolerance", which allowed determining the overall tolerance index of respondents (Soldatova *et al.*, n.d.). An analysis of the results of the tolerance index before and after the experiment is presented in Figure 2.

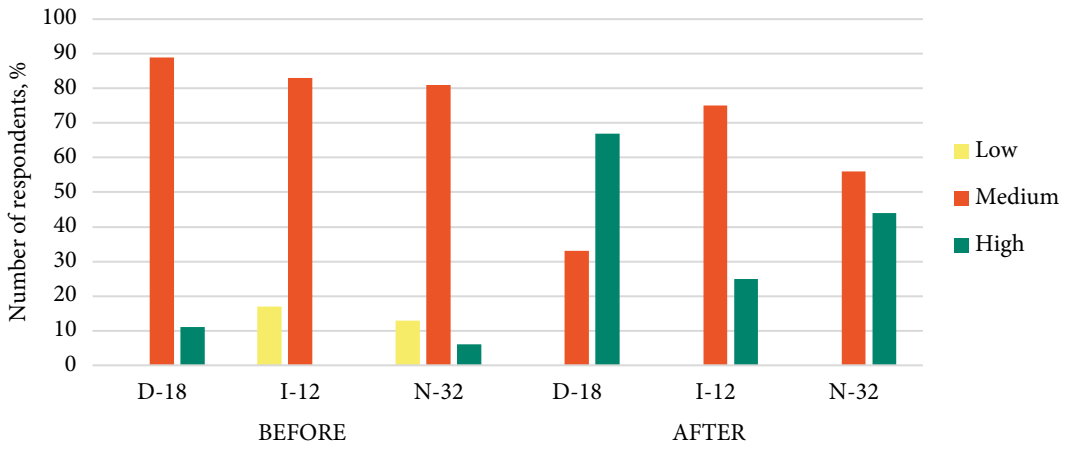

Figure 2. Analysis of the results of the respondents' tolerance index before and after the implementation of the psychological programme

Source: compiled by the authors

The determined indicators of tolerance indicate an increase in the level of tolerance of the respondents after completing the psychological program. The current interview showed that among the respondents of group I-12 (interns), the low rate at the beginning of the experiment reflected the inability to communicate tolerantly with patients due to a lack of understanding of their psychological state, in particular, due to a lack of experience in communicating with different types of patients. At the same time, the low level among the respondents of group N-32 before completing the psychological program is explained (according to interviews with respondents) by exhaustion in professional activities. That is why it is expedient to consider not only the index of tolerance of respondents, but also the level of formation of tolerance according to ethnicity and social affiliation, as well as a personal trait of a person. These data are clearly presented in Table 2.

Table 2. Analysis of the results of respondents' tolerance indicators before and after the experiment

		Ethnic tolerance, %			Social tolerance, %			Personal tolerance, %		
	Group	D-18	I-12	N-32	D-18	I-12	N-32	D-18	I-12	N-32
Before	Low	0	17	13	11	33	19	6	17	19
	Medium	83	67	78	89	67	81	89	83	75
	High	17	17	9	0	0	0	6	0	6
After	Low	0	0	0	0	0	6	0	8	6
	Medium	61	75	75	83	67	72	78	75	81
	High	39	25	25	17	33	22	22	17	13

Source: compiled by the authors

The survey results indicate that it is possible and necessary to influence the level of tolerance of healthcare workers, as it ensures the stability of their interaction with patients. In addition, the results of the current interviews show that targeted influence on the personal qualities of the respondents helped to improve relationships in the team. At the same time, respondents noted an improvement in responses to patients' destructive behaviour during the psychological programme (adolescents ignoring the rules of rest, parents self-medicating their children during hospital stays). Medical specialists point out that instead of feeling aggressive in such situations, they have begun to understand the peculiarities of people's behaviour and have improved their communication with puberty-age children and parents who are in hospital with their children. In general, the implemented programme indicates a decrease in conflict in the team, as well as an increase in tolerance, motivation, and interest in the professional activities of medical professionals. This is especially true for the younger generation of respondents, among interns and nurses who have just begun to gain professional experience in practice. To test the hypothesis about the relationship between the psychological well-being of healthcare professionals and their tolerance in communicating with colleagues and patients, a correlation analysis was performed using the Pearson's method, which was calculated in the statistical data processing software SPSS v. 16.0. The results are presented in Table 3.

Table 3. Correlation between the components of psychological subjective well-being of respondents and tolerance

	D-18, M=29.8, SD=6.8			I-12, M=32.4, SD=8.2			N-32, M=30.4, SD=7.2		
	Ethnic tolerance, M=6.3, SD=2.5	Social tolerance, M=11.2, SD=2.2	Personal toler., M=12.3 SD=5.4	Ethnic tolerance, M=8.1, SD=3.2	Social tolerance, M=11.4, SD=2.9	Personal toler., M=12.9 SD=2.1	Ethnic tolerance, M=8.6, SD=2.7	Social tolerance, M=14.4, SD=2.6	Personal toler., M=7.4 SD=1.9
Tension and sensitivity	0.06	0.142*	0.194*	0.34	0.164*	0.163*	0.32	0.144*	0.162*
Psychiatric symptoms	0.04	0.185*	0.184*	0.361*	0.164*	0.157*	0.46	0.182*	0.249*
Mood changes	-0.026	-0.004	-0.003	-0.022	-0.006	-0.006	-0.009	-0.004	-0.029
Importance of the social environment	0.062	0.82	0.72	0.05	0.74	0.72	0.64	0.58	0.62
Self-assessment of health	0.24	0.13	0.12	0.24	0.14	0.13	0.13	0.24	0.24
Satisfaction with everyday activities	0.05	0.74	0.058	0.84	0.74	0.84	0.82	0.022	0.76

Note: n is the number of respondents in the group; zeros in omission values; * – significance correlation at the $p \leq 0.05$ level, where p is the significance level; M – mathematical expectation SD – standard deviation
Source: compiled by the authors

The data obtained indicate a correlation between tolerance indicators and components of respondents' psychological well-being. In particular, the values of social and personal tolerance indicate that respondents experience tension in their professional activities, which affects their psychological stability. At the same time, the same impact was determined by the scale of traits with psychiatric symptoms. These indicators can indicate sleep disturbances, anxiety, and concern, as well as unpredictable behavioural reactions. This is also confirmed by the data from individual interviews with respondents, where, in addition to these deviations, they indicated inattention at work due to sleep problems. It should be noted that the indicators of ethnic tolerance have no impact on the indicators of psychological well-being of the respondents. Also, no statistically significant relationships were found in the components of self-assessment of physical health and mood changes, which may be explained by the respondents' ability to regulate their own negative emotional reactions and restrain them in their professional activities. Thus, the level of psychological well-being affects social tolerance in the study groups. The targeted development of communication skills and social attitudes of the study sample contributed to the conscious formation of positive attitudes among medical professionals towards professional activities, communication with colleagues and patients, as well as the search for ways to create emotional comfort both in the professional sphere and in everyday life.

Determining the impact of psychological well-being and tolerance contributed to understanding the formation of psychological contact between a healthcare professional and a patient. However, it is still important to assess the communication skills of healthcare staff by patients themselves (parents/guardians). At the beginning of the study, a survey was developed to assess the quality of medical services provided by doctors in certain departments in the context of a psychological approach, including the issues of interaction with hospital staff and patients' repeated treatment (Assessment of the quality…, 2023). At the end of the psychological programme for hospital staff, the questionnaire was closed, and the collected results were processed manually. The responses of patients who repeatedly visited the hospital during the seven months of the pilot study were significant, and their responses (before and after the implementation of the psychological programme) were evaluated as a criterion for the dynamics of the process of transformation of the communication competence of medical professionals. The analysed results indicate that, in the parents' opinion, during this time, medical professionals have become more friendly and patient with repeated questions about diagnosis and prescribed treatment. Patients also noted the absence of conflicts between nurses (who used to settle interpersonal relations in the presence of patients, which frightened children). At the same time, patients noted that the interns had become more interested in communication and more open to discussing patients' emotional experiences. As for the doctors, parents (guardians) noted their involvement in communication with paediatric patients, as opposed to only communication with adults. Thus, the results confirm the positive dynamics of the development of healthcare professionals' communicative tolerance. The questionnaire form for patients with the options for completed answers is presented in Table 4.

Table 4. Results of a patient survey on assessing the quality of psychological interaction with healthcare professionals in hospitals during the first and repeated visit

Question	Responses of patients at the first visit	Amount, % (first time)	Responses of patients at repeated visits	Quantity, % (second time)
Have you applied to our institution before?	No	100	Yes	100
Are you a patient or relative of a patient?	I am with my child	100	I am with my child	100
Rate your impression during admission to the hospital (reception department)	Satisfied	50	Completely satisfied	64
	Not satisfied	50	Satisfied	36
Describe what exactly you liked/didn't like in the reception department	Liked: speed, analyses on the spot	42	Liked: politeness, speed of acceptance	45
	Disliked: rude doctor, carelessness of nurses	58	Disliked: the doctor's inattention, intolerance to understanding the diagnosis	55
In which department did you receive medical care?	General paediatrics	60	General paediatrics	60
	Surgery	18	Surgery	18
	Cardiorheumatology	22	Cardiorheumatology	22
How long were you in the hospital?	Less than a week	74	Less than a week	80
	More than a week	26	More than a week	20
Did you receive the full treatment?	Yes, but the medicine was purchased independently	100	Yes, but the medicine was purchased independently	100
How would you rate the work of the doctors in the department (from 0 to 10, where 0 is negative and 10 is very good)?	3-7	100	7-10	100
How would you rate the work of nurses in the department where you were (from 0 to 10, where 0 is negative and 10 is very good)?	2-8	100	4-10	100
What kind of relationship did you have with the attending physician?	I partially agree with the treatment	60	I completely agree with the methods of treatment	84
	At first there were doubts, but the treatment helped	40	At first there were doubts, but the treatment helped	16
Was the doctor attentive to your questions and desire to get more information about the disease and treatment?	Yes	45	Yes	82
	No	55	No	18
Did you feel discomfort while talking to the doctor?	Yes	42	Yes	7
	No	58	No	93
Was the medical staff polite?	Yes	34	Yes	86
	No	66	No	14
Have you noticed corruption in a health care institution?	No	100	No	100
Would you advise your friends to go to the hospital if they had such a need?	Yes	50	Yes	93
	No	50	No	7

Source: compiled by the authors

Thus, the successful performance of a doctor is interdependent on his or her communication skills. Gaining practical experience, a doctor should improve professional communication and turn the skills into an internal need for a person to perfectly master the technique of interaction with patients. This also allows the doctor to regulate the intensity of emotional contacts with patients or their relatives and increase emotional involvement at significant stages of diagnosis and treatment. At the same time, each clinical case leaves a certain imprint on the doctor's ability to conduct medical interviews, which allows him or her to deepen their knowledge in communicating with patients, determining the aetiology of the disease, its pathogenesis, diagnostic methods, and treatment options.

DISCUSSION

Communicative tolerance is an important component of a medical professional's professional competence. The ability to establish a trusting relationship with patients allows the doctor to build an effective treatment strategy and ensure mutual understanding during this process (Lu *et al.*, 2023). A sign of psychological contact with the patient is that the

patient will not doubt the correctness of the diagnostic and treatment tactics and will follow the doctor's prescriptions. At the same time, the lack of trust in a doctor or its loss during treatment increases the likelihood of patients self-medicating or turning to alternative medicine, which reduces the possibility of timely intervention, disease control, and recovery in general (Keshavarzi *et al.*, 2022).

The analysed studies by T.O. Aremu *et al.* (2022), K. Eggleton *et al.* (2022) and S. Potthoff (2022) show that for effective professional activity in the context of healthcare, the most important traits for a doctor are sincerity, responsibility, tolerance, empathy, dedication, perseverance, and initiative. At the same time, the opposite of these traits or their insufficient formation makes any activity of a healthcare professional impossible. Indifference to patients not only complicates the interaction for the treatment outcome, but also affects the effectiveness of the doctor's professional activity in general. This also correlates with the results of the empirical study. At the beginning of the experimental work, there was a low interest in communicating with patients, which created a sense of indifference to the health of patients. However, in the course of the study, it was determined that the psychological well-being of healthcare workers affects their professional activities, and involvement in the process of communication with parents of paediatric patients gradually began to increase when issues of interaction in the team (conflict) were resolved. In addition, individual interviews with respondents after analysing the observation of their activities helped to resolve personal issues related to motivation and exhaustion in the professional sphere.

Exploring the issue of doctor-patient communication, Y. Wang *et al.* (2022) highlight the need to comply with ethical standards in the professional activities of a doctor. In particular, the researchers emphasize that a doctor should prevent possible conflicts in interaction with a patient, the emergence of informal relationships with him/her, and remain within the framework of his/her professional role in unforeseen situations. J. Du *et al.* (2022) and K. Hanley *et al.* (2019) point out that some medical specialities do not require a high level of empathy or communication skills, in particular, for radiologists, laboratory technicians, pathologists, attentiveness, and professionalism are important. At the same time, for surgical specialists, diagnosticians, anaesthetists and intensive care specialists, the requirements are to have a high level of professionalism. Studying the issue of developing communication skills in future doctors, the authors emphasize that the work of a paediatrician, oncologist, therapist, dentist or traumatologist involves long-term communication with patients, which places demands on their communication tolerance. At the same time, studying the problem of outpatient treatment, J. Mallonee *et al.* (2022) note that compliance with rules, prescriptions, and certain schemes in the treatment process, including surgery, does not exempt the doctor from personalizing therapy for each individual patient and necessitates the selection of an individual style of communication with them.

According to S. Timotheou *et al.* (2023), the rapid digitalization of many areas of society requires young professionals to acquire information skills for distance learning and work. Yet, studying the problem of introducing information technologies into the educational process, the authors note that a significant drawback of the digitalization of the modern educational system is the reduction of social interaction and communication among the younger generation, which negatively affects the formation of students' professional communication experience. The study by M. Diachenko & T. Zakusilova (2020), A. Raza & N. Hussain (2022) on the professional training of medical specialists in the modern educational system indicates that the doctor's consideration of psychological factors in interaction with the patient helps to adequately assess the effectiveness of treatment and predict the further course of the disease. Similar conclusions can be seen in the study by S. Elnikety *et al.* (2022), where the authors point out that the success of therapy is based not only on the professional knowledge and skills of the doctor, but also on his/her communication skills, morality, and ethics. Studying the process of training future surgical doctors, the authors emphasize that in the modern educational system, the need to purposefully develop communicative tolerance in future specialists is a problem. These conclusions also correlate with the findings of the empirical study, which indicates that interns have insufficient experience of communication skills. At the beginning of the study, it was noted that several interns did not have formulated knowledge of psychological interaction with patients, which affected communication with them. In particular, the respondents of the interns' group had gaps not only in the development of communication skills, but also in tolerant behaviour and communication. The implemented psychological programme helped to unlock their potential in the context of psychological interaction with patients. The developed skills of communicative tolerance made it possible to communicate with paediatric patients and their parents without tension and fear. This demonstrates the effectiveness of the programme developed to improve communication skills among hospital staff.

In Ukrainian society, the specifics of providing the population with medical care are enshrined in legislation. According to the Law of Ukraine "Basics of Ukrainian Legislation on Health Care" (1992), the key aspects of providing medical care to the population are compliance with the principles of ethics, deontology, and medical confidentiality. In addition, the Law emphasizes the need to continuously improve the level of professional knowledge, skills, and competence, including digital competence. It provides for the implementation of diagnostic, medical, rehabilitation or preventive work through online patient consultation with the possibility of transferring images (CT, MRI), test results or other examinations to the doctor and maintaining confidentiality. At the same time, the digitalization of the healthcare system contributed to the creation of an electronic system of pre-medical interaction between a

patient and a doctor or a healthcare facility by connecting them to eHealth.

Global practice also shows the introduction of digital technologies in the healthcare system. In particular, in the Netherlands, the government encourages the population to use digital applications for healthcare and patient support (Government of the Netherlands, n.d.). This became especially important after the COVID-19 crisis and contributed to the active implementation of the latest solutions and technologies: from blood pressure monitors to special applications that can track health indicators and human activity. Active digitalization in the Spanish healthcare sector is also driven by the coronavirus crisis (Junyent, 2022). At the end of 2020, the government introduced a digital health strategy. In a few years, it has reached the stage of introducing telemedicine (online) in primary care. In addition, electronic medical records provide medical professionals and citizens with access to the necessary clinical documentation (while maintaining confidentiality). At the same time, the country does not have a specific law regulating the digital healthcare system, but there are provisions on clinical information and patient records regulated by the Spanish jurisdiction. In the United States, the digitalization of healthcare services is based on government financial support, the need for transparent and accessible patient records, the need to improve healthcare delivery, and the transformation of services from an economic (volume/cost) perspective (Keen, 2018). At the same time, for the country, the use of digital technologies in the healthcare system involves monitoring the quality of clinical services and improving medical support for patients.

The issue of information technology plays an important role in the German healthcare system (Olesch, 2023). The government has introduced a strategy with updated goals and deadlines, including the creation of an electronic medical record for citizens with public health insurance by 2026; a digital medication review service should be introduced for patients on medication to avoid uncontrolled medication. The strategy also provides for research projects by the institution. In addition, an electronic prescription will be a mandatory standard for providing medicines to patients, and patient treatment programmes should be supplemented by special digital programmes. In contrast to other countries, Switzerland is moving slowly in the digitalization of healthcare services (Müller *et al.*, 2021). However, it is the benchmark for European countries in the use of digital technologies in the healthcare system. In the digitalization of services, the government has focused on a high level of patient data security and interoperability of services. In particular, the online patient medical card displays medical documents in various formats (pharmacy prescriptions, X-rays, vaccination information, hospital discharge forms, etc.) that the patient can use at any time, including providing access to a medical professional. Automated workflows facilitate targeted medical activities in the system of doctor-patient interaction.

The empirical study correlates with the analysed scientific works, which indicate the need to improve the communication competencies of healthcare professionals for successful doctor-patient interaction. The results of the study also correlate with the findings of S. Rasiah *et al.* (2020) and K. Eggleton *et al.* (2022), which focus on the need to study the issue of psychological support for healthcare professionals, patients, and their families in crisis situations. In particular, healthcare professionals need psychological support in the workplace. The results of the pilot study indicate that the psychological well-being of healthcare professionals and their tolerance in dealing with patients are interdependent. These findings also correlate with the studies of R.J. Blendon & J.M. Benson (2022), A. Madsgaard *et al.* (2022), which indicate the need to improve the emotional stability of interns and nurses with little experience of interacting with patients. The inability to establish psychological contact with a patient reduces confidence in the doctor's professional competence. At the same time, the targeted development of professional communication and tolerance skills can ensure the transformation of personal qualities necessary for the successful performance of a doctor and his/her interaction with colleagues and patients.

CONCLUSIONS

The doctor's interaction with patients is based on his/her knowledge of the psychology of personality and human behaviour, and is also realized through the ability to establish contact, listen attentively, show non-verbal communication, formulate the right questions and direct the conversation in the direction necessary for treatment. In addition, the professionalism of a healthcare professional is not limited to knowledge of physiology, but also requires the ability to advise the patient (parents/guardians, relatives) in accordance with the principles of bioethics and deontology. Adequate communication in the context of medical interaction can only take place if the doctor is able to control his or her own emotional and behavioural reactions, regardless of the patient's psychological state. This is due to the developed communicative tolerance, where a medical professional shows a lenient attitude to the individual characteristics of patients, their qualities, actions, or habits.

The empirical study was conducted with the participation of doctors, nurses, and interns at the CNE Kyiv City Children's Clinical Hospital No. 1. Medical professionals from the departments of general paediatrics, surgery, and cardiorheumatology were invited to participate in the study. The number of respondents was 62 people aged 20 to 56 years. At the beginning of the study, a hypothesis was formulated to determine the impact of the level of psychological well-being on the communicative tolerance of medical professionals. In the course of the experimental study, this assumption was partially confirmed. None of the analysed clusters of psychological well-being has an impact on the ethnic tolerance of respondents. At the same time, the dependencies of the components of tension in professional activity and psychosomatic deviations that affect the personal and social tolerance of

the respondents were identified. In particular, in practice, this is manifested in indifference to the psychological state of patients and intolerance to their characteristic features.

The data obtained helped to clarify the subjective feelings of doctors about the work they do, the presence of psychosomatic disorders, emotional stability, their place in the team, as well as the correspondence of physical health and satisfaction with their own activities in general. The developed psychological programme proved to be effective in building the communicative tolerance of healthcare workers, in particular, it helped to improve communication skills and reduce the number of problematic situations and disagreements in teams.

Studying the world experience of doctor-patient interaction in a psychological context has made it possible to reveal the peculiarities of communication between medical professionals in their professional activities and to identify ways to improve the communicative tolerance of healthcare professionals. A promising area for further research is the analysis of the deontological approach to providing medical care to patients with inclusion. The obtained results of the study and the conclusions formed on their basis are significant for the administrations of health care institutions and psychological workers as a tool for controlling the problems of communicative tolerance of medical staff.

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CONFLICT OF INTEREST

There is none.

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Тетяна Дмитрівна Щербан
Доктор психологічних наук, професор, ректор
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
https://orcid.org/0000-0002-3702-8029
Тиберій Тиборович Долинай
Аспірант
Мукачівський державний університет
89600, вул. Ужгородська, 26, м. Мукачево, Україна
https://orcid.org/0009-0008-3256-8932

Психологія взаємодії лікаря та пацієнта в контексті комунікативної толерантності медичного фахівця

Анотація. Актуальність дослідження зумовлено потребою віднаходити шляхи забезпечення якісної взаємодії лікаря та пацієнта в контексті комунікативної толерантності медичного фахівця. Метою наукового дослідження було визначити психологічні особливості міжособистісних відносин лікаря та його пацієнтів. Фундаментом теоретико-методологічного підходу стало якісне поєднання методів структурно-функціонального аналізу проблеми психологічної підготовки медичних фахівців та аналітичного дослідження з питань формування конструктивних взаємовідносин між лікарем та пацієнтом. Проведено кілька опитувань щодо толерантності працівників медичної сфери та їхнього емоційного добробуту в контексті індивідуально-психологічних особливостей. Представлено результати, які відображують методи впливу лікаря на психологічний стан пацієнта та його родини. Висвітлено питання, як формується довіра до лікаря та його фахових компетенцій. Розкрито проблему етичних принципів, професійної мотивації медичних фахівців та специфіки їхнього спілкування в колективі. З'ясовано суб'єктивні переживання медиків щодо виконуваної роботи. Розкрито питання модернізації медичної освіти та цифровізації послуг. Визначено умови, компоненти й підходи ефективної взаємодії лікаря та пацієнта в системі охорони здоров'я. Деталізовано проблеми розробки діагностичного інструментарію з питань оцінки психологічного стану медичного працівника в його фаховій діяльності. Проведено експеримент, який дав змогу обґрунтувати необхідність впроваджувати програми підвищення комунікативних навичок медичних працівників, зокрема й лікарів-інтернів та медичних сестер. Практична цінність отриманих результатів науково-дослідної роботи полягає в можливості використати окреслений підхід для вдосконалення методів підвищення комунікативних компетенцій лікарів у професійній діяльності

Ключові слова: емоційна стабільність; комунікативна толерантність; професійна мотивація; моральність; медична етика

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Valery Patonich*
Master
Institute of Eating Disorders Therapy
04071, 39V Yaroslavska Str., Kyiv, Ukraine
https://orcid.org/0009-0009-0787-6367

Actual problems of eating disorders and ways to solve them

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*Corresponding author

Abstract. As eating disorders become more and more common, it is necessary to understand the influence of modern life factors on the formation of these diseases in order to develop more effective strategies for their prevention and treatment, so the purpose of this study was to systematically examine the sociocultural and psychological factors of eating disorders. Two key methodological approaches were used to study the social and underlying psychological factors of these disorders: sociocultural and psychoanalytic. The empirical basis of the study is based on the interview method. Social factors, in particular media influence, determine the formation of eating disorders, especially among women, through the creation of negative standards of beauty and bodily satisfaction. Based on interviews with people with eating disorders, it was found that the underlying psychological factors of these disorders are mainly focused on intrapersonal aspects, such as the perception of food and one's own body, emotional sphere, and self-esteem. At the same time, interpersonal factors related to interaction with the environment have a lesser impact. These factors can lead to the development and complicate the course of eating disorders, so it is important to work with psychological aspects for effective treatment. It is substantiated that psychodynamic and Gestalt therapy are effective treatment methods aimed at resolving mental conflicts. Both approaches use a variety of methods, including dream analysis and fissiotherapy, to help patients understand and resolve their emotional and behavioural interactions with food. The practical value of the study is that its results highlight the need to use psychodynamic and Gestalt approaches in therapy, which can address the underlying psychological and emotional factors of eating disorders. The study can be applied in the activities of institutions specializing in the treatment of eating disorders

Keywords: bulimia nervosa; anorexia nervosa; media; psychodynamic therapy; gestalt therapy; fissiotherapy

INTRODUCTION

Eating disorders (EDs) affect at least 9% of the world's population, which indicates the wide scale of the problem, making it one of the most pressing in modern society. In today's society, eating disorders are serious pathologies that negatively affect not only mental but also physical health. This is due to the fact that this disorder has a destructive effect on nutrition, which is one of the main components of the body's normal functioning. People with EDs are often diagnosed with other mental health problems, such as depression, anxiety, and personality disorders. ED can lead to serious health problems such as cachexia, osteoporosis, heart and vascular problems, and suicide. Given these serious consequences, two important aspects are relevant. Firstly, given the complexity of treating these disorders, there is a need for a detailed systematization of the factors of ED, which are both social and psychological in nature. Secondly, there is a need to analyse the latest methods of treating ED, with an emphasis on in-depth study of the factors that trigger the disorder. Over the past three years, the problem of ED has been a rather high level of

intensity in the Ukrainian scientific community, which can be seen in the large number of publications. Therefore, the literature review will focus on publications that are most relevant to this study.

EDs are among the most deadly mental illnesses, second only to opioid overdose (Arcelus *et al*., 2011; The Social and…, 2020). Researchers M. Saliuk & L. Butenko (2021) conducted a theoretical analysis of the scientific literature on the problems of substance use disorders among adolescents and young people. During the analysis, they theorized the roots of eating disorders and body image. The results of their study revealed the following features of the relationship between eating disorders and subjective well-being among adolescents and young people: the higher the level of conscious self-regulation, the more confident the person feels, accepts their body, which is accompanied by an increased level of subjective well-being; the ability to regulate one's own behaviour and emotions affects not only overall well-being but also the form of eating behaviour. The skills of independence, objective assessment of situations and conditions, calm acceptance of changes and quick adaptation are essential for satisfaction with one's body image. The study conducted by V.M. Teslyuk & T.V. Kulibaba (2023) aims to empirically study the main causes of disordered eating and psychological aspects of eating behaviour among women. The study involved 42 women aged 22 to 45 who voluntarily participated in the research. Participants were selected based on criteria such as gender, age, physical and mental health. The results of the pilot study confirmed that most women have insufficient control over what and how much they consume. A quarter of women are prone to stress eating, and slightly more than a third of respondents tend to overeat in company. The study also revealed a high level of body dissatisfaction among the majority of participants. A third of women have a moderately high level of body dissatisfaction, while a fifth of respondents has a moderate level of dissatisfaction. Researchers T.O. Serha & M.V. Bilousenko (2022) also studied eating disorders in women. Analysing these disorders and their consequences, it can be determined that middle-aged women, against the background of general imbalance and tension, experience interpersonal and intrapersonal problems. In particular, this includes misunderstandings with loved ones, conflicts in the family and with friends, failure to realize dreams and plans, fears, low self-esteem, anxiety, constant stress and other psychological disorders.

The study conducted by N. Karvatska (2022) aimed at analysing the peculiarities of students' eating behaviour during forced social isolation caused by the COVID-19 pandemic and indicates a close connection between these peculiarities and the psycho-emotional state of students. In 2021, in compliance with the principles of bioethics and deontology, an intensive comprehensive examination of 60 3rd and 4th year medical students aged 19 to 22 (21 men and 39 women) was conducted. The Dutch Eating Behaviour Questionnaire (DEBQ) and the Food Addiction Questionnaire were used to study students' eating behaviour. It was found that 84.61% of overweight people considered their diet to be irrational. In 36.17% of people with normal body weight, eating disorders were found, mainly of the emotional type. In the group of overweight people, eating disorders were found in 92.31% of students, with all types of EDs observed. Researcher L.M. Absalyamova (2021), basing on theoretical development, analysed studies that examined the effectiveness of cognitive behavioural therapy for body image in the form of individual therapy, group therapy and self-controlled programme. It is noted that the following positive changes have been identified among the results achieved: an increased sense of satisfaction with one's own body and reduced preoccupation with appearance; a decrease in the feeling of stress on body image; a decrease in avoidant and compulsive behaviour; and the accumulation of positive aspects in such areas as self-esteem, social functioning, romantic experience, depressive symptoms and eating behaviour in general. Thus, research by Ukrainian scientists is mainly focused on specific population groups: adolescents, young people, and women. Therefore, there is a need for a more comprehensive study of EDs, taking into account all population groups for further comparative analysis. Thus, the purpose of this study is to comprehensively consider the negative impact of socio-cultural and psychological factors on ED. The goal involves solving the following tasks: to assess the impact of sociocultural factors on ED in modern society; to identify personal deep psychological factors that affect ED; to develop a recommendation strategy to minimize the impact of deep psychological negative factors that contribute to ED based on relevant psychotherapeutic areas. The scientific novelty of the study lies in the fact that the results obtained cover both sociocultural and deep psychological factors of ED, which allows seeing a holistic picture of the problem.

MATERIALS AND METHODS

Two theoretical and methodological approaches were used to study the factors that influence ED, which reveal the social and deep psychological factors of these disorders. The sociocultural approach was used to examine the factors of ED that are intersubjective in nature. The study was aimed at recording both macrostructural and microstructural influences. The macro-structural analysis focused on media and socio-economic determinants of the ED. The microstructural analysis examined the influence of the immediate environment on the development of the ED. Thus, using the socio-cultural approach, it was possible to consider two levels of social influence on the development of the ED: institutional and micro-social. This methodological approach makes it possible to take into account the influence of not only large-scale socio-cultural factors, but also individual interactions and contexts on the development of the chemicals industry. The method of ranking and analysis was used in the selection of literature on the socio-cultural factors of the chemicals industry. The main goal is to identify from the large volume of scientific discourse the thematic units that are most often related to the socio-cultural factors of

ED. This made it possible to identify the main discourse on the socio-cultural factors of ED, which is divided into three areas: the media institution, economic situation, and the role of small groups (family, friends, etc.). Given the existence of the influence of the immediate environment, which was recorded within the framework of the sociocultural approach, it was decided to use a psychoanalytic approach to further elaborate on this determinant. However, it included not only interpersonal interaction (family, friends, intimate relationships), but also internal personal factors of ED. Thus, the use of the psychoanalytic approach allowed combining the sociocultural and psychological contexts, considering not only external factors influencing the development of ED, but also internal psychological mechanisms and personality dynamics. This has contributed to a deeper understanding and more effective intervention in cases of ED.

The study of the deep psychological factors of ED within the psychoanalytic approach is based on the use of the interview method as a tool for obtaining empirical data. In 2023, four anonymous face-to-face interviews were conducted. The study included interviews with people who showed signs of ED. In total, the participants were represented by two men and two women, and they were divided into two groups according to two extreme types of ED: one group with signs of bulimia nervosa (one man and one woman), and the other with signs of anorexia nervosa (one man and one woman). The age of the informants was 41-46 years. That is, the study participants belonged to the middle age category. All ethical standards were strictly adhered to during the study. All participants provided their informed consent and were informed in detail about the purpose and conditions of the study. The study was conducted in compliance with all the rules of the Declaration of Helsinki of the World Medical Association "Ethical principles of medical research involving human subjects" (2008). The structured questionnaire used during the interviews covered various aspects of the participants' lives and psychology related to health and nutrition. The questions were divided into several key subsections, such as "food and body", "family", "friends", "romantic relationships", "sexuality", "emotions", and "self-esteem". The analysis of the data was aimed at identifying key themes and patterns in the interaction between personality and nutrition in the context of ED. The use of open-ended questions during the interviews facilitated deep reflection by participants on their experiences and thoughts, which allowed for a more complete and deeper understanding of their internal state in relation to nutrition and mental health. This study aimed to highlight the underlying psychological aspects of eating disorders and provide a basis for developing effective approaches to support and treatment.

RESULTS

Social factors of ED:
Media, economic situation, close environment

One of the main social factors of the ED is media influence. It consists of two main aspects: "beauty standards" and "diet promotion". In terms of beauty standards, images of the "ideal" body presented in the media can cause body dissatisfaction and contribute to the development of negative attitudes towards one's own appearance. A study conducted by Z. Brown & M. Tiggemann (2022) indicates that there has been a growing interest in studying the impact of celebrities on body dissatisfaction and the development of ED. The researchers conducted a systematic search for research articles on celebrities, body image and ED, using a variety of methodologies such as qualitative analyses, correlational studies, big data, and experimental approaches. The general conclusion of these studies highlights that exposure to celebrity images, appearance comparisons, and the cult of celebrity worship is associated with maladaptive consequences for self-esteem and body image. Frequent advertising of diets and weight loss can also encourage individuals to engage in unhealthy eating behaviours and develop ED. The promotion of the ideal of thinness and the dissemination of slimness values through the fashion world, media, and diet industry have been repeatedly identified as key contributors to the spread of ED (The social and economic cost of..., 2020). This trend is particularly evident among women belonging to specific subcultures where the desire for thinness is endemic, seen as a necessary element for successful career development. The cultural influence of such ideals, which is disseminated through various mass media, actively defines the idea of an ideal figure, and negatively affects self-perception of one's own body. Thus, the constant emphasis on thinness in the media and culture seems to be one of the main reasons for the growing problems of ED (Nasser, 2009). First and foremost, media influence is focused on women. The media actively promotes images of the ideal of thinness for women, and this ideal has become increasingly slim and therefore unattainable for most girls and women since the 1950s. Messages and images that emphasize the importance of appearance and thinness have a negative impact on women's self-esteem, weight attitudes, eating habits and emotional well-being in Western culture. Research shows that the media contributes to the development and maintenance of ED. Thus, it is important to include elements of media literacy, activism, and education in ED prevention and treatment programmes. Given the widespread prevalence of body dissatisfaction and disordered eating among women in society, and the established links between ED and media exposure, professionals, and the public should be encouraged to actively support the dissemination of more positive media messages aimed at improving women's self-esteem (Spettigue & Henderson, 2004).

Socioeconomic factors, according to recent studies, do not have a significant impact on ED. Previously, it was assumed that these disorders were typical of achievement-oriented, high, or middle-class individuals in Western countries. However, new research suggests that ED can be found in different areas of society and in different cultural settings. For a long time, it has been believed that EDs are predominantly found among those with higher socioeconomic status, which may influence their definition

and treatment. However, new research suggests that there is no consistent pattern of evidence supporting a direct link between high economic status and ED. Instead, ED can be observed in a wide range of socioeconomic settings (Pate *et al*., 1992). The close social environment has been found to have a significant impact on ED, with research showing that peers and family influence eating habits, body dissatisfaction, and bulimia in adolescents. The findings highlight how daily social interactions can influence the development of unhealthy eating habits among adolescents and suggest that weight-related problems of parents and peers can be passed on to the next generation of adolescents (Quiles *et al*., 2013). Media exposure is a significant social factor in the development of ED. In particular, the idealization of the body in the media can generate negative emotions and dissatisfaction with one's own appearance, which contributes to the development of negative attitudes towards one's body. In addition, widespread advertising of diets and weight loss methods can cause malnutrition and contribute to the development of ED. It should be noted that socioeconomic factors do not have such a significant impact on the development of ED. These disorders can occur regardless of the socioeconomic status of the individual, indicating the universality of this phenomenon among different population groups. In addition, the presence of a significant influence of the close social environment is emphasized in the context of the development of ED. Interaction with peers and the influence of the family environment may determine some aspects of eating behaviour, body dissatisfaction and the onset of ED symptoms.

Deep-psychological factors of ED: Based on interviews

The first set of interview questions concerned attitudes to food and body among people with bulimia nervosa and anorexia nervosa. In terms of attitudes towards food, people with anorexia nervosa had high standards for "proper" eating and negative emotions associated with eating. Individuals with bulimia nervosa experienced guilt, shame, and negative emotions after binge-eating episodes. Body image perception among the two polar eating disorders also had its own peculiarities. The informants with anorexia nervosa had a high level of body dissatisfaction and increased levels of perfectionism. Individuals with bulimia nervosa experienced stress and anxiety related to weight fluctuations. The informants were further asked questions about family and family relationships. All informants indicated that in their childhood, there were periods of stress or instability in the family that affected their emotional sphere. One informant with signs of anorexia nervosa indicated that her mother paid exaggerated attention to weight, appearance, and nutrition. Regarding the relationship between family relationships and eating disorders, three informants indicated that there was no relationship. Only one informant with anorexia nervosa indicated that she had a desire to meet certain family expectations regarding appearance and behaviour.

Regarding interaction with friends in childhood, three informants indicated that there were no problems. Only one informant with bulimia nervosa mentioned that he was different from his peer group, which had a negative impact on his self-esteem. Current relationships with friends among all four informants are healthy and stable, not affected by their eating disorders, and the friendships themselves do not affect their eating behaviour. No group pressure on the informants was observed. As part of the analysis of issues related to personal relationships, it was noted that interaction with partners in adolescence included critical comments or high standards of appearance, which affected self-acceptance and ED. For female informants, excessive attention to appearance in their first romantic relationships created psychosocial stress and caused a deepening of the disorder. In their current intimate relationships, the informants reported a decrease in criticism from their partners compared to their first relationships. However, a woman with bulimia indicated that her partner had high standards for physical appearance, which created additional pressure and caused stress. A group of questions were also asked about sexuality. The women informants acknowledged that they feel emotionally uncomfortable, stressed, or anxious when thinking about sex, due to their attitude towards their own bodies, especially the informant with bulimia. ED can affect self-acceptance and attractiveness, which in turn can be reflected in attitudes towards sex. Also, according to the results of the interviews, it can be indicated that ED affects the internal acceptance of one's own sexuality, which is more true for women and less for men. A negative sense of one's own body in case of ED directly correlates with the sense of one's own sexuality, which is primarily manifested in uncertainty during sexual intercourse.

As for the emotional sphere related to their own ED, interviewees primarily experience anxiety and stress. Often, they experience constant or periodic anxiety and stress related to pressure about their body, diet, and appearance. Shame and guilt come in second place. The damaged state of health causes shame and guilt, especially after periods of binge-eating or other eating "mistakes". For female informants, the constant negative emotional atmosphere can lead to low self-esteem and a sense of unattractiveness. Three informants indicated that they chose to restrict their diet as a way of controlling their emotions and situation. One male informant indicated that he used food as a mechanism of comfort or distraction from negative emotions. In general, informants reported feeling difficulty expressing their emotions and a general negative emotional background. Negative emotions can create psychological discomfort, which plays a role in the development and maintenance of anorexia nervosa. The self-esteem factor showed that all informants felt low self-esteem, especially informants with signs of anorexia nervosa. Low self-esteem can contribute to the development of eating disorders, especially if a person tries to use eating as a way of control or compensation. An attempt to conform to an idealized picture of oneself leads to severe dietary restrictions. Thus, it is possible to identify a hierarchy of deep psychological factors of anorexia nervosa (Table 1).

Table 1. Hierarchy of deep-psychological factors that affect the development of ED

No.	Deep psychological factors of ED	Interpretation
1	Inadequate attitude to food and body	A person may feel body aversion and view food as an enemy, causing stress and using eating as a control mechanism.
2	Negative emotional sphere	Emotional discomfort, such as stress or depression, can trigger or exacerbate an eating disorder and use food as a coping mechanism.
3	Low self-esteem	Low self-esteem can lead to constant self-criticism and the inability to accept oneself as one is, affecting one's attitude towards food and body.
4	Unhealthy relationships in the family	Family modelling of unhealthy food attitudes and conflict can influence eating disorders through emotional triggers.
5	Bad personal relationships	Eating disorders can cause self-isolation and distance from loved ones, as well as use food as compensation for bad relationships.
6	Problems with sexuality	Sexual discomfort and negative self-esteem can affect the emotional state and cause eating disorders due to stress and anxiety.
7	Bad friendships	Inadequate social support and friendship problems can contribute to self-isolation and the use of eating as a compensatory mechanism.

Source: compiled by the author

Thus, it can be noted that intrapersonal aspects, such as the perception of food and one's own body, emotional sphere, and self-esteem, dominate among the deep psychological factors of ED. The identified intrapersonal factors point to the internal dynamics of the individual as a key component in the development of ED. In contrast, interpersonal factors related to interaction with others do not have such a strong influence, which indicates that the main dynamics of the disorder are determined by internal experiences and attitudes towards oneself. This aspect indicates a significant relationship between ED and personal experiences, which include perceptions and emotions, and suggests that in order to understand and effectively treat ED, it is necessary to pay special attention to the internal mental processes and emotional state of the individual.

Methods of reducing the influence of deep-psychological factors of ED: Psychodynamic approach and Gestalt therapy

Gestalt therapy and psychodynamic approaches can be useful in reducing or eliminating the underlying psychological factors associated with an eating disorder, but they approach this task from different perspectives. Psychodynamic therapy may focus on understanding unconscious aspects of the individual and uncovering subconscious conflicts that may be related to eating disorders. The use of dream and association analysis can help to uncover the underlying mental processes that are at the root of the disorder. Psychodynamic eating disorder treatment focuses on helping patients understand the meaning of their symptoms in the context of their lives in order to find ways to overcome unhealthy coping strategies and improve their overall quality of life. Many people who experience problems with binge-eating, body image disorders, or restricted eating may remain ill even after trying various treatments. In such cases, an eating disorder may be a clear manifestation of a complex psychiatric problem. Psychodynamic interventions aim to uncover potential predisposing factors, such as childhood and adult trauma and unprocessed losses. The approach is to understand each person's unique personal history. Clinicians using the psychodynamic approach listen carefully to patients, helping them to better understand disturbing memories, feelings and broken relationships that may arise when telling their life story. As emotional pain in such cases is often difficult to experience, defence mechanisms such as denial, splitting, dissociation, projective identification and repression can be temporarily used by the mind to cope with internal discomfort (Zerbe, 2001).

Studies of the effects of cognitive behavioural therapy (CBT) and psychodynamic psychotherapy on eating disorders have shown that CBT has demonstrated consistent remission rates for all types of eating disorders, but has left a significant number of patients without achieving remission. In contrast, psychodynamic therapy has not always been effective in achieving remission in patients with eating disorders, although this conclusion may be uncertain due to the limited number of relevant studies. A group of patients with eating disorders may require therapy aimed at strengthening their own functioning deficits, which are not easily addressed by cognitive behavioural methods alone (Moberg *et al.*, 2021). Gestalt therapy can help a person to become aware of their emotions, interactions with food, bodily sensations and general lifestyle, and the focus on the "here and now" can help to uncover imbalances in eating behaviour and reveal underlying psychological conflicts. Working with consciousness and attention can help clients identify their own needs and respond to them in a more adaptive way. Gestalt therapy focuses on the process of contact between a person and his or her environment, as well as on the awareness of this process. The main idea is that psychological disorders arise from unconscious needs, desires, emotions, and mental fixations that have not become the object of attention or the purpose of contact. In Gestalt therapy, the therapist, together with the patient, identifies and works on disorders of awareness and perception,

contact abilities, ways of acting and integrating experience into the here-and-now. The therapist in Gestalt therapy interacts with the patient in a dialogue process where various aspects of the personality and disturbing experiences are identified and discussed. The therapist responds to the patient's immediate experiences, helping them to become aware of their own blockages, fixations, blind spots, and other aspects that may be implicit. Such emotional resonance and interaction facilitate joint efforts in reflection and processing of psychological processes occurring in the here-and-now (Description of Gestalt…, 2023).

In the Gestalt approach to working with EDs, the focus is on exploring the emotions that underlie overeating or undereating and trying to understand the experiences that are expressed in this type of behaviour. In Gestalt therapy, the therapist encourages the client to express their emotions and helps them to become aware of and express their feelings in the context of events and situations. The Gestalt approach also facilitates reactions to one's own feelings. Clients are taught to express their experiences and relate them to specific events. In addition, art therapy techniques such as drawing can be used to help clients express their feelings and events symbolically. This can help in developing mindfulness and expressing emotional experiences through the creative process. These approaches aim to uncover and understand how emotions and experiences shape eating behaviour, which can serve as a basis for further work on changes in this aspect of the client's life (Salgirieva *et al.*, 2022). Within Gestalt therapy, there is a newer method – fissiotherapy. It is aimed at revealing the processes of awareness of the ED radical, its role and relationship with the client's personality. This approach is also aimed at developing proflexion to create healthy relationships between parental figures in the form of a therapist and a client. A key aspect of fissiotherapy is the introduction of the concept of the "eating behaviour radical", which is innovative in the world of psychotherapy. This concept reveals both many mechanisms of the formation of eating disorders and the possibilities of treating these disorders. The definition and classification of the background as mortal or vital is another new characteristic that opens up new opportunities for physiotherapists. This approach allows for the development of individualized interventions that are not only targeted at the client, but also at their social environment and life context. Fissiotherapy opens up new perspectives in the study and treatment of eating disorders, providing a comprehensive and individualized approach to psychotherapy. Thus, the psychodynamic approach and Gestalt therapy can be effective in addressing the underlying psychological factors of eating disorders, but they approach this task from different perspectives. Both approaches aim to develop awareness and identify mental conflicts, but use different methods, such as dream analysis in psychodynamic therapy and a focus on the here and now in Gestalt therapy. Fissiotherapy in Gestalt therapy complements these approaches by providing a new and innovative method for working with the radical of the ED.

DISCUSSION

It is important to note that the results of this study represent only one part of a wide range of research conducted on this topic. However, they do indicate that it is important to pay attention to the internal mental processes and emotional state of the individual in order to understand and effectively treat mental health disorders. A study conducted by I.S. Colmsee *et al.* (2021), which aimed to understand the importance of low self-esteem in the development of disordered eating, found a practically significant effect of self-esteem on ED. This effect was particularly pronounced in women and manifested over shorter periods between measurements. The overall conclusion is that low self-esteem is a universal risk factor for various types of eating disorders. Based on qualitative analysis, the authors' study also found a strong correlation between low self-esteem and eating disorders. However, the German study relied on secondary processing of existing empirical studies, which are predominantly based on quantitative methods. The fact that low self-esteem correlates with ED in both qualitative and quantitative studies indicates that this factor is really important in ED.

Researchers H. Jebeile *et al.* (2021) from Australia identified risk factors for ED, including body dissatisfaction, low self-esteem, depression, and dieting. Dieting to control weight may increase the risk of ED, while structured and supervised weight management is likely to reduce the risk of ED for most adolescents. However, some adolescents may present to an obesity treatment service with undiagnosed ED or may develop ED during or after treatment. The authors conclude that a risk management approach that includes screening or monitoring for risk factors and behaviours associated with ED should be used to identify those at risk. Unlike the authors' study, the focus is on adolescents rather than adults, but similar factors were found to influence ED: low self-esteem and body dissatisfaction. The Spanish and Belgian researchers M. Rabito-Alcón *et al.* (2021) note that many people with ED report experiencing trauma in childhood, and this condition is the basis for many studies aimed at investigating the factors mediating the relationship between traumatic experiences and the development of ED. In their systematic review of published work, they used the PsycInfo and PubMed databases, combining keywords and applying inclusion and exclusion criteria. A total of 18 articles were identified, and the analysis revealed a set of factors that may mediate the relationship between childhood trauma and the development of ED, including pathological dissociation, difficulties with emotion self-regulation, body dissatisfaction, negative affect/depression, anxiety, general distress, self-criticism, and alexithymia. The study emphasizes the importance of considering these possible factors when planning treatment, and the role of early detection of trauma and PTSD symptoms in preventing more serious psychopathology in adulthood. Researchers A. Monteleone *et al.* (2022) found that childhood maltreatment was associated with elevated ED. The study included 325 individuals with ED who

completed the Childhood Trauma Questionnaire to assess their early traumatic experiences. It was found that the association between emotional abuse and ED differed by disorder: in people with bulimia nervosa, the association included ineffectiveness, while in people with binge-eating disorder, it included impulsivity. The findings support the idea that emotional abuse conveys an association with eating disorder risk across the different major diagnoses of ED. Ineffectiveness and impulsivity may represent specific psychopathological dimensions associated with emotional abuse that contribute to the development of specific symptoms characteristic of Eating Disorder. Two independent studies based on meta-analysis and empirical quantitative methods also identified family factors as a predictor of ED. In the author's study, the family environment ranks first in the hierarchy of interpersonal factors, so it can be acknowledged that the data are consistent with the author's study. However, these two studies also detail the correlation between ED and trauma in the family environment, with particular attention paid to the emotional sphere.

Researchers J. Romero-Mesa *et al.* (2021) indicate that deficits in emotional abilities are a key factor in the onset and maintenance of ED. The study conducted a systematic review of current data on emotional intelligence and ED in both general and clinical populations at different stages of development. A search of Medline, PsycInfo, and Scopus databases identified 15 relevant articles, all of which indicated a negative association between emotional intelligence and ED. In addition, several mechanisms were identified, including adaptability, stress tolerance, and emotional regulation. In summary, the systematic review provides promising but challenging preliminary evidence for the link between emotional intelligence and ED across developmental stages. The study indicates that emotional problems are strongly associated with ED, and a high level of emotional influence on ED was also found, but in this case, this pattern was captured using a qualitative methodology. Researchers T. Mason *et al.* (2021) indicates that low levels of positive affect associated with loss of interest or pleasure in activities (anhedonia) may contribute to the onset and maintenance of binge-eating. They present a theoretical model in which anhedonia increases the risk of overeating through its relationship with disordered eating and weight gain. The researchers describe potential direct pathways (e.g., reward-related processes) and indirect pathways (e.g., effects on depression symptoms and physical activity) through which anhedonia may lead to adverse eating and weight-related outcomes. A momentary maintenance model is also proposed, in which the low positive affect and dysregulation of positive affect associated with anhedonia sustain overeating directly or indirectly through maladaptive health behaviours such as reduced physical activity, less healthy eating, and fewer social interactions, which in turn sustain anhedonia. In the present study, a link between anhedonia and ED was recorded, unlike in the author's study, this correlation was not recorded. It is possible to assume that anhedonia is included in the factor "negative emotional sphere" in the author's study, but this requires clarification and further research.

The study conducted by M. Kożybska *et al.* (2021) determined the prevalence of problematic Internet use and ED among Polish students and explored potential correlations between these phenomena. The study involved 1008 Polish students aged 18 to 40 years, who took the Problematic Internet Use Inventory (TPIU22) and the Eating Attitudes Test (EAT-26), as well as completed a socio-demographic and Internet use survey. The results show statistically significant differences between men and women. Men scored higher on the Problematic Internet Use Inventory (TPIU22), while women scored higher on the Eating Attitudes Test (EAT-26). There was also a significant correlation between these two variables. The strongest predictors of ED were indicators of problematic Internet use, such as preoccupation with the Internet, neglecting sleep in favour of Internet use, less negative feelings while working online, and a higher average number of hours spent online on weekends for academic and work purposes and extracurricular activities. The findings highlight the link between problematic Internet use and ED among students in the Polish context. In contrast to the author's study, the present study uses a quantitative methodology to document the relationship between unhealthy Internet use and ED. The author's study focused more on the underlying psychological factors of ED.

The results of the study show that deep psychological factors, such as perception of food and body image, emotional sphere, and self-esteem, play a key role in the development of ED. Studies by other authors using different methodologies confirm these findings. Low self-esteem, body dissatisfaction, childhood trauma, and emotional deficits have been found to be risk factors for developing ED. In addition, some studies have identified ED factors that were not found in the author's study. In particular, a link has been established between anhedonia (i.e., loss of interest or pleasure in activities) and ED, as well as between problematic Internet use and ED. Thus, it can be concluded that ED is a complex multifactorial disorder that develops under the influence of various internal and external factors.

CONCLUSIONS

Social factors, in particular media influence, have a significant impact on the development of ED. Depictions of the "thin ideal" and diet advertising, which are actively promoted through the media, create negative standards of beauty, and can cause body dissatisfaction. In particular, it is emphasized that this media influence is particularly vulnerable for women, who are often subjected to pressure regarding their appearance. It is also mentioned that socio-economic factors, contrary to expectations, do not have a significant impact on the development of body image disorders, which indicates the universality of this phenomenon in different social groups. At the same time, the role of the close social environment, such as peers and family, in the emergence and maintenance of unhealthy

eating habits among adolescents is emphasized. Based on interviews with individuals with signs of anorexia nervosa and bulimia, it was found that among the deep psychological factors of anorexia nervosa, intrapersonal aspects, such as perception of food and one's own body, emotional sphere, and self-esteem, dominate, and they point to the internal dynamics of the individual as a key component in the development of anorexia nervosa. Interpersonal factors related to interaction with others do not have such a strong influence. There is a significant relationship between ED and personal experiences, which include perceptions and emotions. To understand and effectively treat ED, it is necessary to pay special attention to the internal mental processes and emotional state of a person.

However, the study of the deep psychological factors of ED through interviews had a number of limitations. One of them is the small sample size. Only four people took part in the study, which may not be sufficient to obtain representative results. In addition, the study participants were limited in age (41-46 years). This may also limit the overall conclusions that can be drawn from this study. Another limitation is the use of the interview method as a data collection tool. Interviews are a qualitative research method that allows for an in-depth understanding of participants' subjective experiences. However, interviews can also be a subjective method, and the results of the study may depend on the researcher's interpretation. These factors can lead to the development of ED and complicate its course, so for effective treatment, it is necessary to work with these aspects, which can be done with the help of psychodynamic and Gestalt psychotherapy. Gestalt therapy and the psychodynamic approach are effective methods of treating eating disorders. Both approaches are aimed at developing awareness and identifying mental conflicts that may underlie the disorder. The main differences between the psychodynamic approach and Gestalt therapy are as follows: the psychodynamic approach focuses on the past to understand how unconscious conflicts from childhood can lead to a disorder; Gestalt therapy focuses on the present to help patients become aware of their emotions and interactions with food. Prospects for further research should focus on the effectiveness of psychodynamic therapy, Gestalt therapy in general, and fissiotherapy. It is also necessary to focus on the study of the qualitative features of interpersonal interactions that occur in the immediate environment, as well as intrapersonal factors that are not necessarily related to the external environment. This will help to expand the understanding of the underlying psychological aspects of ED and contribute to the development of more effective approaches to the prevention and treatment of these disorders.

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CONFLICT OF INTEREST

None.

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Валерій Олександрович Патоніч

Магістр
Інститут терапії розладів харчової поведінки
04071, вул. Ярославська, 39В, м. Київ, Україна
https://orcid.org/0009-0009-0787-6367

Актуальні проблеми розладів харчової поведінки та шляхи їх вирішення

Анотація. В умовах, коли розлади харчової поведінки стають все більш поширеними, необхідно розуміти вплив факторів сучасного життя на формування цих хвороб, для того щоб розробляти ефективніші стратегії їх профілактики та лікування, тож метою цього дослідження був системний розгляд соціокультурних та психологічних чинників розладів харчової поведінки. Для вивчення соціальних та глибинно-психологічних чинників цих розладів використано два ключові методологічні підходи – соціокультурний і психоаналітичний. Емпірична основа дослідження ґрунтується на використанні методу інтерв'ю. Соціальні фактори, зокрема медійний вплив, визначають формування розладів харчової поведінки, особливо серед жінок, через створення негативних стандартів краси та тілесного задоволення. На підставі інтерв'ю з особами, які мають ознаки розладів харчової поведінки виявлено, що глибинно-психологічні чинники цих розладів переважно зосереджені на внутрішньоособистісних аспектах, як-от: сприйняття їжі та власного тіла, емоційна сфера та самооцінка. Водночас міжособистісні фактори, пов'язані з взаємодією з оточенням, мають менший вплив. Ці фактори можуть призводити до розвитку та ускладнювати перебіг розладів харчової поведінки, тому для ефективного лікування важливо працювати з психологічними аспектами. Обґрунтовано, що психодинамічна і гештальт-терапія – це ефективні методи лікування, які спрямовані на розв'язання психічних конфліктів. Обидва підходи використовують різноманітні методи, зокрема аналіз сновидінь та фісіотерапію, щоб допомогти пацієнтам усвідомити та вирішити їхню емоційну та поведінкову взаємодію з їжею. Практична цінність дослідження пов'язана з тим, що його результати акцентують увагу на необхідності використовувати в терапії психодинамічні й гештальт-підходи, які можуть вирішити проблеми глибинно-психологічних та емоційних факторів розладів харчової поведінки. Дослідження може мати застосунок у діяльності інституцій, що спеціалізуються на терапії розладів харчової поведінки

Ключові слова: нервова булімія; нервова анорексія; медіа; психодинамічна терапія; гештальт-терапія; фісіотерапія

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Anzhelika Kolly-Shamne*

Doctor of Psychological Sinces, Professor
UniDistance Suisse
3900, 18 Schinerstrasse, Brig, Switzerland

Kherson State University
76018, 14 Shevchenko Str., Ivano-Frankivsk, Ukraine
https://orcid.org/0000-0003-1541-6079

The concept of successful ageing in wartime: A review of Western scientific sources

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*Corresponding author

Abstract. Preserving the full life of an elderly person as the most vulnerable category of the population in times of armed conflict raises many methodological, theoretical, and practical issues for scholars. The article is an attempt at a problematic and reflective analysis of the heuristic nature of the concept of successful ageing for the study of ageing of elderly Ukrainians in the context of the war with Russia. The paper presents a problem-oriented review of contemporary Western literature on successful ageing. In addition to the basic empirical and theoretical works, a significant part of the theoretical analysis is based on the results of the most significant meta-analytical studies on this topic. The methodology of problem-oriented and integrative analysis was used to determine which problem areas of the concept of successful ageing can contribute to its study in wartime. The potential and limitations of the modern concept of successful ageing are considered. Eight problem areas of this concept are presented, which reveal certain contradictions, debatable issues, and gaps, which are simultaneously directions for the development of both the concept itself and its research in the context of war. Among them: vagueness of the criteria for successful ageing and its dilution with similar concepts; interaction of biomedical and psychosocial contexts of successful ageing; limits of responsibility for the success of ageing in the context of the "person – society" dichotomy; socio-structural inequalities between older people and the inability to age equally "successfully"; discrepancies between subjective and objective indicators of successful ageing; dominance of the Western model of successful ageing and levelling of its cultural specificity; integration of individual, social and scientific conceptualization of successful ageing. The author analyses the most promising theoretical and methodological concepts and theories of successful ageing that are most relevant to the problem of ageing in war. The literature review presented in the article will help to draw attention to the problem of improving and preserving the full life of an elderly person in the context of armed conflict. The results of the research will be useful to scholars and practitioners for the further development of programmes to protect the mental and physical health of older people in war

Keywords: armed conflict; problem-reflective analysis; ageing; elderly; ageism; mental health; gerontopsychology; meta-analysis

INTRODUCTION

Population ageing is becoming a key component of the transformation of the world's current demographic and age profile. However, an increase in life expectancy does not in itself mean an improvement in its quality. Therefore, the issues of developing and maintaining the functional capabilities of older people, including the problem of their successful, active, healthy ageing, are becoming a topical issue. Among them, the concept of "successful ageing" is one of the most important to explain the effective adaptation of a person to the challenges of this stage of life.

The concept of successful ageing was proposed at the turn of the 1980s and 1990s by American gerontopsychologists J.W. Rowe & R.L. Kahn (1987; 1997). It embodied the rejection of the paradigm that interprets ageing as *senectus ipsa est morbus* (from Latin: "old age is a disease") and the adoption of the paradigm of ageing as a productive stage of development. Since then, for decades, the concept of successful ageing has been the subject of considerable research attention. However, the issues related to both the integration of accumulated knowledge and the lack of empirical data on successful ageing of different groups of people in special conditions, such as armed conflicts, natural disasters, traumatic life circumstances, biographical crises, etc. are still insufficiently studied. In particular, the theoretical and methodological problems of studying successful ageing in wartime remain unclear.

In times of war, older people are the most vulnerable category of the population. Normative losses associated with ageing (exacerbation of diseases, deterioration of cognitive functions, curtailment of social roles) are accompanied by stress associated with the challenges of war (fear for life, uncertainty about the future, inability to adapt to new realities, separation from loved ones, constant psycho-emotional stress, destruction of infrastructure, bombing, interruptions in the provision of basic services, etc.) They are at risk of marginalization and social isolation, separation from loved ones, loss of identity, etc. The urgent need for large-scale programmes to support the proper quality of functioning of older people in war-affected countries should be based on the results of sound methodological and empirical research.

However, current research focuses on the consequences of armed conflicts mainly for children, adult civilians, and the military. It has been shown that war-related stressors, as well as migration and post-migration stressors, contribute to short- and long-term mental health problems in adults and children (internally displaced persons, asylum seekers and refugees) (Carpiniello, 2023). It has been proven that military and civilian adults suffer from mental disorders and negative psychological consequences caused by war (Rozanov *et al.*, 2019). Depression, post-traumatic stress disorder and other mental health problems are long-term consequences of war for adults who survived the war and remained in the conflict zone (Morina *et al.*, 2017; 2018) or became internally displaced (Singh *et al.*, 2021). However, the few studies of successful ageing of veterans according to N.S. Singh *et al.* (2021) do not compensate for the lack of necessary data on human ageing in war. Thus, in the current literature, there is almost no data on successful human ageing in periods of complex social change, such as war. This raises many methodological questions. For example, is the concept of successful ageing able to explain the process of ageing in war and can it be operationalized to assess and explain the ageing of people in the zone of military operations and permanent threat to life, is this concept universal and able to explain how a person here and now experiences the challenges and risks of war, and if so, how older people can maintain successful ageing in a zone of military conflict or in forced migration.

In view of the above, the purpose of the study was to analyse the heuristic of the concept of successful ageing for the study of the functioning of older Ukrainians in the context of a full-scale war with Russia. To do this, it was planned to consider the current state of the concept of successful ageing, to carry out a critical, problematic, and reflective analysis of the problem areas of the concept of "successful ageing", which are directly or indirectly related to the peculiarities of the functioning of older Ukrainians in the context of war. Research questions usually determine the decision on methodology, research design and research methods. Given that it is impossible to find research on the peculiarities of successful ageing in wartime, the article is problem-searching in nature. In particular, the methodology of problem-oriented, problem-reflective, and integrative analysis was used to determine which problem areas of the concept of successful ageing can contribute to its operationalization in war. The methods of theoretical analysis used in this study include abstraction, analysis, synthesis, heuristic forecasting, and a problematic review of contemporary Western literature on successful ageing. It was expected that the reflexive research carried out would allow formulating certain implicit and explicit ideas related to the problems posed.

To achieve the research goal, searching for relevant studies in the online databases of psychological, sociological, and medical publications PubMed and Web of Science, in the electronic reference database of the American Psychological Association PsycINFO, as well as in the biomedical bibliographic database EMBASE and the Google Scholar search engine was conducted. The search in these databases was carried out using the term "successful ageing/ageing". Then, the function of similar articles on the PubMed website was used and the lists of references from published articles were examined to obtain additional sources. The search was limited to articles published in English in peer-reviewed journals. The query identified 2319 publications, most of which contain empirical studies of the phenomenon, while others analyse the definition, operationalization issues, criteria, and predictors of successful ageing. Particular attention was paid to publications

on this topic, which are meta-analyses and comprehensive reviews of empirical studies. The focus was on sources that allowed for the implementation of problem analysis and heuristic forecasting in the context of this goal.

J.W. ROWE AND R.L. KAHN'S MODEL OF SUCCESSFUL AGEING AND ITS CRITICAL ANALYSIS

J.W. Rowe & R.L. Kahn (1987; 1997) formulated the most well-known modern theory of successful ageing based on the results of the seven-year MacArthur Ageing Study. Summarizing its results, they concluded that normal (ordinary) ageing, like the previous stages of ontogenesis, can be quite highly productive. They defined successful ageing as a combination of three elements:

- disease prevention (low probability of illness or disability due to illness);
- good physical and cognitive health (high functional cognitive and physical performance);
- maximum possible involvement in society (Rowe & Kahn, 1997).

According to the classical concept of J.W. Rowe and R.L. Kahn, successful ageing is defined as high physical, psychological and social activity without serious diseases. This model was the beginning of a new area of research in gerontopsychology – "successful ageing" (Stowe & Cooney, 2015; Whitley *et al.*, 2016). Over the past 50 years, it has gained considerable popularity (Katz & Calasanti, 2015; Wahl, 2020). Many scholars from different countries continue to work within this framework – China (Chang *et al.*, 2023), Spain (Blanco-Molina *et al.*, 2021), Israel (Goshen *et al.*, 2022), Singapore (Feng & Straughan, 2017), India (Bandyopadhyay & Singh, 2023), other Asian countries (Tannistha, 2018), etc. They continue intensive research on different groups of older people living in different countries to test the hypotheses of "successful ageing". Thousands of articles have been written about the concept and its components, more than 100 variations of the original model have been proposed (Rowe & Kahn, 2015) and a significant number of operationalization of successful ageing have been made (Depp & Jeste, 2006; Cosco *et al.*, 2014).

At the same time, this concept is a subject of much debate and controversy in scientific circles (Katz & Calasanti, 2015; Calasanti, 2016). The main modern meta-analytical studies of successful ageing (Martinson & Berridge, 2015; Kusumastuti *et al.*, 2016; Kim & Park, 2017) identify the main areas of criticism and improvement of the successful ageing model. M. Martinson & C. Berridge (2015), for example, summarized the existing critical analyses of successful ageing models and proposals for improving the concept presented in 67 articles and divided them into four distinct categories. The first group of studies, "Add and stir" (25% of articles), calls for the creation of new multidimensional models of successful ageing. The second group, "The missing voices critique" (45%), advocates for increased attention to the subjective components of successful ageing. The third group, Hard Hitting Critiques (20%), suggests avoiding stigmatization and discrimination against those who age poorly and calls for a more inclusive definition of successful ageing. The fourth group, New Frames and Names (10%), presents alternative models of ageing, often based on Eastern philosophy, and attempts to correct the Western cultural bias in the MacArthur model.

The broad set of criteria proposed by the authors to expand the original model of J.W. Rowe and R.L. Kahn and the existence of numerous models of successful ageing (Wahl, 2020) indicate the importance of further reflection on the use of the concept of "successful ageing" by gerontologists and representatives of other sciences. That is why a different approach was used, in particular, a problem-reflective analysis of the concept of successful ageing. As a result, seven problem areas have been identified that can potentially serve as a methodological basis for further theoretical and empirical research on successful ageing in wartime.

PROBLEM 1. UNCLEAR CRITERIA FOR SUCCESSFUL AGEING AND ITS OPERATIONALIZATION

Successful ageing as an active, productive lifestyle demonstrates a break with the dark, negative vision of ageing and the stereotype of passive old age (Oris, 2020). However, current meta-analytical research shows significant discrepancies in the definition of predictors, criteria, and indicators of successful ageing. Instead, generalizing these parameters is important for understanding and finding a standard for researching successful ageing in war. E.A. Phelan & E.B. Larson (2002) were among the first to identify and present in the most generalized format the components and predictors of successful ageing that have been proposed in the literature over the past 30-40 years. The authors identified seven main elements of successful ageing (life satisfaction, longevity, freedom from disability, mastery/growth, active participation in life, high/independent functioning, and positive adaptation) and its five main predictors (high educational level, regular physical activity, high self-efficacy, social contacts/support, and freedom from chronic diseases). A. Bowling (2007), in turn, noted such indicators as high security of physical health, cognitive functioning, as well as various psychological and social factors. Another meta-analysis of the correlates of successful ageing (Kim & Park, 2017) found that most studies describe successful ageing in four domains: avoiding illness and disability, having high cognitive, mental, and physical function, being active in life, and adapting psychologically well in later life.

Like some previous authors (Phelan & Larson, 2002), L. Kleinedam *et al.* (2019) note that the operationalization of successful ageing should include measures of physiological health, well-being, and social activity, taking into account both subjective and objective aspects. J.P. Michel & R. Sadana (2017), in turn, classify operational defini-

tions of successful ageing according to four criteria: health and well-being, symptom-oriented indicators of illness or morbidity, fulfilment of roles, activities and functions, and adaptation to age-related limitations. In contrast, T.D. Cosco *et al.* (2014), based on operational definitions of successful/healthy ageing presented in 84 studies, identified five key aspects: physiological constructs, engagement constructs, well-being constructs, personal resources, and external factors. A more detailed meta-analysis showed that out of 105 working definitions of successful/healthy ageing, 92.4% included physiological constructs, 49.5% interaction constructs, 48.6% psychological well-being constructs and personal resources, and 5.7% external factors (Cosco *et al.*, 2017). At the same time, C.A. Depp & D.V. Jeste (2006) found that 13 out of 29 working definitions of successful ageing consisted of indicators of cognitive functioning. Most studies of successful ageing include results that can be interpreted as working definitions of the concept (see, for example, R. Fernandez-Ballesteros, 2019), although, according to A. Bowling (2007), in their definitions, researchers do not distinguish between predictor and component variables of successful ageing. Summarizing the identified indicators and criteria of successful ageing as much as possible, it is possible to identify two main types of models of successful ageing:

- psychosocial models that define successful ageing in the context of mental states (e.g., life satisfaction) and are based mainly on criteria of social functioning and psychological resources as factors of successful ageing;
- biomedical models, which define it as the prevention of disease and disability and emphasize physical and mental functioning as indicators of successful ageing.

The bias in one direction or another largely reflects the academic discipline of the researcher (Bowling, 2007). The authors also note that research on the determinants or predictors of successful ageing often correlates with biomedical indicators. At the same time, there are many multidomain predictors of successful ageing. The latter, along with biomedical criteria, include intelligence, personal and motivational-psychological characteristics, life satisfaction, etc. Therefore, the idea of an integrative approach is increasingly emphasized, and one of its embodiments is, for example, a "holistic" view of successful ageing (McCarthy & Bockweg, 2013). Gerontologists call for a consensus on what successful ageing is and how it should be measured (Pruchno, 2015). However, a single generally accepted definition of "successful ageing" has not yet emerged (Phelan & Larson, 2002; Depp & Jeste, 2006; Cohen *et al.*, 2020) and different studies use different working definitions of this concept (Cosco *et al.*, 2014; Urtamo *et al.*, 2019). This complicates the selection of criteria that can be most informative for assessing the success of ageing under the stress of war. The understandable multidimensionality of the phenomenon of successful ageing is related to the complexity of factors that influence the experience of ageing and the variety of dimensions involved: functional, psychological, social, spiritual, or environmental (Martineau & Plard, 2018). Thus, a multidimensional approach to successful ageing in wartime may be more informative than focusing on individual components of successful ageing.

PROBLEM 2. THE VAGUENESS OF THE CONCEPT OF SUCCESSFUL AGEING WITH SIMILAR CONCEPTS

As noted by D.R. Petretto *et al.* (2016) and colleagues, conceptual models of successful, active, and healthy ageing were developed in Europe and America in the twentieth century, mainly based on the original model of J.W. Rowe and R.L. Kahn. The concept of successful ageing has contributed to the emergence of dual terms, the emergence of which is associated with the emergence of progressive trends in human development in old age.

M. Menassa *et al.* (2023) conducted a mathematical analysis of 65 models/definitions of successful ageing formulated by researchers from 16 countries in Europe, Asia, and America in 1960-2022. They identified 12 terms used to describe or evaluate human ageing: active, good, healthy, resilient, positive, productive, optimal and successful, etc. Four concepts were most widely used: "successful ageing" (number of models / % – 34/52), followed by "healthy ageing" (8/12), "good ageing" (5/8) and "active ageing" (4/6), the remaining 14 models used other terms. This situation provokes confusion related to the operationalization and measurement of these phenomena (Michel & Sadana, 2017). These four main terms are often cited as synonyms in the European literature (Martinson & Berridge, 2015). Some authors even equate these concepts, especially the concepts of active, healthy, and successful ageing (Cosco *et al.*, 2014). From the point of view of the healthy ageing model (Behr *et al.*, 2023; Menassa *et al.*, 2023), the concept of successful ageing is a narrower concept that historically and conceptually underlies the concept of healthy ageing.

The problem is that these terms overlap conceptually. This makes the concept of successful ageing increasingly blurred. As a result, today there is neither a unanimously accepted definition of this concept nor a clear distinction between it and the related concepts (Depp & Jeste, 2006; Urtamo *et al.*, 2019; Cohen *et al.*, 2020). A meta-analysis of 74 studies and reviews on the definition of successful/active/healthy ageing showed that studies often use several parallel concepts – active, successful, healthy ageing (Behr *et al.*, 2023). For example, the authors reviewed four definitions of healthy ageing, all of which were based on the concept of successful ageing by J.W. Rowe and R.L. Kahn (McLaughlin *et al.*, 2012). Some apologists for the concept of successful ageing believe that terms such as healthy, active, productive, good ageing, etc. are components of the concept of successful ageing (Fernandez-Ballesteros, 2019; Urtamo *et al.*, 2019) (Fig. 1).

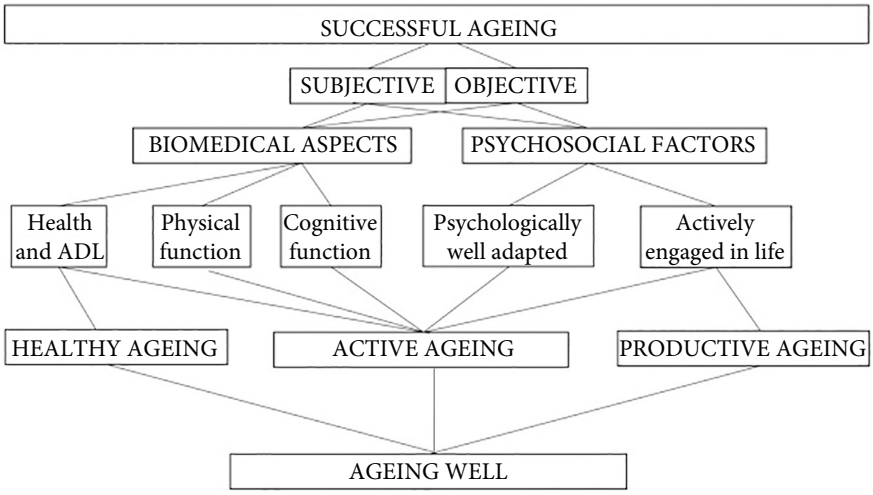

Figure 1. Dimensions of successful ageing
Source: modified with regard to R. Fernandez-Ballesteros (2019). Citation according to A. Urtamo *et al.* (2019)

Thus, healthy, successful, active, and productive ageing describe similar phenomena (Behr *et al.,* 2023), so the definition of successful ageing remains unclear to lay people and policymakers, despite decades of research on the topic.

PROBLEM 3. RESPONSIBILITY FOR THE SUCCESS OF AGEING: THE DICHOTOMY OF "PERSON – SOCIETY"

The discourse of successful ageing overlooks power relations in society and the associated obstacles to "successful" ageing (Katz & Calasanti, 2015). This problem is represented by various aspects, but the most important for the analysis of ageing in the context of military conflict is the contradiction between the personal responsibility of a person for his or her ageing and the responsibility of social and state institutions. J.W. Rowe & R.L. Kahn (1987) believe that it is the "choices" of an ageing person (e.g., their lifestyle) that can improve each of the three components that contribute to successful ageing (disease prevention, good physical and cognitive health, and maximum possible involvement in society). As a result, successful ageing is a direct result of the choices and efforts of the individual who is responsible for his or her own ageing. Most variations of the successful ageing model suggest that a person actively fight against ageing and place full responsibility for his or her ageing on the person. The obligation of everyone to succeed in their own ageing, or at least to provide evidence of this, remains significant in the social policy of Western countries.

Therefore, the concept of successful ageing by J.W. Rowe and R.L. Kahn is sometimes criticized for overemphasizing the role of individual behaviour and emphasizing personal control over life outcomes in old age (Stowe & Cooney, 2015). In this way, it absolves policymakers and social institutions of responsibility for creating an environment conducive to the health of older people. Therefore, many variations of the concept emphasize the need to take into account the historical, socio-political, socio-economic, and environmental factors of ageing that may affect the ability to age successfully. The successful ageing paradigm aims to minimize the effects of ageing, but successful ageing does not challenge hierarchical relationships that stigmatize old age. On the contrary, it encourages people to take responsibility for the consequences of this stigma by giving them the responsibility to resist ageing (Calasanti & King, 2022). Thus, the concept of successful ageing does little to mitigate the inequalities that make old age more difficult than it should. Given these criticisms, J.W. Rowe & R.L. Kahn (2015) suggest that the concept of successful ageing should be complemented by a body of theoretical and empirical research at the societal level. They identify three main goals of scholars in this area: reorganizing basic social institutions, adopting a lifelong perspective, and focusing on human capital.

The importance of understanding this contradiction is evident in the context of the Russian invasion of Ukraine. For example, according to a survey of Ukrainian refugees, 16% of them are elderly, and a significant number of adult Ukrainian refugees who found themselves abroad as a result of the war in 2022 had old, single parents at home (Kolly-Shamne, 2022). Socially-oriented contemporary models of ageing (e.g., productive, conscious, active, solidarity ageing) (Höpflinger, 2023) and the consideration of socio-historical factors of ageing (Rowe & Kahn, 2015; Rowe, 2023) provide an opportunity to refocus discussions on the role older people can play in society during war and to counter the vision of older Ukrainians as incapacitated burdens for society as a whole and for their immediate environment.

PROBLEM 4. DICHOTOMOUS DISCOURSE AND TYRANNY OF THE CONCEPT OF SUCCESSFUL AGEING

In recent decades, the ideology of successful ageing has been gaining momentum in modern Western society and is becoming an international trend. Its spread is a cause for concern among scientists and provokes a set of ethical and social problems. Using the term "successful" ageing,

scientists theoretically formulate a certain benchmark for comparing the ageing of a particular person, on the basis of which it is possible to assess the degree of his or her "success" or "failure". The need to define old age as a "new youth", "third age", "leisure age" and "active retirement" is a symptom of the negative perception of ageing in modern societies (Goldschmidt Élisée, 2016). In an effort to get out of the negative images of old age, which can be compared to ageism, gerontology promotes an overly optimistic view of old age that also stigmatizes retirees.

It is important to note the existence of a widely recognized and implicitly dichotomous discourse on ageing in Western societies. These narratives include terms such as "successful" and "healthy" ageing, implicitly focus on positive adaptation (Hicks & Conner, 2014) and often serve as a counterweight to the negative framing of ageing. The latter suggests that ageing is inherently undesirable and needs to be neutralized, counteracted, denied, or balanced (Laceulle, 2018). Therefore, scholars call the choice of the term "successful" problematic, as it implies comparing people and that there are winners and losers (Strawbridge *et al.*, 2002). The proclamation of successful ageing implies that it is possible to age badly, and talk of successful ageing creates the fear that ageing is more of a failure than a success. Similarly, the fact that the word "ageing" needs to be prefixed with the nouns "good" and "successful" may imply that old age is inherently negative (Goldschmidt Élisée, 2016). Consequently, the pressure of social prescriptions can turn into the tyranny of successful ageing. Some researchers even believe that the concept of successful ageing has exhausted its potential. Timonen Virpi argues that the ideas of both successful and active ageing do not enrich either theory or practice, they simply model the ageing process and prescribe how older people should behave and be in old age (Timonen, 2016). Therefore, in general, and especially in the context of a society at war, it is increasingly important to build a discourse on ageing that simultaneously encompasses the vulnerabilities of the individual and their potentials in later life and the specific social situation of ageing, the importance of moving away from the dichotomous tendency in narratives about ageing and building a narrative that simultaneously encompasses difficulties, adversity, positive outcomes and the process of combining them.

PROBLEM 5. SOCIAL AND STRUCTURAL INEQUALITIES BETWEEN PEOPLE AND THE IMPOSSIBILITY OF AGEING EQUALLY "SUCCESSFULLY"

Recently, there has been criticism that theories of successful ageing ignore the effects of social stratification and the fact that the composition of the elderly population is heterogeneous. These theories smooth out differences in the composition of the elderly population by proposing either a reliable and rewarding health trajectory or a health deficit trajectory that must be resisted. Thus, on the one hand, a certain part of the population is excluded from the analysis of the ageing process, and on the other hand, a one-sided image of the elderly population and the same ageing process is created (Tholomier, 2017). Objectively determined socio-structural inequalities between people do not allow all population groups to age equally "successfully" (Oris, 2020), as social factors have a significant impact on the success of ageing, even when taking into account previous achievements in adulthood and behaviour in later life (Cooney & Curl, 2019). The striking heterogeneity in the living conditions and composition of older people, as shown in the Swiss 30-year longitudinal study VLV (Vivre/Leben/Vivere) (Ludwig *et al.*, 2014), proves that there is no homogeneous and uniform ageing process.

An example is refugees and migrants (Ho *et al.*, 2022), in particular, who moved to another country at an advanced age (Willoughby *et al.*, 2017) and who, compared to the local population, have significantly fewer opportunities for successful ageing (Noubicier & Charpentier, 2013). Old age in migration can put a person at risk of marginalization, social exclusion, etc. In the context of this problem, the conceptual model of preventive and corrective proactivity, which draws attention to special, most vulnerable groups of older people, is promising (Kahana & Kahana, 2001). The opinion of V. Timonen (2016), who believes that the modern world does not need a normative theory of ageing, but instead needs research on different population groups ageing in different conditions. The advantage of recognizing the plurality of forms of ageing is that older people are no longer seen as a homogeneous population. Wide differences in the experience of ageing and the identification of groups that age more or less "successfully" are increasingly recognized (Ludwig *et al.*, 2014). That is why empirical studies of different groups of older people who age in wartime conditions, choosing their own ways of overcoming age and social challenges, are relevant. Older people can maintain successful ageing even in the face of war by using accumulated resources and proactive adaptations to actively address ageing issues (Kahana *et al.*, 2012). It can be assumed that successful ageing in war is possible, in particular, on the basis of those unique internal and external resources that contribute to the maintenance of psychological well-being and social activity of older people.

PROBLEM 6. LEVELLING THE CULTURAL SPECIFICITY OF AGEING

According to researchers, a consensus on the criteria for successful ageing cannot be reached, as it depends not only on a particular scientific paradigm, but also on socio-cultural norms and values. Attitudes towards ageing vary across cultures and subcultures and can change along with changes in norms, values, and knowledge. The concept of successful ageing, like other scientific theories, is a cultural construct (Senay, 2015). It contains both culturally universal elements and culturally specific elements of Western culture (Iwamasa & Iwasaki, 2011). The problem lies in the attempts to make the Western concept of successful ageing universal, one that "works" beyond cultural and historical

specificity (Stowe & Cooney, 2015). Universalization of the concept of successful ageing leaves aside cross-cultural specifics, such as the peculiarities of ageing in small societies. In this regard, there are warnings from scientists who believe that theories that are essentially based on the Western model of successful ageing should not be applied to all peoples, because Western samples are not representative of the entire human race (Henrich *et al.*, 2010).

The successful ageing model has been applied to different ethnic and racial groups (Zhu *et al.*, 2023). It has been determined that even the aspirations of older people for successful ageing differ from one society to another, from one culture to another (Willoughby *et al.*, 2017; Martineau & Plard, 2018). For example, there are cross-cultural differences in perceptions of ageing between Ukrainians, Swiss, and Americans (Tokareva *et al.*, 2021). Field studies of Asian populations have also shown the cultural specificity of successful ageing in Asian countries, where ageing norms differ significantly from Western ones (Feng & Straughan, 2017; Tannistha, 2018). There is also a significant difference in the progress of different countries and even regions in adapting to population ageing (Chen *et al.*, 2018; Rehkopf *et al.*, 2022). Accordingly, it is noted that the influence of historical and cultural context on human functioning in later life cannot be ignored (Stowe & Cooney, 2015). This raises the question of how applicable the results of European or American research on successful ageing, which always contains both culturally specific and culturally universal elements, are to the Ukrainian sample of people ageing in war (Iwamasa & Iwasaki, 2011; Noubicier & Charpentier, 2013). Ukrainian cultural narratives shape older people's perceptions of their lives in old age and influence how and in what ways Ukrainians construct the trajectory of their lives during the war. The inevitable reorganization of personal life narratives under the stress of war prompts us to specify the role of the Ukrainian cultural narrative of ageing. In particular, the idea of a Ukrainian narrative of successful ageing in war should consider the cultural specificity of the Ukrainian nation, as well as the subjective view of older Ukrainians on the possibility, significance, and indicators of successful ageing in war, which simultaneously covers vulnerabilities and potentials, resources, and losses.

PROBLEM 7. DISPARITY BETWEEN SUBJECTIVE AND OBJECTIVE VIEWS ON SUCCESSFUL AGEING

A common criticism of models of "successful" ageing includes the disregard for older people's subjective views of what successful ageing means to them (Martinson & Berridge, 2015). Working definitions of successful ageing tend to be based on objective measures of health and functionality and do not always take into account a person's perception of their own health and well-being (Cosco *et al.*, 2014; Whitley *et al.*, 2016). Therefore, there are growing views that emphasize the need to integrate subjective and objective perceptions of successful ageing (Phelan & Larson, 2002; Petretto *et al.*, 2016; Bandyopadhyay & Singh, 2023). The importance of this is emphasized, in particular, by the well-known model of successful ageing "selection-optimisation-compensation" (SOC) by P.B. Baltes & M.M. Baltes (1990). In 2002, the authors noted the lack of efforts to elicit the views of older people (Phelan & Larson, 2002; Strawbridge *et al.*, 2002) and stressed that understanding older people's own criteria for successful ageing "should improve the conceptualization and measurement of this elusive concept" (Strawbridge *et al.*, 2002). A more recent meta-analysis of the literature (Kusumastuti *et al.*, 2016) revealed two distinct citation networks. The first cluster (1146 publications) focused on successful ageing from the perspective of older people themselves. The second cluster (609 publications) identified by the authors considered successful ageing in terms of objective criteria and dimensions defined by researchers. The authors conclude that there are two mutually exclusive concepts of successful ageing in the current literature, depending on whether the situation is assessed by the individual or the researcher (Kusumastuti *et al.*, 2016).

This conclusion is confirmed in current empirical research, which shows a significant discrepancy between objective and subjective criteria of successful ageing (Plugge, 2021). If an objective definition is used, usually based on physical health, only a small minority of older people can be defined as ageing successfully (Jeste *et al.*, 2010). The paradox is that many older people who consider themselves to be ageing successfully do not meet the objective criteria for successful ageing identified by researchers (Young *et al.*, 2009; McLaughlin, 2012; Bandyopadhyay *et al.*, 2023).

The respondents' self-assessment of their success was quite high, but only a few of them had positive results in all six generally accepted parameters of J.W. Rowe and R.L. Kahn (Strawbridge *et al.*, 2002; Whitley *et al.*, 2016). Among 867 study participants aged 65-99 years, the percentage of those who considered themselves to be successfully ageing was 50.3% compared to 18.8% classified according to the objective criteria of J.W. Rowe and R.L. Kahn (Strawbridge *et al.*, 2002). In another study, the successful ageing of participants based on a combination of objective and subjective criteria ranged from 11.4% to 87.4%. However, the higher rates of successful ageing were associated with self-reported outcomes (Brown & Bond, 2016). Similar results were obtained in a sample of long-livers who feel successful, despite not being objectively considered so (Araújo *et al.*, 2016). Thus, older people themselves consider themselves to be successful in ageing, while according to criteria based on traditional biomedical models, they cannot be classified as such (Bowling, 2007). Thus, the authors conclude that there is a significant gap between the researcher's definition and the layperson's definition. Therefore, a more subjective definition of the concept itself and more attention to people's perceptions of their own ageing is proposed (Whitley *et al.*, 2016; Bandyopadhyay & Singh, 2023). The aim is also to compare objective and subjective criteria and to understand how

they can be combined to produce a criterion that is useful and effective for regional and global policies and practices of older people's support (Sato-Komata *et al.*, 2015; Brown & Bond, 2016; Plugge, 2021).

Subjective age, the personal sense of how old and vulnerable a person feels in difficult circumstances, is an important concomitant post-traumatic legacy of war. The question arises whether it is possible to base the success of older Ukrainians' ageing in war on objective indicators. Understanding the criteria, views, and priorities of older people ageing in war concerning their own health and successful ageing should improve the conceptualization and measurement of quality of ageing. This points to the importance of directly discussing with people their values and ideals related to the process of ageing in war, based on their personal concept of successful ageing. In addition, psychologists could consider re-evaluating people's ideas of what it means to age successfully, particularly in wartime. After all, the ability to change one's goals in accordance with changing social and personal circumstances can be a way to increase personal satisfaction with one's functioning. Successful ageing in wartime should be seen as a multidimensional construct consisting of both objective and subjective success – two independent but interrelated dimensions.

PROBLEM 8. THE INTERACTION (INTEGRATION) OF BIOMEDICAL AND PSYCHOSOCIAL CONTEXTS AND THE SHIFT TO MULTI-DOMAIN PREDICTORS OF SUCCESSFUL AGEING. PSYCHOLOGIZATION OF THE CONCEPT

As the results of the theoretical analysis show, the concept of successful ageing was formed on the basis of two approaches: psychosocial, which defines successful ageing through certain mental states (e.g., acceptance of death, life satisfaction), social connections and activities, etc.), and biomedical, which interprets it primarily as the prevention of disease and disability. In searching for a balance between these paradigms, a dilemma arises: what is the priority in assessing successful ageing in war – biomedical criteria or sociopsychological ones; whether illness or disability is an additional factor in the marginalization of a person in armed conflict. The concept of successful ageing is associated with longevity, the absence of disease and disability, and the prevention of the latter is a common criterion in studies of successful ageing (Kim & Park, 2017). Therefore, some authors argue that it excludes sick people or people with chronic diseases from consideration. Common criticisms of models of 'successful' ageing (Martinson & Berridge, 2015) include the stigma surrounding dependency and disability and the reductionist focus on physical and mental health.

The absence of illness or disability in old age is an almost unattainable ideal that few people can achieve (Strawbridge *et al.*, 2002). Most modern proponents of the concept of successful ageing acknowledge that it depends more on social and environmental conditions, on the lifestyle and environment that people choose, than on hereditary or purely biological factors. These conditions can be influenced, including avoiding negative factors and maintaining favourable conditions. Accordingly, age-related risks can be the subject of prevention, prevention by individuals, relevant social institutions, and the state as a whole. Recent studies such as R.A. Pruchno & M. Wilson-Genderson (2015) have shown that people with chronic diseases can also age successfully if they are socially active and psychologically well-adapted, even if they face a decline in physical and cognitive functions (Kim & Park, 2017). The authors emphasize the need to improve the J.W. Rowe and R.L. Kahn model with a more inclusive universal description of ageing (Petretto *et al.*, 2016). As an example, the model of successful ageing by Y. Young *et al.* (2009) and the model of selective optimization with compensation by P.B. Baltes & M.M. Baltes (1990) emphasize adaptive psychological and social mechanisms that can compensate for physiological health limitations. In particular, the model of Y. Young *et al.* (2009) provides a holistic perspective on successful ageing among people with chronic illness (Manierre, 2018).

Models of successful ageing often do not take into account the possibility of compensating for physiological limitations with social, spiritual and meaningful changes in later life (Martinson & Berridge, 2015). There is considerable variation in the rates of successful ageing between individuals, as well as a very diverse range of older people who actually age successfully (Kok *et al.*, 2015). This is due to the large number of multidomain predictors of successful ageing, among which psychological predictors play a significant role (Fernández-Ballesteros García *et al.*, 2010). The authors of L. Araújo *et al.* (2016) emphasize the significant role of subjectivity and psychological resources, especially in the "fourth" age. This allows talking about the trend of "psychologisation" of the concept of successful ageing, which is moving towards the definition of those traits and qualities that allow a person to age successfully. It can be considered the most significant and promising for the study of the essence of ageing in war. This trend allows suggesting some ways to build a model of successful, meaningful ageing for a person living in conditions of constant danger and threat. For example, current research often links successful ageing to the trait (coping strategy) of resilience ("résilientes"), i.e. a set of skills or abilities to overcome difficulties. Resilience is defined as one of the pillars of successful ageing (Merchant *et al.*, 2022). Instead of avoiding illness and disability, as in traditional models of successful ageing, resilience allows for adversity and determines what level of functioning a person can maintain (Behr *et al.*, 2023). The concept of resilience is useful for understanding how people cope with the typical challenges of life in the ageing period (Beeris *et al.*, 2022). Resilience factors (effective coping strategies, community resources, relationships, productivity, morale, religious beliefs, etc.) can be the subject of remedial work with older Ukrainians who are experiencing stress related to lifestyle and life events in war (bombings, sirens, news stories, etc.).

Related to the concept of resilience, the "concept of resilient ageing" can be a methodological framework for studying ageing in war. According to this concept, the prerequisites for resilient ageing are adverse and protective factors, and the main features are coping, endurance and self-concept (Hicks & Conner, 2014). One of the protective factors may be patriotism (Hamama-Raz *et al.*, 2022). It can be assumed that feelings of patriotic belonging, love, pride, and care for one's country can contribute to successful and resilient ageing. Thus, these concepts (resilience, resilient ageing) are important for understanding the psychological factors of experiencing the stress of war by older people. The theory of successful ageing leaves out spiritual issues, which in reality are key for many older people (McCarthy & Bockweg *et al.*, 2013). Therefore, there are attempts to develop a new concept of successful ageing, which involves full acceptance of the ageing process (Sato-Komata *et al.*, 2015), attention to herotranscendence and positive spirituality as mechanisms of successful ageing. The holistic view of successful ageing is that it should result in a new personal level characterized by a decreased interest in material things and a focus on spiritual things, which can contribute to personal growth and creative development (McCarthy & Bockweg, 2013).

The psychologisation of the concept of successful ageing is also linked to the lifespan approach to ageing and the life-cycle approach according to J.D. Stowe & T.M. Cooney (2015), which is important for most models of successful ageing (Menassa *et al.*, 2023). The idea of lifelong development suggests that the theory of mindful sustainable ageing, which considers the period of ageing as a stage of development, is conceptually close to the operationalization of successful ageing in war, with particular importance to internal processes of self-understanding, reflection, and various spiritual practices as the basis for such development (Nilsson *et al.*, 2015). In this context, to explain the successful ageing of Ukrainians in the context of war, it is worth relying on the model of proactivity of older people, which focuses on how internal and external resources contribute to maintaining quality of life in old age (Kahana *et al.*, 2012; Blanco-Molina *et al.*, 2021). The possibility of compensating for physiological limitations with psychological and social aspects also allows relying on the methodological potential of the concept of resilient ageing, which is based on adverse and protective factors, and the main features are coping, endurance and self-concept (Hicks & Conner, 2014). The concepts of resilience, meaningful sustainable ageing and resilient ageing can serve to build a Ukrainian narrative of resilience and self-sufficiency that simultaneously encompasses adversity, loss, positive gains, and the process of combining both positive and negative outcomes.

Reflective inquiry inevitably raises a number of questions for scholars interested in understanding successful ageing that includes war as a latent variable. What are the minimum criteria and definitions needed to describe successful ageing of Ukrainians in the context of war? How to reconcile different models of successful ageing in this study? How important is the individual perception of Ukrainians in defining indicators and criteria for their ageing in war? Under what conditions can older people age successfully, even in the face of war stressors? What accumulated internal or external resources can be relevant for actively addressing ageing issues? What primary interactions (e.g., social environment, personality traits, life course, self-assessment of successful ageing, etc.) should also be considered? Answers to these questions are essential for researchers and practitioners to further develop mental and physical health programmes for older people in war.

CONCLUSIONS

Over the past 50 years, "successful ageing" has become a globally recognized and influential concept that seeks to explain the ageing process. Over the past decades, it has evolved into a systemic, interdisciplinary model that seeks to explain the ageing process at different levels – political, social, physical, mental, and spiritual. However, contemporary literature contains almost no data on successful human ageing in periods of complex social change, such as war. As the analysis of the theoretical and methodological foundations of the concept of successful ageing has shown, numerous problematic and controversial issues hinder the answer to this query. Their identification is an important stage of methodological search, constitutes the scientific novelty of our study, and can contribute to both the development of the concept itself and its study in wartime.

The first group of these problems is mainly related to the theoretical and methodological definition of the concept. In particular, it is going about the vagueness of the concept of successful ageing with similar concepts, the blurring of the criteria for successful ageing and its operationalization. Despite all efforts, successful ageing still lacks a generally accepted definition, and its criteria often remain unclear to laypeople, researchers, and policymakers. This hinders the adequate use of the concept in specific research issues, including the study of successful ageing of older people in wartime. The second group of problems is related to the psychosocial and socio-cultural aspects of ageing in modern societies. The ideology of successful ageing provokes a set of ethical and social problems. These include an emphasis on personal control over the outcomes of late life and the existence of an implicit standard by which to assess the degree of "success" or "failure" of ageing. A related issue is the problem of objective socio-economic and socio-structural inequalities between people and the dominance of the Western model of successful ageing. The latter draws researchers to the idea of national, culturally determined narratives of successful ageing. The third group of issues is related to the diversity of predictors of successful ageing and the debate on the importance of its subjective, psychological, and spiritual determinants. Multidomain predictors of successful ageing are gaining recognition, and the importance of a person's subjective perception of the success of

their own ageing is growing, which is closely related to the problem of discrepancies between subjective and objective indicators of successful ageing.

The presented research was problem-solving in nature and identified the most important areas for further scientific research. Successful ageing is not an "ideal" description of a progressive path of development in old age. However, this concept contributes to the fight against negative stereotypes of ageing, ageism, and stigmatization of this population category. This is extremely important in a society that is defending its freedom through numerous trials of war. Therefore, it is becoming increasingly important not only to answer the above questions, but also to intensify practical measures to ensure an optimal quality of life for all older people and to broadcast the image of old age and ageing that meets the needs of our society.

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CONFLICT OF INTEREST

There is none.

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Анжеліка Володимирівна Коллі-Шамне

Доктор психологічних наук, професор
Університет дистанційного навчання у Швейцарії
3900, Шинерштрассе, 18, м. Бріг, Швейцарія

Херсонський державний університет
76018, вул. Шевченка, 14, м. Івано-Франківськ, Україна
https://orcid.org/0000-0003-1541-6079

Концепція успішного старіння в умовах війни: огляд західних наукових джерел

Анотація. Збереження повноцінного життя людини похилого віку, як найразливішої категорії населеня в часи збройних конфліктів, ставить перед науковцями безліч методологічних, теоретичних та практичних питань. Стаття є спробою проблемно-рефлексивного аналізу евристичності концепції успішного старіння, для дослідження старіння українців похилого віку в умовах війни з росією. У роботі представлено проблемно-орієнтований огляд сучасної західної літератури на тему успішного старіння. Крім базових емпіричних та теоретичних праць, значна частина теоретичного аналізу базується на результатах найбільш значущих метааналітичних досліджень із цієї теми. Методологія проблемно-орієтованого та інтегративного аналізу була використана для визначення того, які проблемні зони концепту успішного старіння можуть сприяти його вивченню в умовах війни. Розглянуто потенціал та обмеження сучасної концепції успішного старіння. Представлено вісім проблемних зон цієї концепції, які виявляють певні суперечності, дискусійні питання та прогалини, які одночасно є напрямами розвитку як самого концепту, так і його дослідження в умовах війни. Серед них: нечіткість критеріїв успішного старіння та його розведення з близькими за змістом поняттями; взаємодія біомедичного та психосоціального контекстів успішного старіння; межі відповідальності за успіх старіння в контексті дихотомії «людина – соціум»; соціально-структурні нерівності між людьми похилого віку та неможливість старіти однаково «успішно»; розбіжності між суб'єктивними та об'єктивними показниками успішного старіння; домінування західної моделі успішного старіння та нівелювання його культурної специфіки; інтеграція індивідуальної, суспільної та наукової концептуалізації успішного старіння. Проаналізовано найбільш перспективні теоретико-методологічні концепти та теорії успішного старіння, які найбільш дотичні проблематиці старіння в умовах війни. Наведений у статті огляд літератури сприятиме привернення уваги до проблеми покращення та збереження повноцінного життя людини похилого віку в умовах збройного конфлікту. Результати розвідки стануть у нагоді науковцям та практикам задля подальшого створення програм охорони психічного та фізичного здоров'я людей похилого віку в умовах війни

Ключові слова: збройний конфлікт; проблемно-рефлексивний аналіз; старіння; похилий вік; ейджизм; психічне здоров’я; геронтопсихологія; метааналіз

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Matthew Halma*

PhD Candidate
Free University of Amsterdam
1081 HV, 1081 De Boelelaan, Amsterdam, Netherlands

Master of Business Administration
Institute of Management Foundation
01419-002, 1293 Alameda Santos Str., São Paulo, Brazil
https://orcid.org/0000-0003-2487-0636

The entrepreneurial revolution in science research and education

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*Corresponding author

Abstract. There are significant challenges in both student and researcher engagement in both education and research, and one contributing factor is the lack of autonomy that each person experiences. This work charts a new path, whereby students and researchers are free to pursue their own interests, and the role of the teacher or university is to support and guide them. This article is a narrative review examined the challenges faced by the educational industry and how they can be remedied through student led, entrepreneurial education, which can take place online. This article examines the impacts of learner autonomy and present alternative apprenticeship models which can be performed inexpensively and produce value independent of the education itself. Apprenticeship, self-directed and project-based pedagogy provides pupils with the skills that they need to succeed in the modern world, differing importantly from standard education, where the relevance to employers is decreasing. While currently, scientific institutions face a crisis of innovation and a related crisis of public trust, entrepreneurial education provides a means of addressing these related problems. These changes have implications at the institutional level, as well as for the relationship between science and society. During budgetary crises, these changes present ways to provide an improved educational experience at lower cost. Overall, entrepreneurial education may be an effective and cost-effective way to perform research and to train pupils for the skills needed in the 21st century. The work provides a roadmap to how existing educational institutions can adapt to the sea change underway with online education, as well as advise new entrants on best practices

Keywords: entrepreneurship in education; science education; scientific research environment; pedagogy; project-based education

INTRODUCTION

One purpose of education is to prepare the graduate to achieve a greater level of success, productivity, and achievement than they otherwise would without the education. This research explores the current trends in education away from traditional degree-granting universities towards learner directed, "entrepreneurial" education. This research provides a practical guide for how learning institutions can incorporate greater learner autonomy in education and research, and the value of an entrepreneurial outlook to scientific research and education.

The value for the cost of a university education has increasingly come into question, evidenced by decreases in undergraduate enrolment since their peak in 2010 (National Center for Education Statistics, 2022). Enrolments in 2021 were 15% lower than in 2010, and the trend of decline predates the coronavirus pandemic. Additionally, the importance of a college degree is declining; the percentage of US adults who view a college degree as "very important" fell from 70% in 2013 to 51% in 2019, and this decline is most pronounced in young adults (Marken, 2019).

Simultaneously, fewer jobs require college degrees. In the USA, the percentage of jobs requiring a college degree declined from 51% in 2017 to 44% in 2021 (Levanon, 2022). Importantly, the university is increasingly becoming unaffordable, owing to tuition increases; in inflation adjusted dollars, total average undergraduate tuition, including fees, room, and board has increased 175% from $10,097 (2021/22 dollars) in 1980 to $27,764 in 2020 (Digest of Education Statistics, 2023). Likewise, the debt burden for students increases; half of student borrowers still owe at least $20,000 after entering school 20 years ago (Hanson, 2023).

Students are increasingly getting a poor return on investment for the time, money, and energy that they spend on a university degree (Bleemer *et al.*, 2021). As tuition increases, the earning potential of a degree is decreasing, furthermore, lower cost alternatives are entering, including online education, which can often achieve significant price improvements compared to the price of an in-person education (Chirikov *et al.*, 2020). With these factors coming into play, universities must innovate to stay relevant. The current value provision of universities provides several value streams: The education itself, the degree credential, and the university experience, including networking opportunities. The value of education is being competed downwards, with lower cost or even free resources offering the exact same content (Haleem *et al.*, 2022). While many of the other resources do not have the strong credentialing function, increasingly employers are valuing online certifications and competence testing as opposed to a degree (Carnevale *et al.*, 2020). During the Covid-19 pandemic, this issue of the value of a university degree was exacerbated as many universities closed their in-person classes, offering online classes only, which while similar in format and value to many online alternatives, remained at the same price as their in-person offerings before the pandemic (Chakraborty *et al.*, 2021). Many people took issue with this, pointing out that while online-only represents a significant degradation in the quality of education, it was not accompanied by a significant decrease in price. Presently, the market for higher education is typically thought to be restricted to universities, and due to the large demand of students for education and the limited supply of universities, in terms of lecturers, buildings and resources, prices have gone up (Bleemer *et al.*, 2021). Furthermore, the barriers to starting an accredited, degree granting university keep market entrants out. New entrants face the challenge of reputational development, which typically requires five years at minimum. Regulatory forces exist which advantage the currently established players.

Here, new entrants have the advantage of providing online education, which obviates many of the capital-intensive costs of setting up a learning institution. Furthermore, e-learning increases accessibility, as classes can take students from anywhere in the world, so long as that person has at least transient access to the internet (Valverde-Berrocoso *et al.*, 2020). Current primary and secondary education provides the government funded school as the main option, and private school is out of reach financially for many people. However, much of the educational needs can be supplemented by online courses, which can be delivered at low cost. If necessary, one can also, while keeping fixed costs low, rent out venues or rooms in order to teach classes, or the education can be given in the owned spaces (dwellings or businesses) of the teachers, pupils (in the case of adult education) or their parents (in the case of primary or secondary education). While the shift away from a physical campus is important for keeping fixed costs low, the educational institution may choose to create a physical campus as they grow in numbers and resources. Importantly, the shift towards online education allows competitors to enter the market and significantly lower capital requirements. Lowering capital requirements allows for new entrants to provide an online experience and compete with incumbent education.

This article presents a narrative review examining the challenges faced by educational institutions by competitors in online education, as well as the relatively lower value of a university degree in this new environment. This study aimed to investigate how educational institutions can adapt to the growing scepticism of students and employers about the value of a university degree, and how education can adapt to this environment. The study used the methods of analysis, synthesis, generalization, and systematization. A search was conducted for sources in international databases, such as Scopus, related to project-based education, student engagement in research, etc. The 64 most relevant ones were selected, and this paper was written on their basis. This article then examines examples of schools enabling greater learner autonomy and presents alternative apprenticeship models which can be done with low capital requirements and their learner outcomes, presenting a qualitative comparison between entrepreneurial education and standard education. The article then discusses the implications of this educational model for science and the education sector.

EDUCATIONAL TRENDS: SELF EDUCATION AND MICRO-CREDENTIALS

Increasingly, parents are embracing homeschooling, unschooling and alternative pedagogies including Montessori (Lillard & Else-Quest, 2006) and Waldorf schools (Stehlik, 2019). The growth in these alternative forms of education displays a general dissatisfaction with the quality of children's education. Many high school graduates lack basic literacy, numeracy, critical thinking, and reasoning, and often need to take remedial classes when they reach university (Gorzycki *et al.*, 2016). Enforcement of standards for education requires more effort than merely passing students, and the educational quality suffers. Though a lagging measure, the value of a degree lowers, as it takes some time for the current crop of students to fully penetrate the job market to reflect their education upon their employers and peers. Grade inflation has been an issue, as pupils and their parents increasingly see education as a product that one purchases, and not a process that one must take active ownership in (Johnson *et al.*, 2006). The consumer

model also motivates a passive approach to education by the students, where they study merely to achieve the end of graduation. Many researchers, parents, and educators have showcased the importance of learner directed education, as this provides the passion and self-direction to learn something (Brookfield, 2009; Lee *et al.*, 2016). When students learn what they are interested in, discipline and self-direction take care of themselves. Here the role of the teacher becomes less like a singular authority transmitting information unidirectionally, but a coach in dialogue with the students to help them to discover their proclivities, gifts, interests, as well as the possible value that they can provide others (van Nieuwerburgh & Barr, 2017; Beard & Wilson, 2018). Combining these attributes with the willingness of people to pay for the skill produces the Japanese concept of "Ikagai", which is the intersection between one's interests, abilities, an unmet or underserved want in the world, and people's willingness to pay for the work that the pupil does (Kumano, 2018).

This model allows students to reach an optimal vocation for themselves. Courses are imposed on students through standardized curricula. The justification is that students need to take a variety of course requirements in order to provide a well-rounded education. While the student has some say in the courses that they take, they choose from the options presented to them, and are passive agents in a static course structure. Often, a justification presented for faculty designing curricula is that if the students were to decide, they would just make things extremely easy for themselves. While this may hold for the cases in which students are not engaged in course content, when there is alignment between the skills taught and the student's interest, students often go well beyond what would be the mere requirement for passing, or even passing with honours, in a standard class. However, some balance and guidance from a teacher/coach is important. While some students have a clear and definitive idea what their interests are and what their learning journey will look like, many pupils do not know their interests or may know their interests but have not mapped out a learning journey (Bjørke & Mordal Moen, 2020). This process of interesting discovery occurs by pupils exploring topics that they are curious about. If they are not curious about anything, they can notice this, or, with the agreement of the pupil, the teacher can suggest topics for them to investigate, based on the coach's assessment of the pupil's aptitudes and interests. With interest comes greater exploration, and the teacher/coach can be extremely helpful here in charting a learning path together with the pupil. Increasingly, the availability of information means that the teacher is less in this provider role of transmitting information, for this has both limited utilities, and their efforts are better directed towards coaching the pupil in following their own interests. This need not be restricted to any way to learn more, including reading books, watching educational videos, attending courses (online and in person), workshops and seminars, and taking an apprenticeship with someone practising the skill at a higher level. Here, the environment becomes more entrepreneurial. On the demand side, pupils are choosing their own education and designing their own "curriculum" and incorporating multiple different formats, as opposed to being restricted to the standard pedagogical mode of a classroom (Sorgman & Parkison, 2008). On the supply side, advanced practitioners and teachers can design workshops and charge fees for these. Group workshops often produce more favourable economics and can also have the advantage of the pupils teaching each other and being able to participate in exercises. Smaller workshops or class sizes can also be beneficial, as it allows a deep dive into a skill set which may not be reached in a classroom with other pupils. Practitioner-teachers may eschew at least a portion of monetary remuneration by requesting help from the pupil, who can both help with some less advanced aspects of the business while learning. Here, as long as there is communication and agreement, both parties' benefit. In some cases, the coach or a third party may wish to be at the table when the arrangement is made, to ensure that the arrangement is fair for both parties. Apprenticing does require effort on the part of the mentor, and continuation and enthusiastic participation requires that the arrangement be a win-win for both parties.

There are numerous benefits to an apprenticeship model and project-based learning over traditional education (Muehlemann & Wolter, 2014; Wolter & Mühlemann, 2015; Kokotsaki *et al.*, 2016). Students graduate with very practical skills that are already in demand in the marketplace, otherwise the apprenticeship mentor would not be employed. The pupil may continue to collaborate with the mentor for some time afterwards, until they feel confident and have enough resources to begin on their own. This emancipation is the ideal outcome to come from education, where the former pupil now has learned everything, they need to know to pursue their craft, as well as be paid for it enough to continue and to invest in the furthering of their education. Furthermore, the former pupil can now take on apprentices, which is especially valuable to someone starting out. While they may be less senior than some people, pupils learn the business at the early stage, which is the stage that they are entering. As the mentor rises in stature and competency, he may wish to mentor more advanced pupils, and will differentiate in important ways from the other practitioners in his industry. This differentiation means that the mentor can then teach her own method, as she has achieved a level of mastery where her expertise is respected. The practitioner can then begin creating educational products, and these can reach far more people than a one-on-one mentorship arrangement can. Furthermore, these products intended for a broader audience may introduce interested people to the craft. This view of education fundamentally values sharing of knowledge. Many people selling educational products online have very high-quality free content, which they can fund through monetizing higher touch products. This allows people the guidance they seek in executing their plans.

ENTREPRENEURSHIP IN RESEARCH: STUDENTS AT THE FRONTIER

While the intersection of entrepreneurship and scientific research typically is associated with the valorization of the scientific work, it is worth fostering an entrepreneurial orientation for scientists to be more capable at self-directing their own research. There is a transition where an early career researcher goes from as a PhD student or postdoc to an early faculty position where they are expected to fund themselves and define their own project. Here, scientists often find that the skills they previously learned, do not prepare them for this transition (Haubenstock, n.d.).

Beginning a lab is like starting a business, and the management is similar. One must deal with hiring and managing people, spending money, and keeping the venture profitable, while negotiating with the institution, suppliers, and generating support for research. While some researchers do not wish to learn this, some stay as postdocs, preferring the other factors be covered by their lab head. However, this limits their effectiveness as well as their own personal and professional growth. While some may wish to stay where they are due to understandable factors, many postdocs feel dissatisfied in the long term, feeling they have not reached their potential, and that their compensation is too low. It should be said that many postdocs have achieved an elevated level of technical skill, and it may be their most effective position to continue doing this. However, innovation can occur here as well. For example, at an elevated level of competency, they can see if they can automate the process or teach others in the process. Putting out educational products is a way for a laboratory to provide value to the wider community, as well as to provide a source of incoming revenue. Communicating with the public is also necessary; scientists are often implored to become "science communicators" and speak to the public, but public engagement in science events and discourse is limited (Weingart & Guenther, 2016). About half of scientists have some contact with journalists, and 47% of scientists disseminate their research through social media (Pew Research Center, 2015). Still, given the tenuous relationship between scientists and the public, these efforts do not engage the public sufficiently (Intemann, 2023). Achieving a challenge-skills balance, as pointed out by Mihaly Csikszentmihalyi's book Flow in one's efforts, is necessary for one to grow in one's field (Csikszentmihalyi, 1990). While someone who is taking on a new challenge may feel inadequate to face the challenge, at least at first, they do not feel disengaged or like they are stagnating. If the challenge-skills balance is chosen well, then they will experience rapid growth and learning, and at some point, they can look back at having conquered the challenge of learning a new skill.

Universities and granting agencies can support their academics by granting them autonomy in choosing which research directions to take (Jabrane, 2022; Niemczyk & Rónay, 2023). Granting agencies may wish to define a project, and that is fine. By granting autonomy, trust in the capabilities of the researcher is communicated, and the researcher has the confidence they need to take on large challenges. On the other side, academics who do not rise to the challenge should be removed, as they both squander resources and set a poor and highly contagious example to their peers and students (van Mook *et al.*, 2010). Institutions of teaching and research must prioritize excellence and communicate clearly that mediocrity is not allowed so long as one carries this affiliation. With this, genuine excellence can develop in institutions, as the culture pushes people to be greater, rather than the culture of mediocrity exemplified by bureaucracies and most clearly showcased in coffee mugs which say things like "I can't wait for the weekend". Mediocre employees must be removed; they should first be given the choice to step up, though this is a gesture, as those truly willing would take the first steps themselves. If a member of the faculty feels they need help to achieve mastery, this can be answered, so long as the impetus and onus lies with the faculty member. Nobody is trying to hold onto a hiring, when there is an obvious misalignment. Academics need to be free to apply for grants and to initiate interesting projects, capable of reaching out to unconventional funding sources, and communicating through the public via multiple channels. The university can highlight examples of excellence in research, communication, and practice, and invite those with demonstrable excellence to share their knowledge.

Regarding self-development, the university currently focuses almost entirely on mental aspects. While lately there are some initiatives towards mental health, these are focused on coping strategies and do not provide an authentic experience of mastery and growth. Physical exercise should be emphasized, and the university should not sell unhealthy food on its campus, as these empirically undermine learning and health. The easiest way to adopt change is in the cafeterias, which serve as a centralized location to serve students and staff. This food should be of high quality, organic, and unhealthy food, such as soft drinks, should not be available (Hakim & Meissen, 2013). Ideally, the food should be grown locally, if not right on campus as part of practical education in agriculture, horticulture, gardening, animal husbandry and culinary arts (Ratcliffe *et al.*, 2011). To not engender passivity, the students' union may take charge of the cafeteria to ensure that the requisite functions for service are fulfilled, including cleaning (Singapore Introduces Daily Cleaning Duties for Students, 2016). Students are free to organize it how they wish, but they are responsible for its operation. In this model, all parts of the day can serve as educational opportunities, and practical skills are important to learn. Cooking is one of the most important skills that anyone can have, as home cooking is associated with greater health outcomes and can provide a satisfying social experience and way to connect with others. Training students to fund their own research and manage their labs is an essential element which is absent from their education currently, which emphasizes technical skills. Often, technical people believe that these skills are "beneath" them in some way, as evidenced by their designation as

"soft skills". Communication and people skills are vital to having an impact beyond being a technically competent individual. Additionally, educational experience should teach the attributes of taking responsibility, of being self-directed, and of intelligent risk taking. Boldness is reprioritized in schools, which reward obedience, penalize collaboration, maintain that there is one correct answer and approach, and punish mistakes (Table 1).

Table 1. Differences between science as currently practised and entrepreneurial science

Science as practised	Entrepreneurial science
Obedience	Respectful challenge
Risk aversion	Risk taking
Mono-disciplinary	Multidisciplinary
Individual	Collaborative
Scarcity	Abundance
One correct approach	Multiple approaches
Teacher as authority	Teacher as mentor
One-way communication	Dialogue
Mistakes are to be avoided	Mistakes are learning opportunities
Mediocrity	Excellence/mastery
Rewarding meekness	Rewarding valiant attempts
No standards	High yet achievable standards
Implicit denigration of student capabilities	Believing students can achieve more
Sees duty as measuring and sorting static capabilities	Sees duty as growing dynamic student potential
Education detached from real world	Education for the real world
Highest possible achievement: perfect grade	Unlimited upward potential
Prescribed	Self-directed
Learning toward narrow test	Learning towards project application
Intangible, largely forgotten outcomes	Tangible outcome
Teacher does not practice subject	Subject teacher is practitioner
Fixed mindset	Growth mindset

Source: author's original work

The many differences in approaches between entrepreneurial education and standard education are highlighted in Table 1. Self-directed and project-based learning create significant positive benefits on academic achievement for the pupils in these programs (Zhang & Ma, 2023). The ethos of traditional schooling has been suitable for industrial production; however, it fails to teach the skills and mindsets for success in today's world. One of these most important orientations is for pupils to take initiative and responsibility for their own learning, which will often mean signing up for a course or mentorship opportunity. It is even possible for self-directed pupils to advance the frontier of a field. Student capabilities, which are underestimated and underutilized in current school systems, can be better developed by incorporating entrepreneurial elements in education.

SCIENCE IN THE REAL WORLD: THE INTERFACE OF SCIENCE WITH THE PUBLIC

Scientists need to leave the ivory tower and interface with the world to gain support for their research (Halma & Guetzkow, 2023). The public is no longer willing to support nameless research and vague research agendas. The future will require researchers to actively sell the public on their research and to gain funding through voluntary provision of funds, and not government grants which are assumed endless. Lower levels of infrastructure costs motivate "zero-based" thinking in science, meaning that scientists are never guaranteed a continuation of their position. While the project should be contracted out and funded in advance ideally, and the researcher should have time, if they are not making progress, it will become apparent as the deadlines pass without the accompanying milestones. In this case, they may either come back for more support, lower the scale of their project, or possibly abandon it altogether. Investors from the public must also perform due diligence on projects and people, and a percentage will fail. This also enables a shift away from institution-supported narratives, which has come to the fore when official pronouncements about coronavirus and the response, were demonstrably wrong, while amateurs made accurate predictions and assessments that are still being confirmed today (Shir-Raz *et al.*, 2022; Halma & Guetzkow, 2023).

Entrepreneurship relies less on the opinions of experts, and the market is the final judge of success. The non-entrepreneur looks at the economy and assumes all the roles have been filled already, where the entrepreneur finds and creates a role for herself. This is a fundamental difference, and while the latter is less secure, there is far more potential value in people pursuing their own research directions, instead of making incremental improvements suggested by an expert. This is echoed by research

showing that as fields become more established, they also become less disruptive (Park *et al.*, 2023). Given this finding, researchers emphasize creativity training in science (Yanai & Lercher, 2023). Informal and hobbyist science, termed "Night Science" by Francois Jacob, is more interdisciplinary (Jacob, 1995). In several publications, interdisciplinary science is associated with greater impact than its monodisciplinary counterparts, as long as the fields are sufficiently proximal (Yegros-Yegros *et al.*, 2015). Innovation is occurring in the world of bits, while innovation in the world of atoms still faces many challenges. While technology has putatively improved, improvements in real services have not manifested. For example, as medical spending increases, there is not a concomitant increase in population health quality (Tanne, 2023). Despite the tendency for technological development to drive down costs over time, people are increasingly struggling to pay for necessities (Gooding, 2022). One would imagine that with improvements in digital dissemination of lessons, as well as freely available tools and lectures, the cost of education could see decreases, or the quality could see significant improvements. Despite newer technologies, a large scale, 20-year survey from 1988 to 2008 found no significant improvement in undergraduate scientific literacy over the time period (Impey *et al.*, 2011). Several thinkers such as B. Masters & P. Thiel (2014) have postulated that society is currently in a state marked by lower levels of innovation, which echoes other observations of declining rates of innovation (Huebner, 2005). Parallel observations in economics show declining American business dynamism (Akcigit & Ates, 2021).

This would suggest that there is a declining rate of valorization from science, or that the current valorization of science has a lower impact on people's lives. One potential counter to this trend is the adoption of lean startup methodologies in science (Yordanova, 2022). In the example of life sciences, it is estimated that 85% of research funds are wasted, which amounts to an estimated $200 billion USD in the USA in 2010 (Chalmers & Glasziou, 2009; Macleod *et al.*, 2014). Even optimistic estimates making the case for science find a startlingly low return on investment for publicly funded research and development; estimates for the level of National Institutes of Health funding to produce a single patent range from $4.3 million to $40 million (Kalutkiewicz & Ehman, 2014; Azoulay *et al.*, 2019). Within academic economics literature, the value of public investment in research and development (R&D) is equivocal, despite this being the primary justification for the public funding of research (Toole, 2012; Yin *et al.*, 2022). In the USA, the current research funding environment emerges out of the Vannevar Bush era, which prioritized funding both applied and basic science, and importantly, established science as a permanent institution under governmental aegis (Miri, 2021). This established a permanent role for the government to guide the technological development of the nation and an associated bureaucracy to enable research deemed in the public interest. While the current funding system possesses some market mechanisms such as funding competitions, still, the system possesses characteristics of central planning, with all the attendant inefficiencies that that carries (Stringham, 2001).

This discussion of wide-scale inefficiencies calls for entrepreneurial science to be instantiated not only at the level of the individual scientist, but that it permeates the current systems for scientific knowledge production. Little literature exists on the explicit comparison between public funding models for science vs. private funding models, though the analogy of industrial R&D exists. The association between private R&D expenditures and the number of patents is positive, while there is no association between governmental R&D expenditures and the number of patents (Paula & Silva, 2021). The major difference between private and governmental R&D is that private R&D is constrained by the need for the firm to be profitable, which usually leads to them addressing a consumer need. Levels of private R&D funding are disciplined by the market, whereas governmental R&D investment has a less pressing need to address a consumer need and is more insulated from market forces. This work suggests that the introduction of market mechanisms into research can increase the level of innovation, as parametrized by the number of patents issued. Increasingly, scientists are asked to weigh in on issues which affect the public without being accountable to the public. For example, during the Covid-19 pandemic, views dissenting from public policy were denounced as anti-science (Bozeman, 2022; Shir-Raz *et al.*, 2022; Harambam & Voss, 2023). While some suppositions from the opposition were outlandish, others gained credibility, such as the possible laboratory origin of Covid-19, the equivocal effectiveness of masks (Jefferson *et al.*, 2023), and the dangers associated with mRNA vaccination (Piché-Renaud *et al.*, 2023; Looi, 2023). Surveys show the public desires a greater level of transparency and accountability in scientific research (Funk, 2021).

Science which interfaces with the public and public (i.e. market) needs is more likely to produce a novel and useful innovation, which may be a patent. Insulation of science from public engagement and market discipline is deleterious to the institution of science, as it can breed both distrust from the public, or irrelevance, as exemplified by the negligible contribution of governmental R&D to the patent productivity of a nation (Paula & Silva, 2021; Halma & Guetzkow, 2023). A current source of tension between science and the public is the perception that research and education are squandering limited funds, and scientists are in turn "insulated" from the same market that most people live in. This critique is not baseless, as much of scientific research is of dubious value, given its low citation rate. It is important that, if science is to depend on public funds, that it ultimately be accountable by public audit into the value of the research and the allocation of resources. In a healthy and mutual beneficial relationship between science and the public; the public believes that it is receiving an adequate return on investment through the value generated

by scientific research, and valuable work by scientists is adequately supported. A restoration of scientific accountability to the public pays great dividends for social cohesion, and market mechanisms enable limited resources to be allocated towards scientific projects. Institutional science has relied on large public subsidies, and the value of public investment is controversial. Science needs to be oriented towards providing value.

CONCLUSIONS

Higher education is currently in the midst of a crisis of legitimacy, with its student/customer base less willing to pay the premium prices associated with university education. Increasing competition from online course providers, and improvements in online course quality, challenge the effective monopoly that universities have exerted on specialized knowledge and training. Online education is usually much more affordable, and often free, making it accessible across the world. These knowledge dissemination methods are likely to expand access for low income people, while established universities suffer from bloat in their expenditures. Increasingly, training will be learner directed and project based, as several lines of evidence demonstrate that these techniques manifest improvements in the student experience. Similar trends exist in primary and secondary education, as interest rekindles in homeschooling and alternative forms of education, such as Waldorf or Montessori schools.

Empowering the entrepreneur in each scientist is an important and vital task with wide-ranging implications. It is also possible, requiring a new school system, which has been made far more tractable through advances in online education delivery. Once certification and accreditation are made robust, alternatives will be able to compete against existing schools; both in terms of the educational experience and the subsequent value of the diploma. Employability and value of the credential in the marketplace will eventually come to favour the higher value credential, which will be the current alternative, given some time to grow and demonstrate its value. Science currently faces a crisis in legitimacy, as a sceptical and wary public are less trusting of institutionalized science. The means to address this is through public-interfacing science, which also has significant correlates with the entrepreneurial need to interface with market opinion. While scientists have a duty to remain in integrity, which means not merely telling the public what they want to hear, they should be open to presenting their science and recommendations for the public. Instilling an entrepreneurial ethos in science is important to keep it grounded in pragmatism, and will make for more efficacious use of limited research funds. The adoption of a more entrepreneurial mindset in science will provide many knock-on benefits in the trust between the public and scientists, while removing unnecessary expenditures forms the public purse, as these sectors will surely see a contraction. Entrepreneurial education is not only future-proof, but it welcomes the future by creating it. Further research requires discovery of efficient implementation, and the factors which predispose pupils, as well as educators, towards success in a more entrepreneurial educational environment. While metrics such as income, skill level, and grades can measure student progress, research on the impacts of differences in implementation can be better understood. For example, there may be cultural differences by geography, such as the urban/rural divide, which can influence the success of such a system. Additionally, further work can be performed to adapt the curriculum and teaching approach to a skill set specifically. In conclusion, entrepreneurial approaches to education are potentially transformative, and obviate many of the societal crises affecting science and education. Entrepreneurial focuses on education can potentially improve the pupil experience and increase the quality of their education. These approaches should be explored for any educator who values the experience of their pupils.

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This work is for those renegades who have been part of this movement without even realizing it, and those who still dream.

CONFLICT OF INTEREST

The study's author, Matthew Thomas J. Halma, declares no conflicts of interest.

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Метью Халма

Здобувач ступеня доктора філософії
Амстердамський вільний університет
1081 HV, вул. Де Болелан, 1081, м. Амстердам, Нідерланди

Магістр ділового адміністрування
Фундація Інституту адміністрації
01419-002, вул. Аламеда Сантос, 1293, м. Сан-Паулу, Бразилія
https://orcid.org/0000-0003-2487-0636

Підприємницька революція в наукових дослідженнях та освіті

Анотація. Існують значні проблеми із залученням студентів та дослідників як до навчання, так і до наукових досліджень, і один з факторів, що призводять до такої ситуації, це брак автономії, з яким стикається кожна людина. Ця робота окреслює новий шлях, на якому студенти та дослідники можуть вільно розвивати власні інтереси, а роль викладача або університету полягає в тому, щоб підтримувати й направляти їх. Ця стаття – наративний огляд, у якому розглядалися виклики, з якими стикається освітня галузь і те, як їх можна вирішити за допомогою підприємницької освіти під керівництвом студентів, яка може реалізуватися в режимі онлайн. У статті вивчено наслідки автономії учнів і представлено альтернативні моделі навчання, які можуть бути реалізовані недорого і бути корисними незалежно від самого освітнього процесу. Учнівство, самокерована та проектна педагогіка надає учням навички, необхідні для досягнення успіху в сучасному світі, суттєво відрізняючись від стандартної освіти, актуальність якої для роботодавців знижується. Тоді як наукові установи стикаються з кризою інновацій та пов'язаною з нею кризою суспільної довіри, підприємницька освіта є засобом вирішення цих проблем. Ці зміни мають наслідки на інституційному рівні, а також для відносин між наукою та суспільством. Під час бюджетних криз, як правило, відбувається скорочення обсягів фінансування підприємницької освіти. Робота надає дорожню карту того, як навчальні заклади можуть адаптуватися до кардинальних змін, що відбуваються з онлайн-освітою, а також консультує нових абітурієнтів щодо найкращих практик

Ключові слова: підприємництво в освіті; природничо-наукова освіта; науково-дослідницьке середовище; педагогіка; проєктна освіта

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Inna Shyshenko*

PhD in Pedagogical Sciences, Associate Professor
Sumy State Pedagogical University named after A.S. Makarenko
40002, 87 Romenska Str., Sumy, Ukraine
https://orcid.org/0000-0002-1026-5315

Tatyana Lukashova

Doctor of Physical and Mathematical Sciences, Professor
Sumy State Pedagogical University named after A.S. Makarenko
40002, 87 Romenska Str., Sumy, Ukraine
https://orcid.org/0000-0002-1465-9530

Maryna Drushlyak

Doctor of Pedagogical Sciences, Professor
Sumy State Pedagogical University named after A.S. Makarenko
40002, 87 Romenska Str., Sumy, Ukraine
https://orcid.org/0000-0002-9648-2248

Yuriy Hvorostina

PhD in Physical and Mathematical Sciences, Associate Professor
Sumy State Pedagogical University named after A.S. Makarenko
40002, 87 Romenska Str., Sumy, Ukraine
https://orcid.org/0000-0002-8354-944X

Ways to develop soft skills in pre-service mathematics and physics teachers when studying certain topics of olympiad mathematics

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*Corresponding author

Abstract. The development of soft skills in pre-service teachers helps to improve the quality of teaching, create a positive classroom environment and ensure an individualized approach to learning. The integration of soft skills, in particular flexibility and adaptability to change, helps teachers to respond effectively to new teaching methods, technological innovations and the requirements of the modern educational environment. The authors of this article aimed to investigate the possibilities of developing soft skills within the educational components of the training programme for pre-service mathematics and physics teachers. The methodological basis of the study was the analysis of scientific literature, synthesis, formalization of scientific sources, description, comparison, and theoretical generalization of own pedagogical experience of teaching the course "Olympiad Mathematics". The results of the study reveal some ways of developing soft skills of future masters of secondary education of Sumy State Pedagogical University named after A.S. Makarenko in the process of studying the course "Olympiad Mathematics". At the same time, among the various topics of the course, the topic "Proof of Inequalities" was singled out. The peculiarities of applying the following methods and techniques to the proof of inequalities in the context of development of soft skills are revealed: the method of strengthening (weakening) of inequality, the method of mathematical induction, the Malikov's method, the method of transforming the common term in sums and its evaluation, the method of evaluating the terms of the product and introducing an additional factor, the method of applying the properties of functions to the proof of inequalities, the

method of using the properties of the definite integral of a certain function on a segment. It has been found that the most common methods of proving inequalities have wide possibilities in the context of development of soft skills. Each of the methods of proving inequalities discussed in the article is illustrated by relevant examples with detailed explanations. It is proved that this topic opens up wide opportunities for the acquisition and development of a number of soft skills. The research allows identifying specific ways to improve soft skills in pre-service mathematics and physics teachers, which are practically significant for further development of these professions when studying specific topics of the "Olympiad Mathematics" course: using group work formats during seminars, problem-based learning in mathematics, applying digital technologies in the study of Olympiad Mathematics, self-analysis and reflection, using mentoring support technology, public speaking during seminars with presentations of own solutions

Keywords: professional training of pre-service teachers; development of hard and soft skills; future masters of secondary education; study of Olympiad Mathematics; proving inequalities; techniques for proving inequalities

INTRODUCTION

The evolutionary processes caused by the transition of humanity from an industrial to an information (post-industrial) society, as well as various challenges faced by the world in recent years (russia's military aggression against Ukraine, the COVID-19 epidemic), which require the transition to the use of various online learning platforms, pose an acute problem for education to create modern educational technologies and search for alternative forms of education, develop an innovative strategy for teaching and upbringing, etc. This means a radical change in the goals and content of education, a transition from an educational model aimed at developing knowledge, skills, and abilities to the use of innovative educational models, which is possible only if the forms and methods of managing educational processes are updated. With the transition to a post-industrial society, the knowledge, skills, and competences that future professionals must acquire in higher education institutions (HEIs) have undergone a significant transformation. The ability to use digital technologies and relevant applications, collectively referred to as digital literacy, as well as foreign language skills, are moving from the category of important qualities of modern professionals to the category of instrumental skills and competences that are as necessary as language literacy.

In the scientific discourse, the term "soft skills" is often used, which is interpreted by Ukrainian scholars as "soft skills", "flexible skills", "success skills", "social skills", etc. Unlike "hard skills" (which include specialized knowledge, skills, and abilities required to perform specific professional tasks), which are easier to define and measure, "soft skills" are quite difficult to directly identify, test and demonstrate. S. Keng (2023) studied the relationship between academic performance (the degree of development of hard skills) and soft skills. He concluded that soft skills can reduce differences in academic performance due to differences in cognitive abilities. In particular, this is why stakeholders pay attention to soft skills when hiring specialists and the accreditation of HEI study programmes takes into account how the study programme ensures the acquisition of soft skills that meet the goals and learning outcomes of higher education students during their studies at the HEI (Borodina *et al.*, 2020; Rudeshko, 2020; Munir, 2021). According to N.A. Tarasenkova (2019), soft skills include a variety of knowledge, skills, experience, and attitudes that cannot be automated as a whole. These aspects can be manifested as intuitive, non-verbalised forms of knowledge and skills, and often require conscious and subconscious (sometimes even superconscious) support in different situations. In many cases, the use of soft skills involves the deployment of a whole system of actions that may include both conscious and subconscious aspects, and partial verbalization, at least for some of their fragments. The study by M. Danao & K. Main (2023) identified 11 representative soft skills that are not directly related to a specific industry as non-specialised, career-important supra-professional competencies responsible for job success and high performance. They include critical thinking, complex problem-solving, creativity, interpersonal skills, people management skills, judgement and decision-making, emotional intelligence, customer focus, negotiation skills, and the ability to learn new things quickly and easily.

Typical soft skills can be summarized as "4Cs" – collaboration, communication, creativity and critical thinking (Thornhill-Miller *et al.*, 2023). In the study by N. Foster & A. Schleicher (2022) considered a theoretical model of creative thinking implemented at the level of specific tasks, as well as possible ways to measure some aspects of creative thinking. H. Tseng *et al.* (2019) studied the impact of soft skills on the academic performance of business students in online learning.

The problem of soft skills development is of particular importance in the system of training pre-service teachers as

the basis for the implementation of the professional standard of a teacher (Bezlyudna & Dudnyk, 2021), as in this case soft skills and hard skills play an equal role, as emphasized by (Agcami & Doganii, 2021). It is important to improve teachers' own professional skills through the development of skills required for direct communication with children within the school curriculum. Continuing this study, the authors of this article aimed to explore the possibilities and ways of developing soft skills of pre-service mathematics and physics teachers during their professional training.

MATERIALS AND METHODS

To achieve the goal, the following research methods are used: analysis of scientific literature, synthesis, formalization of scientific sources, description, comparison, theoretical generalization of own pedagogical experience of teaching the course "Olympiad Mathematics" on the example of studying the topic "Proof of Inequalities" within the Educational and Professional Programme Secondary Education (Mathematics. Computer Science) (2022), Educational and Professional Programme Secondary Education (Physics. Mathematics) (2020) of the second (master's) level of higher education of Sumy State Pedagogical University named after D.D. Zhukovskyi. Methods such as analysis of scientific literature and synthesis made it possible to determine the basis of the study, namely: the term "soft skills" was studied, the components of "soft skills" were studied, the factors influencing the formation of the overall complex of "soft skills" were identified, and the factors that directly affect the development of individual components of "soft skills" were separately identified. By means of formalizing scientific sources, a holistic view of the problem of developing soft skills of pre-service mathematics and physics teachers has been formed. In order to more fully cover the issue of developing soft skills of pre-service mathematics and physics teachers, the object of the study was divided into two parts. In the first part of the study, the authors investigated what should be understood by the term "soft skills", analysed the ways of forming and developing soft skills in general and which of them are relevant in the modern educational process of professional training of pre-service mathematics and physics teachers. In the second part of the study, the pedagogical experience of teaching the course "Olympiad Mathematics" at Sumy State Pedagogical University named after A.S. Makarenko was studied by comparing the Educational and Professional Programmes Secondary Education (Physics. Mathematics) of the second (master's) level of higher education. The article considers the possibilities of developing soft skills in pre-service mathematics and physics teachers on the example of studying one of the key topics of Olympiad Mathematics – the topic "Proof of Inequalities".

In the article, the authors describe the possibilities of introducing tasks for self-solving using online mathematical calculators, ChatGPT 3.5 artificial intelligence technology, and GeoGebra dynamic mathematics software. The data obtained is the basis for making appropriate changes to the educational process in the course "Olympiad Mathematics". When working with students, we followed the recommendations on the ethical aspect of conducting pedagogical research developed by reputable organizations, in particular The Code of Ethics of the American Educational Research Association (2011) and Ethical Guidelines for Educational Research (2018). At the next stage of the study, the method of theoretical generalization was used to develop recommendations on the use of forms and methods of teaching that would contribute to solving the problem of forming and developing soft skills pre-service of mathematics and physics teachers in the process of their professional training.

RESULTS AND DISCUSSION

One of the basic skills, the development of which is given great attention in the system of training pre-service mathematics and physics teachers, is the ability to prove mathematical statements. This skill includes, in particular: studying ready-made samples of mathematical proofs and the ability to reproduce them; conducting proofs by analogy; independent search for a method of proof; conducting a proof using the specified method; the ability to analyse different methods of proof, compare them and determine the advantages and disadvantages of each; the ability to choose a more rational method of proof among several methods; the ability to apply and synthesize specific mathematical facts and methods in the course of reasoning; the ability to use digital tools and tools for checking hypotheses; and the ability to use the tools to verify hypotheses. In addition, a pre-service mathematics teacher should not only be able to prove the theorems of the school mathematics course and mathematical statements provided for in the school curriculum, but also be able to "convey" these proofs to students, teach them to conduct similar reasoning on their own, and correctly point out students' mistakes. Thus, the ability to prove mathematical statements harmoniously combines hard skills and soft skills.

Author L. Lippman *et al.* (2015) identify five groups of soft skills:

- cognitive competences (innovative thinking, critical thinking, intellectual workload management, digital skills, self-education skills);
- social competences (interpersonal skills, leadership skills, social intelligence, responsibility);
- communication competences (communication skills and ethics);
- self-management skills (ability to control behaviour and manage emotions, ability to direct and focus attention, time management);
- positive self-esteem skills (emotional intelligence, empathy).

G. Duffy & T. Gallagher (2017) emphasize the importance of acquiring and developing a range of soft skills related to communication, including the ability to defend one's point of view, argue, and the ability to ask constructive questions in the course of collective activities. The development of the ability to prove mathematical statements in pre-service mathematics teachers takes place in all fundamental mathematics courses and in certain

methodological disciplines (for example, in the courses "Methods of Teaching Mathematics", "Methods of Teaching Physics", "Elementary Mathematics", "Selected Issues of the School Physics Course", etc.) However, exceptional opportunities for the development of both this skill and related soft skills are provided by the course "Olympiad Mathematics", which is part of the programmes for the training of teachers of mathematics in Secondary Education (Mathematics. Computer Science) (2022) and physics Secondary Education (Physics. Mathematics) (2020) of the second (master's) level of higher education of Sumy State Pedagogical University named after A.S. Makarenko. This course is based on the hard skills of pre-service mathematics teachers mathematics teachers (knowledge of elementary mathematics, number theory, mathematical analysis, ability to apply them to solving typical problems), and on the other hand, it requires a certain level of soft skills (well-developed mathematical intuition, critical thinking, ability to apply knowledge in non-standard situations, ability to apply heuristic techniques, including the use of digital technologies, high level of communication skills, etc.) The ability to solve non-standard problems indicates a deep mastery of the mathematical apparatus, which in many cases is much more important than the so-called "pure knowledge" that can always be replenished.

Next, it is worth considering the prospects of developing soft skills in pre-service mathematics and physics teachers on the example of studying one of the basic topics of Olympiad Mathematics – "Proof of Inequalities". The tasks for proving inequalities are quite complex and have a high heuristic load. They allow for a deeper consolidation of a wide range of theoretical issues studied in the school mathematics course (inequality theory, equivalence of transformations, properties of functions, application of derivatives and integrals, geometric and vector inequalities and evaluations, etc.), contribute to the formation of critical thinking (in this case, the ability to critically analyse information, see logical connections and violations of logic in the proof of statements, the ability to indicate the grounds for errors and correct them, argue their opinions, the availability of justification for the statements, etc. It is for these reasons that tasks involving the proof of inequalities are popular among numerous mathematical competitions and contests.

In the proof of inequalities, *general methods of proving mathematical statements* are used (the method from the opposite, analytical and/or synthetic method, method of mathematical induction), *special methods of proving inequalities* (by definition of inequality, strengthening or weakening of inequality, reduction to obvious or well-known or classical inequalities, etc.), as well as artificial techniques based on *the properties of vectors, sequences, number series, certain properties of functions* (monotonicity, boundedness, convexity up or down), *the use of derivative and definite integral, various geometric estimates and characteristics*. The above list is rather arbitrary, and in practice it is often necessary to combine several methods simultaneously. Among the common approaches used in proving inequalities are the following: *transforming one or both parts of the inequality to a form convenient for its further proof; using the method of substitution* (for example, replacing the variables included in the correct inequality with some expressions in order to obtain the desired inequality); *considering a special case with further generalization of the idea of proof; breaking the inequality into several simpler ones and proving the latter; generalizing the inequality to be proved (for example, by the number of variables)* – in some cases, the study of a general statement requires less effort than a partial one. Special ideas and techniques for transforming inequalities used to prove them include: *adding the same expression to both parts of a correct inequality; adding or multiplying several correct inequalities of the same sign by parts; strengthening (respectively, weakening) inequalities*; and *using classical inequalities*. Let's consider the specifics of applying some of these methods and techniques to proving inequalities in the context of development of soft skills. One of the most popular methods of proving inequalities is the method of strengthening (weakening) the inequality.

1. Strengthening (weakening) inequality.

This method is used to one degree or another in proving many inequalities, and consists in the fact that to prove an inequality $a < b$, two inequalities are proved: $a < c$ and $c < b$. It is worth considering the application of this method on an example.

Example 1. Prove the inequality:

The left part of the inequality is to be strengthened as follows:

$$\underbrace{\sqrt{6+\sqrt{6+\ldots+\sqrt{6+\sqrt{6}}}}}_{2023}+\underbrace{\sqrt[3]{6+\sqrt[3]{6+\ldots+\sqrt[3]{6+\sqrt[3]{6}}}}}_{2024}<5. \tag{1}$$

The next idea is to use the method of mathematical induction.

$$\underbrace{\sqrt{6+\sqrt{6+\ldots+\sqrt{6+\sqrt{6}}}}}_{2023}+\underbrace{\sqrt[3]{6+\sqrt[3]{6+\ldots+\sqrt[3]{6+\sqrt[3]{6}}}}}_{2024}<$$

$$<\underbrace{\sqrt{6+\sqrt{6+\ldots+\sqrt{6+\sqrt{9}}}}}_{2023}+\underbrace{\sqrt[3]{6+\sqrt[3]{6+\ldots+\sqrt[3]{6+\sqrt[3]{8}}}}}_{2024}<\sqrt{9}+\sqrt[3]{8}=3+2=5. \tag{2}$$

2. Application of the method of mathematical induction.

The method of mathematical induction is used to prove mathematical statements that depend on a natural (rarely, an integer) parameter, and are true for all values of this parameter. This method is based on the principle of mathematical induction: *let some statement* T(n), *that depends on the natural n, be true for* $n=1$ (*or for* $n=n_0$, $n_0 \in \mathbb{N}$), *and from the assumption that it is true for* $n=k$ *follows its truth for natural* $n=k+1$, *then this statement is true for all natural n (with all natural* $n \geq n_0$ *respectively*).

Example 2. Prove that for arbitrary natural $n \geq 2$, inequality is fulfilled:

$$\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}<1-\frac{1}{n}. \qquad (3)$$

Let's apply the method of mathematical induction and check the truth of the statement for $n = 2$. Since $\frac{1}{2^2}=\frac{1}{4}<1-\frac{1}{2}$, the inequality is correct.

Suppose that the inequality holds for $n=k$, i.e.:

$$\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{k^2}<1-\frac{1}{k}, \qquad (4)$$

and it will be proved that the inequality is correct for $n=k+1$:

$$\underbrace{\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{k^2}}_{supposing\ that\ <1-\frac{1}{k}}+\frac{1}{(k+1)^2}<1-\frac{1}{k}+\frac{1}{(k+1)^2}=$$

$$=1+\frac{-(k+1)^2+k}{k(k+1)^2}==1+\frac{-k(k+1)-1}{k(k+1)^2}=$$

$$=1-\frac{1}{k+1}-\frac{1}{k(k+1)^2}<1-\frac{1}{k+1}, \qquad (5)$$

i.e., the inequality is valid for $n=k+1$. Therefore, according to the principle of mathematical induction, this inequality holds for an arbitrary one natural $n \geq 2$. In the third step, when transforming the inequality, the assumptions of induction and amplification by discarding the negative multiplier were used. The method of mathematical induction is a fairly standard algorithm for proving mathematical statements, however, when performing an inductive transition in tasks for proving inequalities, the ability to "see" the desired result and discard the extra is largely used, and these are soft skills.

It is worth paying attention to one interesting modification of the method of mathematical induction – ***Malikov's method***, which greatly simplifies the verification of the statement at the inductive step. Its practical application to the proof of inequalities is based on the verification of the fulfilment of statements of one of the following schemes.

Scheme 1. *Let* $n \in N_0$ *and the conditions are fulfilled:*

1. $a_k > b_k$ for $k \geq 0$
2. $a_{n+1}-a_n > b_{n+1}-b_n$ at $n \geq k$

Then $a_n > b_n$ for every $n \geq k$.

Scheme 2. *Let* $n \in N_0$ *all terms of sequences* a_n *and* b_n *be positive and the conditions are fulfilled:*

1. $a_k > b_k$ for $k \geq 0$
2. $\frac{a_{n+1}}{a_n} > \frac{b_{n+1}}{b_n}$ at $n \geq k$

Then $a_n > b_n$ for every $n \geq k$.

It is worth applying Malikov's method to prove the inequality from **example 1**:

$$\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}<1-\frac{1}{n}\ , n \geq 2.$$

It is worth using scheme 1 and considering sequences with general terms $a_n=1-\frac{1}{n}$, $b_n=\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}$, $n \geq 2$. Since $a_2=1-\frac{1}{2}$, $b_2=\frac{1}{2^2}$, $a_2 > b_2$. It is worth considering the differences:

$$a_{n+1}-a_n=1-\frac{1}{n+1}-\left(1-\frac{1}{n}\right)=\frac{1}{n}-\frac{1}{n+1}=\frac{1}{n(n+1)}$$

$$b_{n+1}-b_n=\left(\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{(n+1)^2}\right)-$$

$$-\left(\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}\right)=\frac{1}{(n+1)^2}, \qquad (6)$$

and $a_{n+1}-a_n=\frac{1}{n\cdot(n+1)}>\frac{1}{(n+1)^2}=b_{n+1}-b_n$, then by the Malikov's method $a_n > b_n$ for an arbitrary natural $n \geq 2$, i.e., $1-\frac{1}{n}>\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}$.

Thus, Malikov's method is simpler compared to the method of mathematical induction, although its application requires the ability to "see" the required sequences. It should be noted that the direct use of the method of mathematical induction (as well as Malikov's method) to prove the specified type of inequalities is not always possible, especially if one of the parts of the inequality is a number. It is worth considering the following task as an illustration.

Example 3. Prove that for arbitrary natural $n \geq 2$ inequality is fulfilled:

$$\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{n\cdot(n-1)}<1. \qquad (7)$$

In this case, when proving the inequality by the method of mathematical induction, at the stage of performing the inductive step, the following is obtained:

$$\underbrace{\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{k\cdot(k-1)}}_{supposing\ that\ <1}+\frac{1}{k\cdot(k+1)}<1+\frac{1}{k\cdot(k+1)}, \qquad (8)$$

and further strengthening of the inequality, as in the previous example, is impossible. In such cases, it is advisable to use either more accurate estimates or other methods of proof. In this regard, we will consider the following method.

3. Conversion of the common term into sums and its evaluation.

This method involves transforming (evaluating, replacing, or the same transformation) the common term of the sum appearing in the inequality so that it can be calculated directly.

Example 4. Prove that for arbitrary natural $n \geq 2$ inequality is fulfilled:

$$\frac{1}{n+1}+\frac{1}{n+2}+\cdots+\frac{1}{2n}>\frac{1}{2}. \qquad (9)$$

It is worth replacing each fraction of the amount on the left part of the inequality with a smaller $\frac{1}{k}>\frac{1}{2n}$, $k<2n$:

$$\frac{1}{n+1}+\frac{1}{n+2}+\cdots+\frac{1}{2n}>\underbrace{\frac{1}{2n}+\frac{1}{2n}+\ldots+\frac{1}{2n}}_{n}=n\cdot\frac{1}{2n}=\frac{1}{2}, \qquad (10)$$

which had to be proved.

It is worth returning to **example 3** and writing the general term on the left part of the inequality in the form: $\frac{1}{k\cdot(k-1)}=\frac{1}{(k-1)}-\frac{1}{k}$. Next, each term of the sum is replaced with the specified difference, the following is obtained:

$$\frac{1}{1\cdot2}+\frac{1}{2\cdot3}+\cdots+\frac{1}{n\cdot(n-1)}=\left(1-\frac{1}{2}\right)+$$

$$+\left(\frac{1}{2}-\frac{1}{3}\right)+\cdots+\left(\frac{1}{(n-1)}-\frac{1}{n}\right)=1-\frac{1}{n}<1, \qquad (11)$$

which had to be proved.

When proving the above inequality, it is possible to use one more non-standard technique in the context of this topic, related to the use of digital technologies. It is worth finding the amount on the left part of the inequality using an online calculator (Fig. 1).

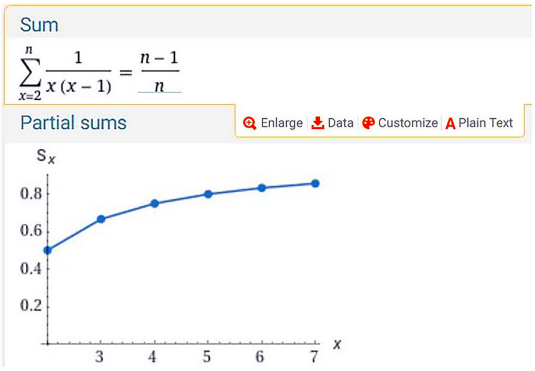

Figure 1. Using an online calculator to solve the inequality from example 2
Source: WolframAlpha (n.d)

Therefore, the sum of the expression on the left part of the inequality is equal to $\frac{1}{1\cdot2}+\frac{1}{2\cdot3}+\cdots+\frac{1}{(n-1)\cdot n}=\frac{n-1}{n}$, and the inequality itself follows from the obvious estimate $\frac{n-1}{n}<1$ for all $n\geq2$. An obvious advantage of using an online calculator is the opportunity to see how to prove this inequality. At the same time, proving the identity $\frac{1}{1\cdot2}+\frac{1}{2\cdot3}+\cdots+\frac{1}{(n-1)\cdot n}=\frac{n-1}{n}$, for example, by the same method of mathematical induction or replacing the k term of the sum by the difference $\frac{1}{k\cdot(k-1)}=\frac{1}{k-1}-\frac{1}{k}$, is a much simpler task than proving an inequality.

In this case, the ability to correctly and motivatedly apply digital technologies when proving inequalities contributes to the development of mathematical intuition and can be fully classified as soft skills. For this purpose, we offer students to analyse the solution of example 3 with the help of artificial intelligence technology ChatGPT 3.5 among tasks for independent solving. It should be noted that ChatGPT mainly uses the method of mathematical induction to solve problems for proving inequalities. However, it is example 3 that the system solves by replacing the term of the sum with a difference $\frac{1}{k\cdot(k-1)}=\frac{1}{k-1}-\frac{1}{k}$ (Fig. 2). However, the analysis of the solution, proposed by ChatGPT 3.5 artificial intelligence technology shows that the system incorrectly applies the decomposition and does not "see" terms with opposite signs, which should cancel each other out. This is where the mistake in the proof comes from, which the students must explain and correct on their own (Fig. 3).

"For any natural number $n\geq2$ prove the inequality:

$\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}<1-\frac{1}{n}$

Let's decompose the left part:

$\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}$

First, using the fact that $\frac{1}{k^2}<\frac{1}{k(k-1)}$ for any $k\geq2$.

It follows that $\frac{1}{k^2}>\frac{k}{k(k-1)}$ for all $k\geq2$.

Now we apply this inequality for every k from 2 to n:

$\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}<\frac{1}{2\cdot1}+\frac{1}{3\cdot2}+\ldots+\frac{1}{n(n-1)}$"

Figure 2. Solution of example 3 using artificial intelligence technology ChatGPT 3.5

"Many terms in the middle part cancel out:

$\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}<\left(\frac{1}{2}-\frac{1}{3}\right)+$

$+\left(\frac{1}{3}-\frac{1}{4}\right)+\ldots+\left(\frac{1}{n-1}-\frac{1}{n}\right)+\frac{1}{n}$

Now, if we add $\frac{1}{n}$ to both sides of the inequality, we get:

$\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}+\frac{1}{n}<$

$<\left(\frac{1}{2}+\frac{1}{n}\right)+\left(\frac{1}{3}+\frac{1}{n}\right)+\ldots+\frac{1}{n}$

After simplification, we obtain:

$\frac{1}{2^2}+\frac{1}{3^2}+\ldots+\frac{1}{n^2}+\frac{1}{n}<1-\frac{1}{n}$ ✓"

Figure 3. Mistake in solving task 3 using ChatGPT 3.5 artificial intelligence technology

The task of finding mistakes in inequality proofs has several useful aspects for students: developing critical thinking, enriching understanding of the topic, increasing responsibility, increasing the level of mastery of the material, which correlate with the task of developing the soft skills of pre-service mathematics and physics teachers by means of Olympiad mathematics. Such tasks stimulate students to carefully read and understand the material, as well as to identify possible flaws or inaccuracies in the logic of proofs, which contributes to the development of their critical thinking and analytical skills. By looking for mistakes in proofs, students deepen their understanding of the material, which can help them improve their understanding of the theory or concepts they are studying. The task of finding mistakes increases students' responsibility for their learning, as they learn to independently check and analyse the learning material to identify possible errors. However, the ability to detect mistakes in logic and reasoning is an important skill in many areas of both professional and everyday life, including scientific research, programming, and others. Also, identifying and correcting mistakes can improve the level of understanding of the material. In general, the task of finding mistakes in proofs is an effective tool for stimulating learning and developing students' cognitive skills.

We also pay attention to the fact that the inequalities from examples 2 and 3 make it possible to generate a whole series of new inequalities, in particular:

1) *Prove that for* $n \in \mathbb{N}, n \geq 2$: $\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}<1$.

2) *Prove that for* $n \in \mathbb{N}, n \geq 2$: $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{(n-1)\cdot n}<\frac{n}{n+1}$.

3) *Prove that for* $n \in \mathbb{N}, n \geq 2$: $\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{2023^2}<\frac{3}{4}$.

4) *Prove that for* $n \in \mathbb{N}, n \geq 2$: $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{2022\cdot 2023}<1$.

5) *Prove that for* $n \in \mathbb{N}, n \geq 2$: $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{2022\cdot 2023}<\frac{2023}{2024}$.

The proof of inequalities 1)–2) can be carried out either by the methods specified above, or by using the results of examples 1 and 2 in combination to strengthen inequalities. For example, to prove the inequality, $\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}<1$ we evaluate the general term: $\frac{1}{k^2}<\frac{1}{(k-1)\cdot k}$:

$$\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}<\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{(n-1)\cdot n}. \quad (12)$$

Since the right part of the inequality is less than 1, the left side will also be less than 1.

To prove the inequalities 3)-5), it is necessary to first apply the transition to the general problem by introducing the variable n, and carry out the proof of the following inequalities:

3`) $\frac{1}{2^2}+\frac{1}{3^2}+\cdots+\frac{1}{n^2}<\frac{3}{4}$ for $n \in \mathbb{N}, n \geq 2$;

4`) $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{n\cdot(n-1)}<1$ for $n \in \mathbb{N}, n \geq 2$;

5`) $\frac{1}{1\cdot 2}+\frac{1}{2\cdot 3}+\cdots+\frac{1}{n\cdot(n-1)}<\frac{n-1}{n}$ for $n \in \mathbb{N}, n \geq 2$.

It is worth considering another heuristic technique, which uses the idea of strengthening inequalities.

4. Evaluation of terms of the product and introduction of an additional factor.

Quite often, when proving inequalities that contain products, the following idea can work: to prove an inequality $a < b$ for positive a and b, prove the inequality $ab < b^2$ (or $a^2 < b^2$, or $a^2 < ab$).

It is worth considering the application of this method on an example.

Example 5. Prove that for arbitrary $n \in \mathbb{N}$:

$$\frac{1}{2}\cdot\frac{3}{4}\cdot\frac{5}{6}\cdot\ldots\cdot\frac{2n-1}{2n}\leq\frac{1}{\sqrt{2n}}. \quad (13)$$

Let's replace each term of the product with a larger fraction:

$$\frac{1}{2}<\frac{2}{3},\ \frac{3}{4}<\frac{4}{5},\ \frac{5}{6}<\frac{6}{7},\ldots,\frac{2n-1}{2n}<\frac{2n}{2n+1}, \quad (14)$$

and multiply the given inequalities:

$$\underbrace{\frac{1}{2}\cdot\frac{3}{4}\cdot\frac{5}{6}\cdot\ldots\cdot\frac{2n-1}{2n}}_{A}<\underbrace{\frac{2}{3}\cdot\frac{4}{5}\cdot\frac{6}{7}\cdot\ldots\cdot\frac{2n}{2n+1}}_{B}. \quad (15)$$

We have $A < B$. It is worth multiplying both parts by $A > 0$: $A^2 < AB$, from where $A < \sqrt{AB}$ or:

$$\frac{1}{2}\cdot\frac{3}{4}\cdot\frac{5}{6}\cdot\ldots\cdot\frac{2n-1}{2n}=A<\sqrt{AB}=$$
$$=\sqrt{\frac{1}{2}\cdot\frac{2}{3}\cdot\frac{3}{4}\cdot\frac{4}{5}\cdot\frac{5}{6}\cdot\ldots\cdot\frac{2n-1}{2n}\cdot\frac{2n}{2n+1}}=\sqrt{\frac{1}{2n+1}}\leq\frac{1}{\sqrt{2n}}, \quad (16)$$

which must be proved.

It is worth considering the application ***of properties of functions*** to proving inequalities. In this context, the properties of boundedness and monotonicity of functions, finding the largest and smallest values, using the derivative, constructing graphic images of the function, etc. are useful. As an illustration, consider the use of a graph of a function to estimate its values on a given interval.

Example 6. Prove that for $0 < x < \frac{\pi}{2}$ the inequality is fulfilled:

$$\sin\sqrt{x}<\sqrt{\sin x}. \quad (17)$$

It is worth considering the function $y = \sin\sqrt{x} < \sqrt{\sin x}$ and examining its sign at the specified interval. To plot the graph of this function, we will use the dynamic mathematics software GeoGebra (Fig. 4).

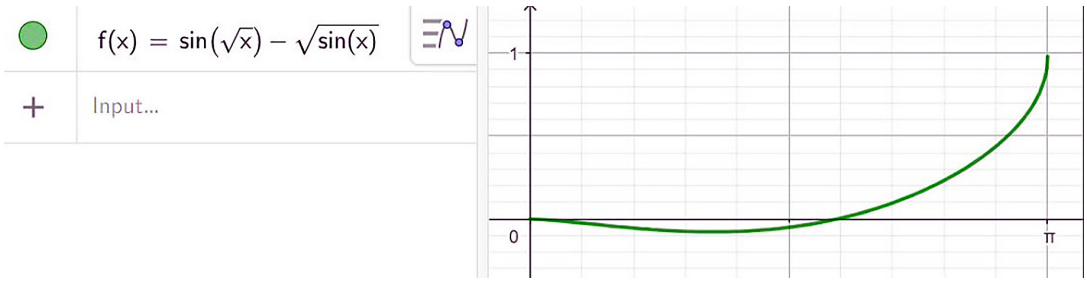

Figure 4. Application of the GeoGebra environment to solving example 5
Source: GeoGebra (n.d)

Since $0 < x < \frac{\pi}{2}$ the specified function takes on negative values, when $\sin\sqrt{x} - \sqrt{\sin x} < 0$, $\sin\sqrt{x} < \sqrt{\sin x}$.

It is worth noting that the given method allows "constructing" several obvious inequalities:

6) *Prove that in* $\sqrt{2} - \sqrt{\sin 2}$;

7) *Prove that* $(\sqrt{\cos 1} < \sqrt{\sin(\cos 1)})$;

8) *Prove* that $\sin\sqrt{\frac{1}{n^2}+2} > \sqrt{\sin(\frac{1}{n^2}+2)}$, $n \in \mathbb{N}$.

Of course, a strict justification for graphing a function $y = \sin\sqrt{x} < \sqrt{\sin x}$ should be done using the derivative, but using the capabilities of GeoGebra gives a hint as to exactly how to proceed in this case. It was presented another method

of proving inequalities, which is based on estimates of integral sums and the use of properties of the definite integral of some function on the segment.

5. Use of integral properties for monotonic functions.

The use of this method is largely based on the monotonicity property of the integral, the mean value theorem, the value of the integral of monotonic and convex functions, etc. It is worth considering the application of these ideas on examples.

Example 7. Prove that for there is an inequality $e^x - 1 \geq x + \frac{x^2}{2}$.

To prove this inequality, it is worth applying *the monotonicity property of the integral* for continuous functions: *if the functions $f(x)$ and $g(x)$ are continuous and $f(x) \leq g(x)$, where $x \in$ [a;b]*:

$$\int_a^x f(t)dt \leq \int_a^x g(t)dt. \quad (18)$$

At $x \geq 0$ we have an obvious inequality $e^x \geq 1$. Let's take $g(x) = e^x$, $f(x) = 1$. Then, according to the above property of monotonicity of the integral for functions $f(x)$and $g(x)$, we obtain$\int_0^x e^t dt \geq \int_0^x 1dt$, from where $e_x \geq x+1$ for any $x \geq 0$.

Using the same method to the inequality $ex \geq x+1$, we obtain:

$$\int_0^x e^t dt \geq \int_0^x (1+t)dt \text{ or } e^x - 1 \geq x + \frac{x^2}{2}. \quad (19)$$

Example 8. Prove that for any natural n:

$$\frac{1}{1^3} + \frac{1}{2^3} + \ldots + \frac{1}{n^3} < 2. \quad (20)$$

Let's write the left part of the inequality in the form:

$$\frac{1}{1^3} + \frac{1}{2^3} + \cdots + \frac{1}{n^3} = 1 + \frac{1}{2^3}(2-1) + \cdots$$
$$+ \frac{1}{n^3}(n-(n-1)) = 1 + \sum_{k=2}^{n} \frac{1}{k^3}(k-(k-1)). \quad (21)$$

It is worth entering the function $f(x) = \frac{1}{x^3}$ and dividing the segment [1, n] points $x_k = k$, $k = 1,2,\ldots,n$ on n of equal parts of length 1. Then the expression $\sum_{k=2}^{n} \frac{1}{k^3}(k-(k-1))$ is equal to the sum of the areas of rectangles built on segments [k - 1; k] as on foundations with elevations $f(x_k) = f(k) = \frac{1}{k^3}$.

As it is known, for a continuous, positive and decreasing function $f(x)$ *on the interval* [a, b] there is an inequality (which follows from the method of rectangles):

$$\sum_{k=2}^{n} f(x_k)(x_k - x_{k-1}) < \int_a^b f(x)dx <$$
$$< \sum_{k=2}^{n} f(x_{k-1})(x_k - x_{k-1}). \quad (22)$$

Since the function $y = \frac{1}{x^3}$ at $x > 0$ is decreasing, continuous and positive:

$$1 + \sum_{k=2}^{n} \frac{1}{k^3}(k-(k-1)) < 1 + \int_1^n \frac{dx}{x^3} =$$
$$= 1 - \frac{1}{2x^2}\Big|_1^n = \frac{3}{2} - \frac{1}{2n^2} < 2, \quad (23)$$

which had to be proved.

The proof of the last inequality can be carried out in another way, using the evaluation of the common term of the left part, followed by the representation of the resulting fraction in the form of a difference (example 2):

$$\frac{1}{k^3} < \frac{1}{k^2} < \frac{1}{k\cdot(k-1)} = \frac{1}{k-1} - \frac{1}{k}, k = 2,3,\ldots, \quad (24)$$

Then:

$$\frac{1}{1^3} + \frac{1}{2^3} + \cdots + \frac{1}{n^3} < \frac{1}{1^2} + \frac{1}{2^2} + \cdots + \frac{1}{k^2} + \cdots + \frac{1}{n^2} <$$
$$< 1 + \frac{1}{1\cdot 2} + \cdots + \frac{1}{k\cdot(k-1)} + \cdots + \frac{1}{n\cdot(n-1)} =$$
$$= 1 + \left(1 - \frac{1}{2}\right) + \cdots + \left(\frac{1}{k-1} - \frac{1}{k}\right) + \cdots$$
$$+ \left(\frac{1}{(n-1)} - \frac{1}{n}\right) = 2 - \frac{1}{n} \leq 2. \quad (25)$$

Therefore, $\frac{1}{1^3} + \frac{1}{2^3} + \cdots + \frac{1}{n^3} < 2$ for all natural n.

The use of the properties of the integral to prove inequalities provides a wide range of possibilities for creating new inequalities. For this purpose, both the above methods and various estimates of areas and volumes, which are direct applications of the definite integral, are used. As the authors' own experience shows, the problem of developing soft skills of pre-service mathematics and physics teachers can be effectively solved by studying the course of Olympiad Mathematics. In their previous studies (Lukashova *et al.,* 2022; Lukashova *et al.,* 2023), the authors also reveal the possibilities of developing soft skills within the educational components of programmes for the training of pre-service mathematics and physics teachers, which include heuristic workload. This study is consistent with the research by E.O. Cardoso-Espinosa *et al.* (2021) on the development of mathematical software skills at the higher education level through project-based learning in times of COVID-19. In particular, the expediency of group work during seminars is confirmed: it is advisable to organize group work of students on solving Olympiad tasks, as joint work contributes to the development of communication skills, the ability to cooperate and resolve conflicts. The group form of work allows including elements of personal development training in the course of Olympiad mathematics, which will help pre-service mathematics and physics teachers to understand and develop their soft skills, such as leadership, tolerance, and teamwork. The study confirms the experience of active learning of business students by D. Gil-Domenech & J. Berbegal-Mirabent (2020) and ideas on how to make learning mathematics meaningful. In particular, the authors found that problem-based learning of mathematics is appropriate, as the use of Olympiad-level problems often requires creativity, critical thinking and complex problem-solving, which contributes to the development of soft skills in pre-service teachers. As the results show, the study fully supports the work of C.M.A. Pinto *et al.* (2022) on ways to develop soft skills in students, in particular through the use of digital technologies: studying a course in Olympiad mathematics allows integrating the use of modern digital technologies into

teaching through the use of video lectures on the study of theoretical material, virtual graphing tools, interactive platforms, which can make learning more attractive and contribute to the development of technological and communication skills.

This study is consistent with the research by R.Y. Stytsyuk *et al.* (2022), as mathematics learning has a high potential for development of soft skills. In particular, it is advisable to encourage pre-service mathematics and physics teachers to conduct self-analysis and reflection on their learning and development of soft skills. This will also contribute to the development of self-improvement and self-management. The use of Olympiad mathematics as a basis for soft skills development helps to create a comprehensive approach to learning that contributes to the formation of not only mathematical knowledge but also key competences for pre-service teachers. The study confirms the findings of P. Zimmermann *et al.* (2018) on the use of project-based learning and STEM education technologies for the development of soft skills. Indeed, studying a course in Olympiad Mathematics allows the use of mentoring technology, where students with a higher level of learning capabilities or a mathematics teacher can help students develop both professional and personal skills, and such forms of organizing students' learning activities as public speaking during seminars to present their solutions or teaching theoretical material for a task encourage them to overcome internal barriers to public speaking, which can help them to develop soft skills. In their previous studies (Lukashova *et al.,* 2022; Lukashova *et al.,* 2023), the authors studied the possibilities of developing soft skills within the educational components of the EPP for pre-service mathematics and physics teachers, including those that involve a significant heuristic component. This study confirmed that the educational components of these programmes (in particular, Algebra and Number Theory and Elementary Mathematics) contribute to the formation and development of both hard skills (thorough knowledge of a number of sections of elementary mathematics, higher algebra and number theory, the ability to apply them to solving basic problems, mastery of methods of proving inequalities, etc:

- ingenuity (ability to apply knowledge in atypical situations; ability to create ideas for proof, ability to apply heuristic techniques and methods, in particular, with the use of digital technologies);
- critical thinking (the ability to critically perceive and analyse information, to see logical connections in the proof of statements and their violations, the ability to rationally choose a particular method of proving an inequality, the ability to "see" the idea that gives the key to the solution; the ability to ask appropriate questions during the joint proof of inequalities in practical and seminar classes, the ability to analyse, justify and evaluate different approaches and methods of proof, the ability to identify errors and correct them, the presence of doubts);
- communication (ability to prove one's position, justify why a particular method of proof was chosen, be able to explain why other methods cannot be used to solve a given inequality);
- time management skills in determining deadlines for individual and homework assignments, etc., the ability to use their time rationally;
- the ability to learn independently (a significant part of the hours is allocated for self-study).

The results of the study show the expediency of group work, the use of group presentations to develop cooperation and teamwork skills of pre-service teachers. This approach is in line with current trends in education and supports the introduction of digital technologies to ensure effective learning.

CONCLUSIONS

The study notes that over the past 5 years, stakeholders in the accreditation of educational programmes of higher education institutions have been increasingly paying attention to such qualities of pre-service teachers as soft skills – abilities and skills that allow them to perform work effectively, creatively and efficiently. These are the qualities a pre-service teacher should have, as this is a profession in which soft skills and hard skills are equally important. In this context, mastering fundamental mathematical disciplines in the professional training of pre-service teachers should include the development of a balance between hard and soft skills.

The study examines the interpretation of the term "soft skills", analyses the components of soft skills, identifies the factors that influence the formation of the overall soft skills complex, and separately identifies the factors that directly affect the development of individual components of soft skills. The results of the study demonstrate different ways to solve the problem of developing soft skills of pre-service mathematics and physics teachers. For example, when studying the topic "Proof of Inequalities", the development of soft skills is greatly facilitated by organizing students' work in groups (both in seminars and at home), using problem-based learning in mathematics, using digital technologies both for modelling the problem and for analysing the finished solution generated by a chatbot with artificial intelligence, using mentoring technologies, public speaking and presenting their own solutions, self-analysis, and reflection. At the same time, the study highlights the peculiarities of applying the following methods and techniques to the proof of inequalities in the context of development of soft skills: the method of strengthening (weakening) inequality, the method of mathematical induction, the Malikov's method, the method of converting the common term in sums and its evaluation, the method of evaluating the terms of the product and introducing an additional factor, the method of applying the properties of functions to the proof of inequalities, the method of using the properties of the definite integral of a certain function on a segment.

Through theoretical generalization of their own pedagogical experience, the authors have determined that the ability to correctly and motivatedly apply digital

technologies in proving inequalities contributes to the development of mathematical intuition and can be fully attributed to soft skills. The ways of developing soft skills of pre-service mathematics and physics teachers of in the process of studying the topic "Proof of Inequalities" are illustrated by the use of such digital tools as online mathematical calculators, artificial intelligence technologies ChatGPT 3.5, and dynamic mathematics software GeoGebra. The authors see the prospects for further research in studying the peculiarities of development of soft skills of mathematics and physics teachers during their in-service training.

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CONFLICT OF INTEREST

There is none.

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Інна Володимирівна Шишенко

Кандидат педагогічних наук, доцент
Сумський державний педагогічний університет імені А.С. Макаренка
40002, вул. Роменська, 87, м. Суми, Україна
https://orcid.org/0000-0002-1026-5315

Тетяна Дмитрівна Лукашова

Доктор фізико-математичних наук, професор
Сумський державний педагогічний університет імені А.С. Макаренка
40002, вул. Роменська, 87, м. Суми, Україна
https://orcid.org/0000-0002-1465-9530

Марина Григорівна Друшляк

Доктор педагогічних наук, професор
Сумський державний педагогічний університет імені А.С. Макаренка
40002, вул. Роменська, 87, м. Суми, Україна
https://orcid.org/0000-0002-9648-2248

Юрій Вячеславович Хворостіна

Кандидат фізико-математичних наук, доцент
Сумський державний педагогічний університет імені А.С. Макаренка
40002, вул. Роменська, 87, м. Суми, Україна
https://orcid.org/0000-0002-8354-944X

Шляхи розвитку soft skills у майбутніх учителів математики та фізики при вивченні окремих тем олімпіадної математики

Анотація. Розвиток soft skills у майбутніх вчителів допомагає підвищити якість навчання, створити позитивне середовище в класі та забезпечити індивідуалізований підхід до навчання. Інтеграція soft skills, зокрема гнучкість та здатність пристосування до змін, допомагає вчителю ефективно реагувати на нові методи навчання, технологічні інновації та вимоги сучасного освітнього середовища. Авторами даної статті була поставлена мета дослідити можливості розвитку soft skills у межах освітніх компонент програми підготовки майбутніх учителів математики та фізики. Методологічну основу дослідження склали аналіз наукової літератури, синтез, формалізація наукових джерел, опис, зіставлення, теоретичне узагальнення власного педагогічного досвіду викладання курсу «Олімпіадна математика». Результати дослідження розкривають деякі способи розвитку soft skills майбутніх магістрів середньої освіти Сумського державного педагогічного університету імені А.С. Макаренка у процесі вивчення курсу «Олімпіадна математика». При цьому серед різних тем курсу було виокремлено тему «Доведення нерівностей». Розкрито особливості застосування таких методів та прийомів до доведення нерівностей в контексті розвитку soft skills: метод підсилення (послаблення) нерівності, метод математичної індукції, метод Малікова, метод перетворення загального члена в сумах та його оцінка, метод оцінки членів добутку та введення додаткового множника, метод застосування властивостей функцій до доведення нерівностей, метод використанням властивостей визначеного інтеграла деякої функції на відрізку. З'ясовано, що найбільш поширені прийоми доведення нерівностей мають широкі можливості в контексті розвитку soft skills. Кожен з розглянутих у статті методів доведення нерівностей проілюстровано відповідними прикладами з детальними поясненнями. Доведено, що дана тема відкриває широкі можливості для набуття та розвитку цілої низки soft skills. Дослідження дозволяє визначити конкретні способи покращення soft skills у майбутніх вчителів математики та фізики, що мають практичне значення для подальшого розвитку цих професій при вивченні окремих тем курсу «Олімпіадна математика»: використання групових форм роботи під час проведення семінарських занять, проблемне вивчення математики, застосування цифрових технологій під час вивчення олімпіадної математики, самоаналіз та рефлексія, використання технології менторської підтримки, публічні виступи під час проведення семінарських занять з представленням власних розв'язків

Ключові слова: професійна підготовка майбутніх учителів; розвиток твердих та м'яких навичок; майбутні магістри середньої освіти; вивчення олімпіадної математики; доведення нерівностей; прийоми доведення нерівностей

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Yuliia Sylenko*

Postgraduate student, Assistant
Dragomanov Ukrainian State University
01601, 9 Pyrohov Str., Kyiv, Ukraine
https://orcid.org/0000-0002-5535-176X

Individualization of independent work in the professional training of future teachers: An experimental study

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*Corresponding author

Abstract. The individualisation of independent work in the professional training of future teachers contributes to the stable achievement of results in professional and pedagogical training, as it takes into account the needs, motivation, and capabilities of the student. One of the leading technologies of innovative education is tutoring, which ensures an open educational environment in a higher education institution. The article outlines the results of an experimental study of the state of individualisation of independent work in the professional training of future university teachers on the basis of comprehensive, competence-based, systemic and activity-based approaches. The experiment was conducted in the form of a questionnaire among 54 respondents – master students majoring in "011 – Educational, Pedagogical Sciences" of the Mykhailo Drahomanov Ukrainian State University in order to find out their attitude to the current individualisation of independent work and the introduction of tutoring technology. The respondents were offered a Google Forms questionnaire "The current state of individualisation of students' independent work in higher education institutions", which consisted of 10 questions with possible answers. The results of the experiment showed that modern higher education institutions do not provide adequate conditions for the development of important skills and qualities in students, such as independence, the ability for self-education, self-development, and self-knowledge. It is established that the majority of master's students express their dissatisfaction with the organisation of individualised independent work in higher education institutions, which is due to insufficient attention to their interests, needs, and motives. It is proposed to introduce an integrated form of professional and pedagogical training of future teachers – tutoring technology as an important mechanism for innovating education, which can ensure the openness of the educational and scientific environment. The essence of the educational process under the guidance of a tutor, when a student acts as a tutor on the basis of subject-subject partnership interaction, is revealed. The results of the confirmatory experiment make it possible to further study the conceptual foundations of tutoring as a leading technology for individualising the educational and scientific process. The developed experimental study on the current state of individualisation of independent work in higher education institutions can be implemented at all levels of training of future pedagogical specialists

Keywords: higher education institution; educational and scientific environment; tutoring technology; individual educational trajectory; professional competences

INTRODUCTION

The leading trends in education in the 21st century are internationalization and globalization, which lead to changes in content and organizational educational priorities. Internationalization of education focuses on free academic exchange of teachers and students between higher education institutions in different countries, while globalization involves the universalization of curricula that takes into account the demand for qualified specialists in the global labour market. The most urgent trend in higher education, both within the framework of internationalization and globalization, is to ensure independent and individual educational, cognitive, and scientific work of students. The free exercise of the subjects of the educational process, in particular, through the right to choose an individual trajectory of professional formation and development, is a mechanism of the main strategy of self-directed learning. At present, higher education institutions (hereinafter – HEIs) define independent work of students as the leading form of organizing cognitive and educational activities, based on the current regulatory and legal documents. Its volume is regulated from 1/3 to 2/3 of the total proposed study time. Independent work has an individual character, as each student, depending on his or her needs and motives, processes sources of information to come to the required result. Therefore, the organization of independent learning and cognitive activity is possible only through individualization. At the same time, many aspects of individualization of independent work remain unresolved and await justification of the possibility of implementation in the educational process. After all, in a democratic society, individuality is a priority in the system of social values, both in the spheres of public life and in education.

The Laws of Ukraine "On Higher Education" (2014), "On Scientific and Scientific-Technical Activities" (2015), "On Education" (2017), the Laws of Ukraine "On Professional Development of Employees" (2012), "On Professional Higher Education" (2019) trace the imperative to give importance to independent work as one of the leading components of the educational process in higher education institutions, however, due to the lack of properly developed methodological support and tools, this task has not been fully implemented in practice. The analysis of scientific sources on the research problem shows a significant contribution of scientists to the issue of individualization of learning, N. Alimova (2021) analyses the conditions for improving the technology of individualization of learning in teaching English language students; N. Alimova & M. Radjabova (2020) consider the role and importance of individual education in the system of higher education, highlighting pedagogical conditions; V. Dolinskyi *et al.* (2021) clarify and substantiate the methodological aspects of designing an individual trajectory of professional development of a teacher, where the individual approach is leading. The authors have developed a methodology for designing an individual educational trajectory.

N. Demyanenko *et al.* (2022) analyse the professional training of teachers in the design of animation and recreational space for students of different ages. The researchers note that the relevance of the results is influenced by the ability to design the training so that all objective and subjective factors of an individualized approach are taken into account. V. Vyshkivska *et al.* (2021a) consider the features of an individualized approach when building a course on the Moodle platform, the effectiveness of which will be determined by the formation of professional competences. The theoretical and practical foundations of the organization of students' independent work in higher education institutions from the concept of a research-oriented educational environment are substantiated in the work of S. Kushniruk (2016). The research of O. Samoilenko *et al.* (2023) outlines the peculiarity of professional and pedagogical training of a future specialist in the modern realities of the open educational and scientific space of HEIs, where the authors note the individual form of learning as a leading trend in the modern dimension in the context of interaction with quasi-professional activities. The authors emphasize that one of the possible ways to implement individualization may be the introduction of tutoring as a leading technology in lifelong learning.

In the work of Yu. Sylenko (2023), the author substantiates the tutoring technology from the perspective of pedagogical innovation in the professional training of future university teachers. The author defines tutoring technology as one that can be used in the professional and pedagogical training of teachers as an effective highly adaptive model (technology) in innovative educational processes that are driven by social need and in changing the educational and scientific environment in which its life cycle is carried out. The author emphasizes that tutoring technology, as a type of pedagogical innovation, can be applied not only in the educational and scientific environment of a higher education institution in vocational and pedagogical training, but also as a technology in formal or non-formal vocational education of specialists, which is also confirmed by D. Taradiuk (2018). Instead, T. Shvets (2018) conducted a comparative analysis of the implementation of tutoring practice as a way of individualization in Polish and Ukrainian schools. The author developed and implemented a model of personal tutoring support in education, which was implemented from 2015 to 2020. Among foreign works, special attention should be paid to V. Shneider (2020), where the technology of personal support from the perspective of mentoring in higher education institutions was considered as a basic feature to ensure the success of students.

However, both in theoretical and practical aspects, insufficient attention is still paid to the deepening of individualization of independent work. Unanimity of views has not been achieved, despite the desire of many scholars to consider the concept of individualization systematically. Individualization should be considered as a necessity in the professional training of students, in order to take into

account the individual characteristics of each student in the organization of a flexible learning system with maximum adaptation to each student, taking into account his or her motives, needs, and capabilities. The purpose of the study is to conduct an experimental study of the state of individualization of independent work in the professional training of future university teachers.

MATERIALS AND METHODS

Experimental work to substantiate the need for individualization of independent work in the professional training of future university teachers took place in June-July 2023. In the course of the study, a significant role was given to the individualization of future teachers' independent work as the basis of the research. During the experimental work, the pedagogical survey was carried out anonymously, the rights of the participants were not violated, the honour, dignity and moral principles of the respondents were not humiliated, the respondents' physical or mental health was not harmed when taking the survey, and the results are presented in a generalized form. When formulating the questions for the survey, the age of the respondents (18-45 years) and their normative psychological characteristics were taken into account. The content of the questions adheres to the principles of the *Ethical code of a scientist of Ukraine* (National Academy of Sciences of Ukraine, 2009) and the Guidelines on good publication practice (Committee on Publication Ethics, 1999).

The main approaches to the research are comprehensive (consideration of different views on the problem), systematic (consideration of different elements of the issue and the stages of implementation), humanistic (all students could express their opinion in the research), competence-based (development of basic competencies in students), and activity-based (active involvement of students in the research process). The key attention is paid to the competence approach, as it is designed to improve the competences of different students. These approaches in the study allow for the development of important competences in higher education students. The content of the ascertaining stage of the experiment is a direct questionnaire via Google Forms "The current state of individualization of students' independent work in higher education institutions", where master students highlighted their attitude to the current individualization of independent work. The survey will lead to further research on the construction and substantiation of the author's model of individualization of the educational process.

To establish how the individualization of independent work in a higher education institution is organized among students majoring in 011 Educational, Pedagogical Sciences of the educational and professional programmes "Higher Education Pedagogy", "Andragogy. Adult Education" and "Pedagogical Counselling" (1st and 2nd year Master's students) of the Mykhailo Drahomanov Ukrainian State University (Ukraine, Kyiv), a questionnaire was conducted. It should be noted that students, after completing the educational and professional programmes "Higher Education Pedagogy", "Andragogy. Adult Education" and "Pedagogical Counselling" programmes, students receive an academic qualification – Master of Education, Pedagogical Sciences, teacher of a higher education institution. A total of 54 respondents (full-time and part-time masters) took part in the survey. The respondents were offered a Google Forms survey "The current state of individualization of students' independent work in higher education institutions", which included 10 questions with possible answers (Table 1).

Table 1. The current state of individualization of students' independent work in a higher education institution

n/a	Question	Answer options
1	What do you think individualized independent work is?	a) work without a teacher b) independent information search c) independent work at a different level, which is carried out at one's own will and according to special tasks of teachers d) performance of practical tasks outside the classroom
2	What do you think is the essence of the individualization of independent work?	a) load the student with additional tasks b) develop the student's skills in independent search for information and performance of tasks c) reduce the teacher's workload
3	How do you divide classroom and extracurricular work during your studies (for example, 75/25, where 75 is classroom work, 45 is independent work)?	a) 70/30 b) 60/40 c) 30/70 d) 40/60 e) another option (write it down)
4	What tasks does your independent work include?	a) independent processing of texts b) independent information search c) writing essays and summaries d) another option (write it down)
5	Does the teacher often send you lectures, educational materials, literature via electronic means of communication?	a) every time after/before class b) through classes (at least once every two weeks) c) once every several classes (no more than once a month) d) another option (write it down)

Table 1. Continued

n/a	Question	Answer options
6	Which material is easier for you to work with when doing individual independent work?	a) electronic version (for example, moodle) b) a printed version of the tasks
7	What sources of information do you most often use during individualized training?	a) digital textbooks and scientific works b) printed journals and publications c) Internet d) I combine all the above-mentioned options
8	Do you know who a tutor is and what his role is in education?	a) yes, a tutor is a person who conducts individual or group classes with pupils, students, a tutor, a mentor b) yes, helps with studies, assistant c) no, I don't know d) heard several times, probably a teacher
9	Have you used the services of a tutor, or are you currently using them?	a) yes, I used it b) I did not use it c) I use it now d) I want to try to use it
10	Are you satisfied with the level of organization of independent individualized work in higher education? Why?	a) no, there is no systematicity b) yes, everything is fine, the organization is clear and concrete c) it is difficult to decide d) does not suit, I have my own version why (write it down)

Source: author's development

After conducting a questionnaire in Google Forms "The current state of individualization of students' independent work in higher education institutions", the data were statistically processed.

RESULTS

The question of the role of individualization of independent work in the professional training of future university teachers is quite acute. This is due to several factors: the ratio of knowledge acquired independently and with the help of a teacher; the ratio of traditional and distance education; the transition from the usual transfer of knowledge to tutoring. Another aspect of the individualization of learning is that the role of the tutor is not understood. In other words, individual work in higher education institutions is carried out by a teacher who forms the task and exercises control; and a student who performs the task in extracurricular time. Therefore, a tutor is almost always absent as a component of individualized independent work in professional training. Even if there is a tutor in this system, his, or her role may be misrepresented as a tutor who checks the performance of independent work. The main misconception is that the tutor should not determine how many per cent of the student has completed their assignment. Instead, they should be a mentor who can help students discover the truth, navigate the sources of information, guide them to the correct form of data presentation, and help them set goals and objectives. According to a survey of 54 respondents, Fig. 1 shows that 87.5% of respondents perceive individualization of independent work in the professional training of future university teachers as work at different levels, which is performed at their own discretion and according to special tasks of teachers. It should be noted that only 6.3% of respondents consider it to be work without a teacher, and 37.5% – as an independent search for information.

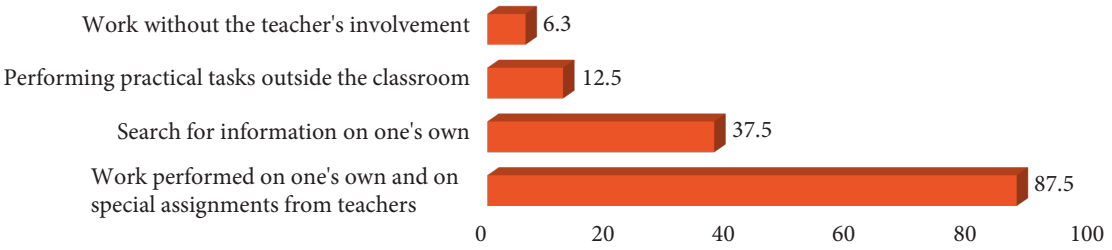

Figure 1. The answer to the question "What, in your opinion, is the individualization of independent work?", in %
Notes: statistical data processing
Source: author's development

According to 100% of respondents, the purpose of individualizing independent work is to develop students' skills of independent information search and task completion. In addition, students noted that the distribution of independent work tasks was as follows: independent study of texts (56.3%); independent search for information (87.5%); writing essays and notes (43.8%); all of the above types of independent work (6.3%). An important issue of

this block was to determine the distribution between classroom and independent work. Accordingly, Fig. 2 shows that 62.5% of respondents answered that the ratio between them is 50/50; 12.5% of students answered that the distribution is 30/70; 6.3% each – 10/90, 40/60, 70/30, 60/40, respectively.

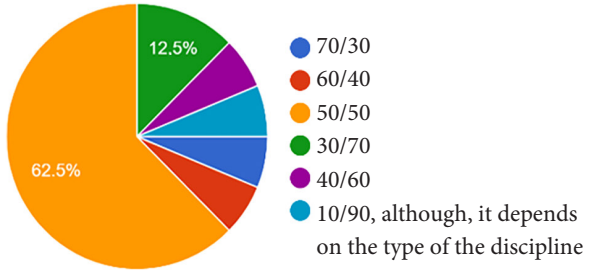

Figure 2. Answer to the question on the division between classroom and independent work, in %
Note: statistical data processing
Source: author's development

In conformity with this, it can be determined that students do not spend much time on individualizing their independent work. They learn the material mainly through group work in the classroom. Therefore, independent work is practically not implemented. However, only 50% of respondents said that the teacher sends them educational material by electronic communication every time before or after class. For the most part, students work through all the questions in a seminar class or take notes during a lecture. In addition, 56.3 per cent of respondents said that they use various sources of information (textbooks and scientific articles, the Internet) to prepare for their studies. It is worth noting that Fig. 3 shows that no respondent uses magazines or publications in print for preparation.

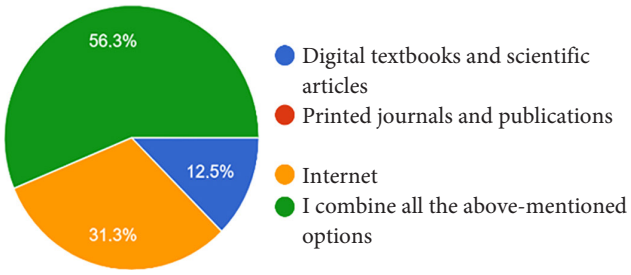

Figure 3. Answer to the question about sources of information used by students during individual study, in %
Note: statistical data processing
Source: author's development

Another block of the survey included questions about tutors. 81.3% of respondents know what a tutor is, namely a person who conducts individual lessons with students; and 18.8% said that a tutor is just an assistant who helps with learning. Not surprisingly, Fig. 4 shows that 56.3% of respondents have never used a tutor. However, it is worth noting that 25% of students would like to try it.

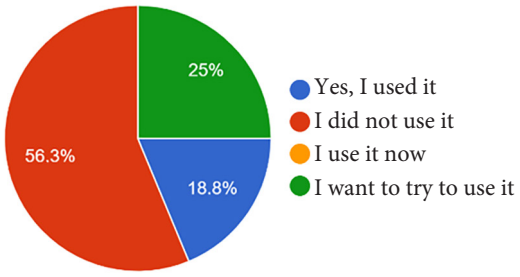

Figure 4. Answer to the question "Have you used the services of a tutor?", in %
Note: statistical data processing
Source: author's development

The last question concerned whether students are satisfied with the level of organization of individualization of independent work in the professional training of future university teachers. 56.3% of respondents said they were satisfied with the organization, it was clear and specific; 43.8% said they were not satisfied with the organization of individualization of independent work due to the lack of consistency. Accordingly, students themselves believe that the process of learning is effective only when an individual approach to each student is applied, taking into account their abilities, motives, and desires. Thus, it has been found that, for the most part, master's students are not satisfied with the level of organization of individualization of independent work in higher education institutions. They believe that little time is devoted to their interests and motives. Consequently, they perform tasks that do not contribute to the development of individual abilities.

DISCUSSION

A number of scholars have studied the problem of individualization of learning and various aspects of independent work in educational activities. According to N. Alimova & M. Radjabova (2020), N. Alimova (2021), the technology of individualization of learning and the main concepts of building students' independent work in learning a foreign language are substantiated. Their study shows that students share the opinion that individualization of learning is a prerequisite and should be provided with a variety of task variations in accordance with their needs, motives, and motivations. The results of the authors' confirmatory experiment confirm the provisions outlined in this paper that students are not satisfied with the level of organization of independent work in learning a foreign language.

Instead, V. Dolinskyi *et al.* (2021) identified methodological aspects of designing an individual trajectory of a teacher's professional development, which confirms the need for an individual approach to the development of a future specialist's personality, its importance and essential component in the structure of professional training, which confirms the views in this study. The authors B. Bezyazychnyy *et al.* (2017) characterized individualization of learning as a principle of scientific cognition in the process of

teaching students of pedagogical universities. The authors analysed individualization as a prerequisite for the process of acquiring the necessary professional competences, the results of which fully coincide with the views of this experimental study.

Authors V. Vyshkivska *et al.* (2021b) investigated the peculiarities of theoretical and practical aspects of teaching science on the Moodle platform with the aim of an individualized approach. The authors determine the effectiveness of such an approach, which leads to the formation of the necessary special (professional) competencies, but according to N. Demyanenko *et al.* (2022), the individualization of the educational and scientific space of higher education institutions in Ukraine is considered in the context of the content of professional training according to the andragogical and heroic model. The author is of the opinion that currently, in the education of adults and the elderly, there is also a lack of consideration of the motives and needs of adult students in the implementation of the educational process. The authors note that the contextual approach to the formation of the educational and scientific environment in higher education institutions will lead to a review of the features of the individualized approach from the perspective of the andragogical and heroic model of training, which in the context of this study makes it possible to consider the individual approach from the perspective of continuing education. Researchers T. Stoyanova *et al.* (2021) outlined a system-cluster technology for improving e-learning in the context of the COVID-19 pandemic, where individualization is important. The authors conducted an experimental study from the perspective of cluster technology as one that promotes the development of creative thinking based on an individual approach to each subject of education. The results of the test confirmed the views of this study in terms of the necessity and importance of an individual approach, but this experimental test does not consider the development of creative thinking.

In the research of A. Anosova *et al.* (2021) and O. Samoilenko *et al.* (2023), the authors consider the professional and pedagogical training of a specialist in the context of the modern realities of the open educational and scientific space of higher education institutions, where individualized learning is a priority. The authors note that an individualized approach is a modern trend in continuing education, which fully confirms the views of the authors of this study. Instead, A.V. Buhra (2016) outlined the didactic conditions for individualizing students' independent learning activities in mathematical sciences in higher education. K. Horash *et al.* (2022) provide a detailed assessment of the school innovative educational environment, identify their features, essence, components. The authors define the pedagogical conditions for the formation of an innovative educational environment, where a significant role is given to taking into account the individual characteristics of the subjects of learning. Instead, T. Hodovaniuk (2010), in her monograph, analysed in detail the identical concepts to the individual approach, thoroughly analysed the conceptual foundations of building the educational process in a higher education institution. The results confirm the fact that the educational and scientific environment in higher education institutions should be transformed to ensure an individualized approach by using tutoring technology as a leading technology of individualization in education, which is discussed in this paper.

In the work of Yu. Sylenko (2023), the tutoring technology, is substantiated from the perspective of pedagogical innovation in the professional training of future university teachers. The author defines tutoring as a technology that can be implemented not only in professional training, but also as a technology for professional growth and self-realization of a specialist within formal, informal, and non-formal education. The author emphasizes the interpretation of tutoring as a highly adaptive model in innovative educational processes that are correlated with the social need and the transformation of the educational and scientific environment in which its life cycle is carried out, which confirms the view of the importance of tutoring technology as a leading technology of individualization. S. Boiko (2020) studied the effectiveness of the introduction of tutoring technology into the education system in Ukraine as a means of implementing the principle of individualization in education. T. Shvets (2018) conducted a study that examined the practices of individualization tutoring in Ukrainian and Polish schools, comparing them. The researcher determined that the main model of tutoring support is individual tutoring, which includes weekly sessions with 2-3 tutors. T. Shvets (2018) examined tutoring practices of individualization, outlining a comparative analysis of Ukrainian and Polish schools, where the result of her activities was a model of personal tutoring support, which was implemented in 2015-2020. The researchers emphasized that the leading model of tutoring support is individual tutoring, the concept of which is based on weekly tutoring sessions with 2-3 tutors. The results of the study are tangential to the generalizations of T. Shvets, since individual tutoring is an integral common concept. O. Ivanytska (2020) outlines the features of tutoring and mentoring in higher education institutions in Switzerland and conducts a comparative analysis with the existing education system in Ukraine. The results of this study are not intended to compare different educational systems, but special attention should be paid to individual tutoring, which will be considered by the authors in the future.

The ZekoLL Centre (Official website of the Centre for Cooperative…, n.d.) has developed proposals for the professional development and self-development of tutors in order to develop their professional competences. The analysis of the results of the ZekoLL Centre shows that tutors are offered a variety of activities aimed at professional development and self-education of teachers, the successful completion of which is regulated by certification. The Centre is aimed at regulating the acquired professional competences of tutors. There is no such experience in Ukraine at present, as the profession of "tutor" is not included in the

National Classifier of Ukraine "Profession classifier" (Ministry of Economy of Ukraine, n.d.), which makes it relevant to consider this position and identify the importance of tutoring technology. In accordance with the study by S. Boiko (2020), who conducted research and experimental work on the introduction of tutoring technology into the system of work of educational institutions in Ukraine, the following results were summarized: when implementing tutoring, the level of self-determination of students increased from 40% to 60%, in particular, the readiness to choose a study profile increased from 45% to 75%. The results of her work indicate a significant increase in the quality of educational activities in experimental educational institutions. S. Boiko considered tutoring technology as a means of implementing the principle of individualization in education, which, as a result, was the basis of the national priority for the development of education in the New Ukrainian School based on the concepts of individual, developmental, personality-oriented learning, and collaborative pedagogy. These results outline the level of self-determination of schoolchildren, but in this study, the subjects are master students.

At the University of Würzburg, the KOMPASS tutoring and mentoring programme (n.d.) is aimed at developing tutoring. The main goal of this tutoring programme is to create and maintain a system of resources to improve the performance of subject tutors and introduce new initiatives to support students at the initial stage of their studies. The KOMPASS programme covers all faculties and includes research, organization of scientific work and development of learning strategies. The results of their activities confirm the belief that more than 80% of the students surveyed highly appreciate the work of tutors, approximately 20% of students have a good or neutral attitude to the programme, and only 1% express dissatisfaction with the programme. Therefore, the scientific and methodological literature makes it possible to assert that scientists now consider extracurricular activities to be the leading form of organizing students' independent work. The individualization of independent work of higher education students is aimed at more intensive classes with students, dividing learning tasks into parts for better knowledge acquisition, as well as consultations with the teacher.

CONCLUSIONS

The individualization of independent work in the professional training of future teachers is considered from the standpoint of an experimental study based on methodological approaches – complex, systemic, humanism, competence, and activity-based. The key role is given to the competence approach, since it is designed to improve the competences of master students. The conducted pedagogical survey among master students made it possible to identify the current state of individualization of independent work in higher education institutions as at the stage of formation. A total of 56.3% of respondents indicated that they were satisfied with individualization in the educational and scientific process. 43.8% said that they did not observe any systematic approach in the organization, did not feel an individual approach and consideration of personal abilities, motives, or desires. In particular, the block of questions about tutoring gave the following results: 18.8% of respondents said that a tutor is just an assistant who helps with learning. Therefore, it is logical that 56.3% of respondents have never used the services of a tutor. However, 25.0% of students would like to try it. The developed experimental study to establish the current state of individualization of independent work in higher education institutions can be implemented at all levels of training of future pedagogical specialists. The study was conducted with a sample of 54 respondents among 1st and 2nd year master's students (full-time and part-time) majoring in 011 Education, Pedagogical Sciences in the educational and professional programmes "Higher Education Pedagogy", "Andragogy. Adult Education" and "Pedagogical Counselling", who obtain the qualification of "teacher of a higher education institution" at the Mykhailo Drahomanov Ukrainian State University (Ukraine, Kyiv). The research can be implemented in other areas of professional training at the bachelor's and master's level of education.

The analysis of the problem showed that the modern organization of higher education institutions does not create sufficient conditions for the formation of such qualities as independence, the ability to self-education, self-development, and self-knowledge in students. Accordingly, the most appropriate solution would be to introduce a combined form of professional training under the guidance of a tutor, which would be more convenient for all participants in the educational and scientific process. Tutoring technology is an important mechanism for innovating education, capable of ensuring the openness of the educational environment of higher education institutions and contributing to the achievement of stable results in professional training. The results of the ascertaining experiment make it possible to further study the conceptual foundations of tutoring as a leading technology for individualizing the educational and scientific process in higher education institutions, which will lead to a revision of the content of the professional and pedagogical training of a future tutor on the basis of the development of the author's integrated model of individualization of the educational process, based on pedagogically appropriate subject-subject interaction between tutor (teacher) and tutee (student), which determines the practical significance of the research results. Implementation of the integrated model of tutoring support will be effective in implementing the ideas of individualization of mentoring in higher education institutions; active implementation of tutoring technology of individual support in the professional training of specialists; creation of individual educational trajectories, development of individual educational programmes, use of individual and group tutoring in the process of mastering individual educational courses. Prospects for research may be to study the areas of individualization of the

educational process in higher education: tutoring, educational support, individual technologies for providing an educational trajectory and the development of a model that will lead to the development of positive dynamics of individualization in higher education institutions.

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There is none.

CONFLICT OF INTEREST

There is none.

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Юлія Володимирівна Силенко

Аспірант, асистент
Український державний університет імені Михайла Драгоманова
01601, вул. Пирогова, 9, м. Київ, Україна
https://orcid.org/0000-0002-5535-176X

Індивідуалізація самостійної роботи в професійній підготовці майбутніх викладачів: експериментальне дослідження

Анотація. Індивідуалізація самостійної роботи в професійній підготовці майбутніх викладачів сприяє стабільному досягненню результатів у професійно-педагогічній підготовці, оскільки враховує потреби, мотивацію, можливості студента. Одна з провідних технологій інноваційної освіти – тьюторинг, який зумовлює забезпечення відкритого освітнього середовища в закладі вищої освіти. У статті окреслено результати експериментального дослідження стану індивідуалізації самостійної роботи в професійній підготовці майбутніх викладачів ЗВО на основі комплексного, компетентнісного, системного та діяльнісного підходів. Проведено констатувальний етап експерименту у вигляді анкетування серед 54 респондентів – студентів-магістрантів спеціальності «011 – Освітні, педагогічні науки» Українського державного університету імені Михайла Драгоманова з метою з'ясувати їхнє ставлення до нинішньої індивідуалізації самостійної роботи та упровадження технології тьюторингу. Респондентам було запропоновано анкету в Google Forms «Сучасний стан індивідуалізації самостійної роботи студентів у закладі вищої освіти», яка складалася з 10 запитань з можливими варіантами відповіді. Результати експерименту показали, що сучасні заклади вищої освіти не забезпечують належних умов для розвитку в студентів важливих навичок і якостей, таких як самостійність, здатність до самоосвіти, саморозвитку й самопізнання. Установлено, що більшість магістрантів висловлюють своє незадоволення щодо організації індивідуалізованої самостійної роботи в закладах вищої освіти, що зумовлено недостатністю уваги до їхніх інтересів, потреб та мотивів. Запропоновано запровадити інтегровану форму професійно-педагогічної підготовки майбутніх викладачів – технологію тьюторингу, як вагомий механізм інноватизації освіти, що здатний забезпечити відкритість освітньо-наукового середовища. Розкрито суть освітнього процесу під керівництвом тьютора, коли студент виступає в ролі тьюторанта на основі суб'єкт-суб'єктної партнерської взаємодії. Результати констатувального експерименту уможливлюють подальше дослідження концептуальних основ тьюторингу, як провідної технології індивідуалізації освітньо-наукового процесу. Розроблене експериментальне дослідження щодо сучасного стану індивідуалізації самостійної роботи у закладах вищої освіти можливо реалізовувати на всіх рівнях підготовки майбутніх фахівців педагогічного спрямування

Ключові слова: заклад вищої освіти; освітньо-наукове середовище; технологія тьюторингу; індивідуальна освітня траєкторія; фахові компетентності

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Iryna Sokolovska*

PhD in Medicine, Assistant
Zaporizhzhia State University of Medicine and Pharmacy
69035, 26 Maiakovskyi Ave., Zaporizhzhia, Ukraine
https://orcid.org/0009-0008-2487-1675

Serhii Nakonechniy

PhD in Medicine, Associate Professor
Zaporizhzhia State University of Medicine and Pharmacy
69035, 26 Maiakovskyi Ave., Zaporizhzhia, Ukraine
https://orcid.org/0000-0002-1087-9659

Iryna Ganzhiy

Doctor of Medicine, Professor
Zaporizhzhia State University of Medicine and Pharmacy
69035, 26 Maiakovskyi Ave., Zaporizhzhia, Ukraine
https://orcid.org/0009-0008-2490-5222

Distance education in the field of obstetrics, gynaecology, and ultrasound diagnostics in the conditions of quarantine restrictions and hostilities: A literature review

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*Corresponding author

Abstract. Forced distancing in the context of the COVID-19 pandemic has necessitated the transition of medical education to distance learning. The problem was exacerbated by the outbreak of full-scale hostilities, which necessitated further research in this area. The purpose of the study was to comprehensively review current scientific materials and consolidate existing knowledge on educational activities in obstetrics, gynaecology, and ultrasound diagnostics in the context of the coronavirus pandemic and full-scale hostilities. The following methods were used for the study: bibliographic, analysis, synthesis, induction, generalization, analogy, systematization, and categorization. The article presents a comprehensive analysis of the current literature on overcoming pedagogical challenges in the context of the COVID-19 pandemic and military operations through the achievements of distance education. The methodological foundations of distance education, the peculiarities of applying this practice in a pandemic and military operations, the similarities, and differences between them, especially in the context of obstetrics, gynaecology and ultrasound diagnostics, are considered. The connection between telemedicine and distance learning is presented both at the level of theory and practice. The practice of distance learning in obstetrics and gynaecology is compared with some other clinical disciplines. The result of the study was to solve the problem of the lack of a systematic view of the adaptation of the educational process to the conditions of a pandemic and military operations as emergency distance learning, rather than the classical practice of distance education, which contributes to the formation of an adequate assessment of pedagogical activities conducted in such conditions, in particular, in the field of obstetrics, gynaecology, and ultrasound diagnostics. The results of the study are of practical importance in the field of medical education,

where they can be used to develop recommendations for the organization of training in obstetrics and gynaecology or other medical disciplines in conditions of forced distance learning

Keywords: educational activities; information technology; telemedicine; digitalization; simulation medicine

INTRODUCTION

Since 2020, the education system has continued to face significant obstacles. The COVID-19 pandemic has become a significant challenge for both the global healthcare system and other sectors, including the education system. The medical education sector, which is at the intersection of these two areas, has faced particular difficulties. The biggest crisis was experienced by such a practically oriented discipline as obstetrics and gynaecology, for which, under quarantine restrictions, the main obstacle was distancing from healthcare facilities; similar challenges were faced in the field of ultrasound diagnostics. The end of the COVID-19 pandemic coincided with the start of large-scale military operations in Ukraine, which increased the burden on both the educational and medical sectors. The need to conduct the educational process in extreme conditions has exacerbated the problems that arose during the pandemic and has made it more urgent to find ways to optimize educational activities in the current situation. Therefore, the study covers a wide range of issues related to conditions that are restrictive to the educational process, such as the availability of educational information, the safety of the educational environment and its comfort, and the integration of modern practices under stressful conditions. Similar issues have already attracted the attention of Ukrainian scholars in the past. A. Prokopenko & S. Dotsenko (2021) emphasized in their study that the digitalization of educational systems and ensuring the ability of both teaching staff and students to study remotely is the most optimal solution to the problem of providing educational services in the context of the coronavirus pandemic. From the point of view of foreign colleagues, the problem was considered by N. Aristova & O. Malykhin (2021). Based on the experience of the Benelux countries, it was concluded that practices such as placing digital materials on resource platforms, transforming media resources into full-fledged educational portals, using existing applications for educational purposes, and developing new applications can have a positive impact on the educational process. These scientific works were focused on the study of ways to use information systems in the context of a wide range of educational programmes, which is why insufficient attention was paid to the clinical disciplines themselves and methods of their adaptation to the new pedagogical reality.

In their study, O. Lasytchuk *et al.* (2021) considered the issue of teaching such a clinical discipline as obstetrics and gynaecology. Taking into account the forced distance from medical hospitals, it was decided to increase the time for independent work of students and conduct distance learning in synchronous mode, compensating for the lack of clinical practice with case studies. Recommendations for the digitalization of the educational process in a pandemic were also proposed by Yu. Donska & N. Simonova (2021) based on their practical experience. It was emphasized that applications and platforms such as GOOGLE Meet, Caroline, ZOOM, Edmondo, TEAMS, Fliogrid and Skype are optimal for use in teaching obstetrics and gynaecology. The presented materials provide in-depth information on the peculiarities of teaching obstetrics and gynaecology in a pandemic. However, the problems that arise under martial law and ways to solve them have not received sufficient attention. In their work, H. Ridkodubska *et al.* (2022) studied the educational process in the context of hostilities and concluded that the use of information technology helps to ensure the continuity of the educational process, reduce stress, and prevent social maladjustment. An important problem in this context, given the unpredictability of the situation, is the issue of access to these resources for students and their social and living conditions. In their material, A. Sibruk *et al.* (2023) emphasized the importance of maintaining students' motivation, and the authors also expressed concern about the lack of qualified professionals who can work in such conditions.

In the course of the work, a comprehensive search of scientific literature on pedagogical, scientific, and practical, medical, and social resources was conducted using the bibliographic method to form a comprehensive basis for the study: ERIC, Education Research Complete, ProQuest Dissertations & Theses Global, Web of Science, Science Direct and PubMed. Using a number of keywords and phrases, such as: distance education; obstetrics; gynaecology; ultrasound diagnostics; quarantine restrictions; military operations; online learning; medical education; COVID-19; telemedicine; medical education; distance learning – a search for information on the problems related to the problem of the educational process in the field of obstetrics, gynaecology, and ultrasound diagnostics under the restrictive conditions of the COVID-19 pandemic and military operations, both in Ukraine and other countries, was carried out. Given that the problem is quite new, the criterion for the literature search was the time limit of 2019-2023, although some materials were included in the study as an exception. The above allowed coming closer to the most modern idea of conducting a distance learning process, touching on such clinical disciplines as obstetrics, gynaecology and ultrasound diagnostics, in the limited and unpredictable conditions of a pandemic and large-scale hostilities. Given

the significant medical and social significance of the problems, the purpose of this study was to consolidate existing knowledge through a comprehensive review of current literature on current practices in teaching obstetrics, gynaecology, and ultrasound diagnostics in the context of the COVID-19 pandemic and full-scale military invasion. This will further enable the creation of optimal educational programmes, both in normal and extreme conditions, not only for this, but also for other medical and social disciplines.

TRANSFORMATION OF MEDICAL EDUCATION IN THE CONDITIONS OF THE COVID-19 PANDEMIC

The COVID-19 pandemic has become a global shock that has affected all spheres of life: politics, economics, healthcare, education, and others. The changes caused by this event have affected various groups of people, including university professors, students, and their parents. The healthcare sector was particularly stressed at both the global and local levels, which led to a number of significant changes in the provision of medical care. The increased burden on all levels of healthcare, from outpatient to highly specialized inpatient departments, has led to an increased risk of COVID-19 infection and necessitated the need to distance healthcare institutions, including from medical students (Markwei & Goje, 2021). This has been especially true in the context of medical education, particularly in clinical disciplines such as obstetrics and gynaecology, as training in such a highly practical field has never been conducted under such restrictions before (Cisar & Matalega, 2020). Prior to the pandemic, the national curriculum for medical students included three types of activities: practical classes, seminars, and lectures (Shchurko, 2022). The quarantine conditions on the part of healthcare facilities and the need to limit contact between students, teaching staff and practitioners made it impossible to conduct the first type of activity, and subsequent changes on the part of medical education institutions significantly changed the latter (Shevchuk *et al.*, 2020). The above has led to two main trends in medical education during and likely after the COVID-19 pandemic: the transformation of traditional educational practices that have been established for many years and the emergency transition to distance learning. Both educational institutions and students were not ready for the former and the latter, which significantly complicated the implementation of new educational practices (Gromova *et al.*, 2020). Representatives of educational institutions faced methodological problems in the form of the need to reformat the old curriculum in accordance with the realities of emergency distance education, and the lack of guiding models that would provide for such changes. Students were more likely to have social and psychological problems, in particular, motivation. For both interest groups, the mismatch of material and technical capabilities with the larger demands that arose in connection with the realities of distance education was also a problem, which deepened the phenomena of social and material inequality (Polyanskaya *et al.,* 2021; Haelermans *et al.*, 2022).

According to the United States Distance Learning Association (USDLA), distance education is a way of acquiring certain knowledge and skills through the use of information transfer. In this case, the definitions of distance education and distance learning can be identified. According to W. Holmberg (1977), it is a complex term that covers not only different methods but also levels of education. The main feature of distance learning is the absence of constant control and physical interaction, both on the part of the teacher and the subject of study. Distance education involves interaction between the teacher and the student outside the educational institution through the use of electronic media and other technical means. From the methodological point of view, distance education is classical when the learning materials are originally developed for this format and do not require additional adaptation. The classification of distance learning is presented in Table 1.

Table 1. Classification of the classic form of distance learning

Characteristic	Type of distance education
For continuity of communication	Synchronous: the contact is continuous by the type of video conference or audio communication
	Asynchronous: contact is made via video, audio or written messages
According to the form of education	Face-to-face: involves the direct participation of the student in the educational process; this term is used in the context of emergency distance education
	Correspondence: a classic option for distance learning, which involves the student's partial participation in the educational process, since a certain part of the material is given to self-study
By character	Individual: focused on an individual student of education
	Group: aimed at a small group of acquirers
	Mass: covers numerous learners nationwide, mainly used in the context of open online lectures.

Source: compiled by the authors of this study

In the context of medical education, classical distance learning is used only in the training of pharmaceutical specialists. The forced transition from classical to distance learning in the context of the COVID-19 pandemic should be considered as emergency distance learning, i.e. a temporary transformation of educational practice into an alternative mode due to emergency circumstances (Bernard *et al.*, 2009). It is especially important that this type of distance

education uses learning materials that were to be studied in the classroom. In this case, the main goal of implementing new learning practices was to provide fast and reliable temporary access to education in a crisis (Lockee *et al.*, 2001). Before the pandemic, this type of distance learning was mainly used in regions where military operations were taking place (Davies & Bentrovato, 2011; Hodges *et al.*, 2020). However, during the pandemic, it has become a widespread practice. The distinction between distance education and emergency distance education is strictly methodological, although it is important when comparing different practices. Since the learning materials in emergency distance learning are not adapted, this negatively affects learning outcomes, unlike the classical form of distance education, when the format of materials originally created for such conditions allows maintaining the learning process at the desired level.

EMERGENCY DISTANCE LEARNING IN THE FIELDS OF OBSTETRICS, GYNAECOLOGY, AND ULTRASOUND DIAGNOSTICS

Open distance learning is a form of distance education in which learning resources and materials are openly available to anyone without restrictions. It is implemented mainly in such forms as online courses, webinars, and forums. The main characteristics are greater cost-effectiveness, wide accessibility, high individualization, and flexibility than for other types of distance education (Ag-Ahmad, 2020). Thus, when discussing the topic of distance education in the medical field, in particular, in the field of obstetrics, gynaecology and ultrasound diagnostics, the default is emergency distance learning. This creates certain difficulties in assessing the effectiveness of the work done, as the comparison of results is sometimes made taking into account classical methods of distance education, when the teaching materials were specially developed for this learning format. To ensure the safe training of medical students in obstetrics, gynaecology, and ultrasound diagnostics in the context of the COVID-19 pandemic, measures were taken at the initial stages to limit contact with patients. Later, given the evolution of quarantine restrictions, distancing with medical staff also took place, and eventually, the management of healthcare institutions decided to restrict access to hospitals for students. This necessitated the development of alternative learning practices to enable students to continue learning the necessary knowledge and skills (Lassoued *et al.*, 2020; Budiman, 2021). Although obstetrics and gynaecology is a clinical discipline, the use of information resources in both the educational process and clinical practice was not fundamentally new (Ten Cate & Durning, 2007). However, the transition to distance learning in the context of the pandemic was a challenge, and not all educational institutions were prepared to adapt educational materials to the new conditions. The main goal of emergency distance learning was to provide opportunities for virtual continuous learning, a flexible system of support for learning activities that meets institutional and national standards (Patil & Yan, 2023).

The vast majority of programmes were delivered in the form of synchronous group distance learning using video conferencing applications: GOOGLE Meet, ZOOM, TEAMS, and Skype (Syusyuka *et al.*, 2016). In the case of teaching ultrasound diagnostics to medical students, an application such as Ecofisio is recommended (Lozano-Lozano *et al.*, 2020). The time allocated for student's independent work was increased. In order to optimize learning platforms, existing digital resources were also modernized, and new ones were developed. Given the impossibility of conducting practical classes in the usual sense, considerable attention in the educational process was paid to the Virtual Patient programme, a computer simulation model created to simulate clinical cases, patients, and situations (Pakharenko, 2018). The programme provided an opportunity to gain a realistic, interactive, and most importantly, safe experience away from the medical hospital (Chang *et al.*, 2020). Also, a significant part of the learning process was devoted to solving case studies, which also allowed simulating clinical experience (Quintiliani *et al.,* 2022). Regarding distance education in the field of ultrasound diagnostics itself, which is related to both obstetrics and gynaecology and other areas such as cardiology and others, it is worth mentioning tele-ultrasound diagnostics (tele-USD) courses (Drake *et al.*, 2021). According to the feedback from teachers and students, the tele-ultrasound course was effective for learning practical skills, but teachers noted that virtual lectures were less effective than classroom classes. Teachers also expressed dissatisfaction with the difficulties associated with concentrating students' attention on the learning process, troubleshooting problems with the image, and providing feedback to participants in the educational process. The students rated the practice of tele-education higher than classroom classes, while the teachers had the opposite opinion. It should also be noted that in the case of distance learning, the results of the final tests were better than those obtained during classroom training (Soni *et al.*, 2021).

In a distance learning programme, about 88% of learners reported feeling more comfortable answering questions via video conference than in person (Pelikan *et al.*, 2021). This practice has the potential to overcome the limitations of physical space and fear of public speaking. However, the long duration of distance learning, in the absence of any timeframe for completion, has had a negative impact on the mental health of students, so it is also important to integrate mental health programmes into the learning process (Donska & Simonova, 2021). Much of the educational materials adapted for emergency distance learning or directly created for it can be further used in the classical educational process, for example, in the form of stations for the objective structured clinical examination (OSCE) (Krychkivska *et al.*, 2022). However, the issue of a full return to the old educational standards requires further discussion.

The outbreak of large-scale hostilities coincided with the easing of quarantine restrictions in Ukraine. This meant that the use of digital technologies and information systems in curricula that had been adapted for the pandemic

period became even more important in the more extreme conditions of military conflict (Lysenko *et al.*, 2023). From the perspective of medical education, the factor that led to the transition to distance learning was common in both cases – the need to avoid physical contact with medical facilities and educational institutions (Vyhivska *et al.*, 2023). However, the conditions of the military conflict have exacerbated some of the problems that were less visible during distance learning in a pandemic. These include social and material inequality, demands on living conditions, and psychological stress, which have become more acute in the context of hostilities (Miroshnichenko & Goldovskiy, 2022; Nitsovych & Semeniak, 2023). A significant number of students and teachers have been and continue to be in dangerous areas, such as war zones or temporarily occupied territories. This has resulted in a lack of access to the Internet and technical facilities, which hinders participation in distance learning. The need to evacuate due to frequent air raids in most of Ukraine has also had a negative impact on the quality of distance learning. This situation has a direct impact on the organization of the learning process and can lead to its disruption (Xie *et al.*, 2020).

Therefore, due to the uneven access of the participants of the educational process to synchronous distance learning, it is recommended to switch to asynchronous distance learning. Given the complexity and practical orientation of obstetrics, gynaecology and ultrasound diagnostics, as well as the growing problems associated with stress, it is recommended to conduct short psychological trainings and review the material in compliance with the principles of professional ethics (deontology). In some regions, distance learning is becoming the only way to obtain the necessary education and psychological support. Thus, even though distance education, especially in medical fields, is not a universal solution, in some cases it can be an important means of supporting the social well-being of students. Thus, the methodological foundations for the definition and typology of distance education were considered, and the main trends in the transformation of educational practices during the pandemic and military operations were identified, in particular, through the prism of teaching obstetrics, gynaecology, and ultrasound diagnostics. The future of educational practices, both new and traditional, as well as the use of experience from other medical disciplines other than these, require further discussion. Telemedicine should also be considered as a practical extension of distance learning methods.

TELEMEDICINE AND DISTANCE LEARNING IN THE FIELD OF REPRODUCTIVE HEALTH

As X. Xie *et al.* (2020) highlighted in their study, distance education is currently in the global spotlight and plays an important role in the context of the COVID-19 pandemic. The massive use of online resources during the pandemic is likely to change students' perceptions of distance learning and promote its wider use in the post-pandemic world. The authors emphasize that distance education is becoming an integral part of general educational practice, and it can successfully coexist and be combined with traditional classroom methods of teaching. In his study, A. Mitchell (2023) concluded that technology will play a key role in the future of education. Educational technology has long been an important area of investment, and the online education market is set to grow even larger in the coming years. The introduction of the fifth generation of mobile networks (5G) is opening up new opportunities for mobile learning, which could become the main channel for distance education in the future. More and more hardware and software are emerging to enable device-to-device interaction in classrooms, allowing students to learn and join online classes at any time using their smartphones, tablets, and other portable devices. A high-speed mobile network provides efficient, real-time data transmission, including high-quality audio and video, which enables high-quality online interactions. Mobile learning provides additional flexibility and convenience, allowing students to use their time, for example, on the road, in queues and in other spare moments to study.

In their work, G. Dick *et al.* (2020) noted that higher education institutions are introducing innovative online learning methods in the classroom as well, using advanced technologies such as artificial intelligence, augmented and virtual reality. The use of artificial intelligence covers various aspects of education, including automatic work verification and monitoring of the testing process. Virtual reality allows students to immerse themselves in learning material as if they were there in person. They can visit any place on Earth, get to know different cultures and historical periods, and even feel like a participant in events. Augmented reality allows learners to better understand educational material by enabling them to see it in a real environment. Students can explore complex concepts, conduct experiments, and even create their own virtual models. Large technology companies and course developers will continue to invest in the development of advanced applications based on virtual reality (VR), augmented reality (AR) and artificial intelligence (AI) in education. Online courses and hybrid education will become an integral part of the long-term strategy of many universities. Many students are concerned about the high cost of education, and online education has the potential to reduce education costs and attract more students, including those living in remote areas or other countries. This provides students with a wider range of choices and helps to increase accessibility, which is an important objective of public universities. The walls of universities and other educational institutions are no longer the only place to learn. Online education is being combined with traditional methods and is becoming an important part of the education of the future. Thus, the results of a number of studies presented above confirm the findings of this paper regarding the further use of distance learning practices in its classical and blended forms.

Telemedicine and distance learning are two areas of activity that emerged at the same time and have undergone

joint development and popularization. In terms of education, distance learning precedes the use of telemedicine achievements by future specialists, due to closer interaction with information and technical resources and overcoming the wariness of implementing the latest resources in medical practice. Medicine in the field of women's reproductive health has developed especially well. The study by S. Murugesu *et al.* (2020) notes that the coronavirus pandemic has provoked significant changes in the field of reproductive care. The increased burden on the healthcare system, both at the outpatient and inpatient levels, including specialized departments, has led to a decrease in the availability of routine medical services. This has directly affected the field of obstetrics and gynaecology, and to cope with this situation, it is important to adapt the provision of medical care in this area using telemedicine technologies. C.L. Ventola *et al.* (2014) note that even before the pandemic, telemedicine in the field of reproductive health had developed significantly, which led to the rapid development of the industry in proportion to consumer demand. Therefore, a number of common phone applications can be adapted to provide professional medical care in the field of obstetrics and gynaecology. Telemedicine can provide much more effective assistance in the prevention and correction of reproductive health factors for both women planning a pregnancy and their partners than traditional visits to medical facilities. Telemedicine is most effective in addressing chronic rather than acute health problems, which are a priority in preventive programmes. It also provides accurate and continuous monitoring of diseases. Modern applications automatically generate reports, which eliminates the need for the service user to provide data on their own. Such a simulation of classic visits to an obstetrician-gynaecologist has a positive impact on the results of prevention programmes.

Quite often, financial and time constraints are an obstacle to visiting a healthcare facility, and the use of online resources can help overcome such barriers. Such resources provide individualized and continuous information to the extent that it facilitates more effective disease management. Telemedicine, like distance learning, opens up new opportunities to optimize the delivery of healthcare services, particularly in the field of obstetric and gynaecological care. In the context of improving the quality of medical care, telemedicine offers a solution for overloaded healthcare delivery systems and contributes to the improvement of confidentiality in obstetrics and gynaecology. Thus, the above studies complement the material on continuity in the system of "telemedicine and distance education" and draw attention to the prospect of using telemedicine in the provision of preventive obstetric and gynaecological services. The issue of disciplines related to obstetrics, gynaecology, and ultrasound diagnostics has also attracted the attention of scientists, for example, V. Mehta *et al.* (2021) investigated the prospects of distance education in the most practical medical field – surgery. They used both conventional online resources and more complex virtual patient programmes, including online broadcasting of surgical interventions, which had a positive impact on the clinical experience gained by students. The prospects of a mixed type of distance education in the context of surgery are also emphasized, as greater experience with information technology resources is positively correlated with the quality of the use of telemedicine tools, which are developing rapidly in this area.

Authors A.J. Machado Júnior & H.F. Pauna (2020) examined distance education through the prism of otolaryngology in their study and came to the following conclusions: a wide range of resources for distance education in the field of otolaryngology, including applications with 3D models of anatomical structures, effectively complement classical teaching methods. Virtual consultation, both in terms of its high importance and prevalence, should be equated with distance learning, with an indication of the appropriate continuity between the way of acquiring knowledge and its use in practice. The researchers also emphasize the importance of considering individual differences among students, as their preferences and skills in using technology can vary considerably. Thus, these studies complement this article in relation to distance education in the context of other medical disciplines, ultimately confirming the prospect of further application of this practice both independently and as a supplement to classical methods.

CONCLUSIONS

The scientific material presents a comprehensive literature review on the topic of distance learning in the field of medical education, especially obstetrics, gynaecology, and ultrasound diagnostics. The COVID-19 pandemic has significantly changed the paradigm of medical education, prompting the rapid development of distance technologies. The transition to urgent distance learning was a major challenge for the education system. Mainly, the accelerated transformation of the educational process was caused by the need to distance students from healthcare institutions. The article discusses the methodological foundations of distance education and focuses on its main types: classical, emergency, and open. During the pandemic and military operations, the participants of the educational process took part in emergency distance learning, so the main challenge was the need to adapt the curriculum to unusual conditions. The analysis of the experience of teaching obstetrics, gynaecology, and ultrasound diagnostics during the pandemic demonstrated the effectiveness of various methods, such as video conferencing, use of virtual patients and case methods. At the same time, problems related to unequal access to technology and psychological difficulties were identified. The conditions of the military conflict have exacerbated some problems associated with distance education, in particular, those related to psychological stress. However, for certain regions, distance education remains virtually the only available educational practice. It is now important to pay more attention to asynchronous learning methods and psychological support for students.

The pandemic experience has also contributed to the development of telemedicine in obstetrics and gynaecology,

which has proved extremely useful in providing medical services and consultations under restrictions. Overall, distance learning technologies are now a necessary component of medical education, effectively complementing traditional teaching methods. Given all the above, a complete return to classical educational practices in the modern digital world seems unlikely. There is a growing trend towards digital transformation in education in general and medical education in particular. The optimal solution may be a combination of classical and distance learning methods, using modern information and technical resources. This approach will allow students and teachers to enjoy the benefits of traditional learning, as well as effectively implement digital tools to improve the learning process, minimizing the disadvantages of each. It is important to continue to improve teaching methods, considering the specifics of medical specialities, and to ensure equal access to education through the use of modern technologies. The development and improvement of educational platforms that provide access to relevant courses and materials in obstetrics, gynaecology, and ultrasound diagnostics can be seen as a leading area for further research in this area. Also, researchers should make efforts to study effective pedagogical methods and strategies specific to distance learning in medical sciences. In addition, an important area for further research is to analyse ways to integrate distance education practices into the teaching of clinical disciplines to medical students in conditions of forced distance learning.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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Ірина Сергіївна Соколовська
Кандидат медичних наук, асистент
Запорізький державний медико-фармацевтичний університет
69035, просп. Маяковського, 26, м. Запоріжжя, Україна
https://orcid.org/0009-0008-2487-1675

Сергій Юрійович Наконечний
Кандидат медичних наук, доцент
Запорізький державний медико-фармацевтичний університет
69035, просп. Маяковського, 26, м. Запоріжжя, Україна
https://orcid.org/0000-0002-1087-9659

Ірина Юріївна Ганжий
Доктор медичних наук, професор
Запорізький державний медико-фармацевтичний університет
69035, просп. Маяковського, 26, м. Запоріжжя, Україна
https://orcid.org/0009-0008-2490-5222

Дистанційна освіта в галузі акушерства, гінекологоії та ультразвукової діагностики в умовах карантинних обмежень та бойових дій: літературний огляд

Анотація. Вимушене дистанціювання в умовах пандемії COVID-19 викликало необхідність переходу медичної освіти на дистанційну форму навчання. Проблема поглибилася у зв'язку з початком повномасштабних бойових дій, що зумовило необхідність подальших досліджень у цій галузі. Метою роботи був комплексний огляд сучасних наукових матеріалів та консолідація наявних знань стосовно проведення освітньої діяльності в галузі акушерства, гінекології та ультразвукової діагностики в умовах пандемії коронавірусної інфекції і повномасштабних бойових дій. Для проведення дослідження використано такі методи: бібліографічний, аналіз, синтез, індукція, узагальнення, аналогія, систематизація та категоризація. У матеріалі представлено комплексний аналіз актуальної літератури щодо подолання педагогічних викликів в умовах пандемії COVID-19 та військових дій за допомогою досягнень дистанційної освіти. Розглянуто методологічні основи дистанційної освіти, особливості застосування цієї практики в умовах пандемії та воєнних дій, спільне і відмінне між ними, особливо в контексті акушерства, гінекології та ультразвукової діагностики. Представлено зв'язок між телемедициною та дистанційним навчанням як на рівні теорії, так і практики. Порівняно практику дистанційного навчання в акушерстві та гінекології з деякими іншими клінічними дисциплінами. Результатом дослідження стало вирішення проблеми відсутності системного погляду на адаптацію освітнього процесу до умов пандемії та військових дій як саме екстреного дистанційного навчання, а не класичної практики дистанційної освіти, що сприяє формуванню адекватної оцінки проведеної в подібних умовах педагогічної діяльності, зокрема в галузі акушерства, гінекології та ультразвукової діагностики. Результати дослідження мають практичне значення у сфері медичної освіти, де вони можуть бути застосовані для розробки рекомендацій щодо організації навчання акушерства й гінекології чи інших медичних дисциплін в умовах вимушеного дистанціонування

Ключові слова: освітня діяльність; інформаційні технології; телемедицина; цифровізація; симуляційна медицина

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Sergii Melnychenko*
Senior Lecturer
Odesa Military Academy
65009, 10 Fontanska Doroha Str., Odesa, Ukraine
https://orcid.org/0000-0002-0708-9859

Volodymyr Ovchynnyk
Lecturer
Odesa Military Academy
65009, 10 Fontanska Doroha Str., Odesa, Ukraine
https://orcid.org/0000-0003-4523-8015

Sergii Hudal
Lecturer
Odesa Military Academy
65009, 10 Fontanska Doroha Str., Odesa, Ukraine
https://orcid.org/0000-0001-8005-3265

Mykhaylo Kulyk
Senior Lecturer
Odesa Military Academy
65009, 10 Fontanska Doroha Str., Odesa, Ukraine
https://orcid.org/0000-0002-0734-3837

Pedagogical aspects of the development of leadership qualities in cadets of higher military educational institutions

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*Corresponding author

Abstract. The development of leadership qualities in cadets of military institutions is of particular importance in today's conditions, since the formation of a new generation of professional competent officers-leaders will directly affect the combat capability of the Armed Forces and the defence capability of the state as a whole. The purpose of the study was to identify pedagogical aspects and ways to improve the system of leadership development among cadets of the Military Academy. The study analysed the theoretical foundations of the leadership problem and summarized the best Ukrainian and foreign experience. The methods used were: structural-functional method; analysis, induction. The study also used the following methodological approaches: systemic approach; reductionist and holistic approaches. As a result of the research, it was found that the existing system of training military leaders in higher military educational institutions currently has certain significant drawbacks that significantly reduce its effectiveness, namely: insufficient attention is paid to military-humanitarian disciplines, which shape the socio-communicative qualities of a modern leader; outdated reproductive teaching methodologies dominate instead of innovative interactive ones; individual-psychological characteristics of the cadet's personality and potential are not sufficiently taken into account; the educational potential of the faculty is weakly utilized due to mentoring; the system of cadet self-government is underdeveloped, within which future officers could gain real practical leadership experience. Therefore, constructive

ways of improving the existing system were proposed by strengthening the humanitarian component of training, wider use of interactive teaching methods, introducing individual educational trajectories, increasing the role of mentoring from senior command staff, creating an effective system of cadet self-government, and substantiating the feasibility of using innovative pedagogical methods of active learning for the effective targeted formation of necessary leadership qualities and competencies. The results of the study on improving the system of leadership development of cadets of Higher Military Educational Institutions are of great practical importance, as they can be used to improve the effectiveness of training officers as future military leaders

Keywords: wargames; business games; mentoring; strategic thinking; analytical skills; staff motivation

INTRODUCTION

In the context of repulsing the military invasion of the Russian Federation and implementing the state's strategic course of integration into the European community, the Armed Forces of Ukraine (AFU) needs competent specialists with leadership skills capable of performing tasks to protect the state and acting jointly with units of the North Atlantic Treaty Organization (NATO) member states. According to the Doctrine of Military Leadership Development in the Armed Forces of Ukraine (2020), the development of leadership skills in cadets of Higher Military Educational Institutions (HMEIs) is the main mission and the most important problem they have to solve. To successfully fulfil this task, each future officer must develop character and professionalism, striving for excellence. The mission of military leaders is to prepare themselves and their personnel morally, psychologically, and professionally to perform assigned tasks, to unite them and lead them to a specific goal, so the topic of pedagogical aspects of developing leadership skills of HMEIs cadets is quite relevant and requires in-depth scientific study.

At all times, military affairs have required special qualities from command personnel. The ability to lead, inspire and guide is what has always distinguished a true leader on the battlefield. Given the complex challenges and threats to Ukraine's national security, the issue of training a military leader is of particular importance, as officers are responsible for making important decisions that often determine the fate of entire units. A commander's leadership qualities and ability to inspire soldiers by example are the key to success in combat operations. Conversely, the lack of leadership potential can have fatal consequences on the battlefield. Therefore, it is clear that the problem of forming true leaders should become a priority in the military education system. The study of P.V. Sluvenko (2023) analyses the concept of practical training and psychological and pedagogical conditions for the development of leadership skills during practical training in HMEIs. It is determined that such conditions are aimed at ensuring positive motivation, creating a developmental environment, individualization, and differentiation of future officers' training. Specific psychological and pedagogical conditions are highlighted, in particular: a systematic approach to practical training, organization of independent work, use of innovative methods, development of individual qualities of cadets, motivation to study and work. The article by S.V. Katerynchuk & I.V. Lopatkin (2023) considers the problem of using the modelling method for the development of military leadership in border guard officers. The authors substantiate the relevance of this problem by the need to reform social structures and develop the personality of an officer-leader. The essence of leadership as a socio-psychological phenomenon is analysed. It is concluded that among many methods, the most effective for the development of military leadership is the method of modelling. It is proposed to single out specific professionally oriented practical situations in the form of descriptions for the development of leadership qualities. The advantages of this method are identified, in particular, the possibility of maintaining a balance between the officer's readiness for change and adherence to the principle of consistency. The study pays attention to a thorough scientific analysis of the problem of developing the leadership competence of officers of the Ukrainian Airborne Forces (UAF). Author V.S. Karpenko (2023) formulated the theoretical and methodological foundations of the study, clarified the basic concepts, developed a model and methodology for developing the leadership competence of UAF officers, and identified the pedagogical conditions for the effectiveness of this process. S.V. Bezpalko *et al.* (2022) rightly point out that there is a certain dissonance between the number of people with higher education and its quality in Ukraine. At the same time, the authors emphasize the importance of developing leadership skills and charisma of young people, and engaging talented graduates in teaching and research. However, the article does not sufficiently address the issue of developing the leadership competence of future law enforcement officers, the practical aspects of developing their leadership skills.

The article identifies the peculiarities of formation of leadership qualities of future border guard officers in the course of studying specialized disciplines. V. Zhuravlov & V. Miroshnichenko (2022) rightly emphasize the priority of this area of training for future officers, identifying the key

components and necessary leadership qualities. The pedagogical strategies proposed by the authors aimed at developing these traits in the study of professional disciplines are noteworthy. However, the possibilities of interactive teaching methods and case technologies for the development of cadets' leadership qualities are not sufficiently disclosed. There is also a lack of specific methodological recommendations for the application of sound approaches in the professional training of border guard officers. The purpose of the study was to theoretically substantiate and develop practical recommendations for improving the process of developing the leadership potential of cadets in HMEIs. To achieve this goal, the following tasks was expected to be solved:

- to study theoretical aspects and modern approaches to leadership development;
- to study the peculiarities of developing the leadership potential of cadets in the process of military training;
- to analyse existing pedagogical methods for developing leadership skills in the military environment;
- to substantiate appropriate ways to improve the system of leadership development of HMEIs cadets.

LITERATURE REVIEW

The study of A. Wierzbic & A. Taurogińska-Stich (2022) analyses the practices of developing cadets' leadership competencies in leading military academies in the United States, Austria, and Greece. It is found that these academies use multifaceted approaches that transform knowledge into action and behaviour, adapting competencies to future positions. It is proposed to introduce a targeted leadership development programme in Polish military education. The author also emphasizes the importance of aligning standards and cooperation with NATO and the European Union (EU) to share responsibility for security. The article by W. Pruchnicki *et al.* (2022) examines the development of leadership competencies in military academies in the United States and Austria to determine the best solutions for improving training at the Polish General Academy. The authors use peer reviews, programme analysis, and experience. The key competencies of officers are identified, and the methods of selecting and training cadets are analysed. It is proposed to improve training in Poland based on the best practices of other academies. Authors S. Sefidan *et al.* (2021) examine the practices of character education and their impact on the development of leadership skills in the military, including ethical and moral aspects. The paper discusses the key characteristics of effective leaders, such as vocation to service, transformational leadership, and professional growth. It is emphasized that the goal of officer training should be long-term character development, as this will be crucial in the performance of leadership functions. It is proposed to integrate effective methods of character education into the overall strategy of military training for the successful completion of missions and professionalism of the officer corps.

M. Matthews *et al.* (2020) substantiate the need to develop the character of military leaders and propose a model for the development of military leaders with character called Leadership Identity Development (LID), which combines the development of vocation, identity, and moral excellence to increase self-awareness, social awareness, and the ability to make ethical decisions by future officers. The book by M.P. Ryan & T.L. Weekes (2021) takes a comprehensive look at the critical role of these institutions in developing responsible leaders, covering a wide range of topics and practical resources for designing effective development programmes based on the authors' diverse perspectives. The study by A.S. Nogueira *et al.* (2021) presents evidence-based approaches to measuring and developing leadership at the Brazilian military academy Agulhas Negras. The macro-process of leadership development, the system of observation and assessment of behavioural skills, social media analysis, and psychological variables are considered. It is shown that the study of these factors contributes to a better understanding of the phenomenon of leadership and the development of effective leadership training tools in military contexts. All the studies reviewed emphasize the importance of a targeted and systematic approach to leadership development and character building for future officers. Effective programmes combine theory, practical training, simulation, mentoring, self-reflection, and teamwork. The key is to develop a clear vision of the leadership role, understanding of one's vocation, development of moral qualities and the ability to make responsible decisions. Integration of efforts at all levels of training and close cooperation with foreign partners in the context of joint missions are essential for success.

MATERIALS AND METHODS

One of the key materials of the study was the Doctrine of Military Leadership Development in the Armed Forces of Ukraine (2020). A detailed analysis of the provisions made it possible to identify the current vision of the military-political leadership of the state regarding the purpose, tasks, principles, functions, and main components of the military leadership training system. The doctrine made it possible to establish the targets and vectors of development of the phenomenon under study, which is extremely valuable from both theoretical and practical points of view. The study also analysed the materials of foreign military educational institutions, in particular, the guidelines for teaching the discipline "Military Leadership" at the West Point Military Academy, USA. In particular, the study guide by R.P. Lemler (2020) contains valuable information on the purpose, content, organizational forms, and methods of developing cadets' leadership skills at the leading American HMEIs. The analysis of these materials made it possible to compare approaches to training future leadership officers in different educational systems. This identifying positive foreign experience that can be borrowed and adapted to improve practice in Ukraine in the context of Euro-Atlantic integration. The analysis of legal and regulatory documents defining the conceptual framework for the formation of military leadership, in particular, the Doctrine of Military

Leadership Development in the Armed Forces of Ukraine, made it possible to clarify the official position of the military leadership and the requirements for the professional training of future leadership officers.

The analysis was also applied to the study of curricula and programmes of HMEIs, in particular, to consider the topics, disciplines, and practices presented in them aimed at developing the leadership skills of future officers. The method of generalization was used for the methodological developments of HMEIs teachers to identify effective pedagogical approaches, forms, methods, and technologies of leadership development. The study used a combination of reductionist and holistic approaches to study the problem of developing cadets' leadership skills. In particular, the reductionist approach was used to consider certain aspects of leadership, such as motivation, communication, decision-making, and conflict management. Each of these phenomena was analysed as an independent element, which allowed for a deeper understanding of its essence. At the same time, the holistic approach implied consideration of the leadership phenomenon as a single, inseparable whole. Attention was focused on the interrelationships between all its components and the integrative effect they create in the aggregate. Such a comprehensive approach made it possible to obtain both detailed knowledge of each aspect of cadets' leadership training and a holistic view of the phenomenon under study and the principles of its formation as a systemic entity.

The systemic approach was applied to the consideration of the pedagogical process in HMEIs as an integral system of interrelated components, analysis of its structure, functions, and principles. The structural-functional method made it possible to identify the structural components of the system of leadership development of cadets and determine their role and purpose within this system. The methods of analysis and generalization were used to study scientific views on the problem of developing the leadership qualities of future military professionals. The study used the method of induction when considering specific models and approaches to the development of leadership qualities and formulating generalizable conclusions based on them. In particular, given the study of the provisions and principles of certain leadership theories (transformational, authentic, etc.), the key aspects that should form the basis of a modern system of developing the qualities of military leaders were identified. Thus, the materials, approaches, and methods used have created an appropriate basis for a deep and comprehensive study of the object and subject of the study, as well as substantiation of its conclusions and recommendations.

RESULTS

Theoretical foundations and practical aspects of the formation of leadership qualities in the training of military officers

In modern environment, leaders are required to be able to effectively influence people, inspire them to achieve a common goal and improve the organization. As noted by R.P. Lemler (2020), leadership is seen as the activity of influencing people by creating purpose, direction, and motivation to achieve the mission and improve the organization. One of the key approaches to leadership development is the concept of authentic leadership. Authentic leaders are aware of their values and purpose, demonstrate sincerity in relationships, and make informed decisions based on all information. This allows them to gain the trust and respect of their followers. The formation of authentic leadership is influenced by self-regulation, positive relationships with others, and a balance between personal and professional roles. Another important theory is the full spectrum leadership model. It includes transactional leadership (exchange of rewards for the performance of tasks) and transformational leadership, which focuses on changes in the minds of followers to achieve progress. Transformational leadership is based on the leader's ability to change the perceptions and motivation of followers to achieve organizational progress. This is achieved through four components:

- idealized influence (the leader demonstrates high moral principles);
- intellectual stimulation (encouraging innovation and creativity);
- inspirational motivation (creating an attractive vision of the future);
- individual approach (support and mentoring of followers) (Lemler, 2020).

Leadership education programmes, in particular, in military institutions, should instil in future officers the understanding that effective unit management involves more than just control and punishment. It is important to learn how to inspire soldiers, engage them in a common vision of mission success, and develop their potential. This will be facilitated by training in communication skills, speeches by successful practitioner leaders, case studies, etc. Another relevant area is staff motivation. Situational theories explain motivation by the specifics of the work context (task complexity, control system, etc.). Process theories focus on the psychological needs of a person. Both approaches are important for leaders because they allow them to better understand what motivates their subordinates to work effectively (Lemler, 2020). Thus, the curriculum should comprehensively develop the qualities and competences of future leaders, both professional and interpersonal. Thus, modern scientific approaches emphasize the importance of values, relationships with others, personal development, and the ability to inspire and motivate people for effective leadership. These aspects should be taken into account in leadership training programmes, including for the military.

The development of cadets' leadership potential in the course of military training is an extremely complex and multifaceted process that covers both the formation of professional competences of future officers and the overall personal development of young people. As rightly noted in a thorough study by C. Szelwach *et al.* (2023), in the context of the chaotic and volatile modern world, leaders are forced to be flexible, make informed decisions quickly in critical

situations, and lead a team, inspiring and motivating subordinates. These aspects of leadership are undoubtedly of direct relevance to the officers of the armed forces of any country, as the professionalism and strong-willingness of officers determine not only the effectiveness of combat missions, but sometimes the fate of the military and civilians. Therefore, the training course for cadets in military educational institutions should be aimed at the targeted development of what scholars call "embodied leadership". This implies that future officers should be thoroughly aware of their own physical and psycho-emotional state, as well as the state of their subordinates. In other words, it is about the harmonious development of both mental (cognitive) and physical aspects of leadership, because only when the mind and body are united can a high level of awareness of oneself and the environment be achieved and an adequate response to changes in the situation be made (Szelwach *et al*., 2023).

In view of the above, the process of training future officer leaders should be based on an inseparable link between theoretical knowledge and practical skills. On the one hand, cadets learn thorough theoretical models of leadership, decision-making strategies, psychology of team management, etc. On the other hand, they have the opportunity to put this knowledge into practice by leading units during field exercises and training. The latter aspect, i.e. practical training, is an extremely important component, because only real experience allows developing the soft skills that are inherent in true charismatic leaders. It is about the ability to respond quickly to unpredictable turns of events, make informed decisions under stress or uncertainty, encourage, and motivate subordinates, demonstrating a personal example of resilience and courage. It is the simulation of extreme situations during military exercises that allows young people to develop resilience to the pressure of circumstances and stress factors, as combat conditions are always associated with risk, uncertainty, and a lack of time to make decisions. To summarize, it is worth noting that a comprehensive and effective combination of thorough theoretical training, intensive physical training, and practical exercises to develop tactical skills in conditions as close to combat as possible allows for the development of extremely important leadership qualities of future officers. By practically honing their teamwork skills, cadets not only learn models of effective leadership, but also gain valuable experience in putting theory into practice, considering all the complexities of real-world conditions. This approach allows developing competent, proactive, and strong-willed leaders who are able to act in a balanced manner in any, even critical, circumstances.

Substantiation of expedient ways to improve the system of leadership development of HMEIs cadets

The effectiveness of the functioning of any organization, including the military, directly depends on the quality of leadership within it (Lemler, 2020). It is the leaders who determine the strategic direction of development, shape the organizational culture, create a favourable psychological climate, and motivate personnel to achieve set goals. Therefore, the preparation of future leaders is one of the priority tasks of any military educational institution. The current system of leadership training at HMEIs (Higher Military Educational Institutions) has certain shortcomings that reduce its effectiveness. Specifically, the content of educational disciplines is not fully oriented towards the formation of leadership qualities in cadets. Significant attention is paid to military-technical, military-specialized, and military-applied disciplines. At the same time, subjects that develop "soft skills" of a leader, such as psychology, sociology, conflict resolution, etc., are studied as secondary. Additionally, teaching methods predominantly have a reproductive nature, aimed at acquiring ready-made knowledge and forming standard professional and combat skills. Insufficient attention is given to the development of creative and critical thinking, the ability to think and act non-standardly in extreme conditions, which is important for a leader. The role of an individual approach to each cadet is underestimated. In most cases, cadets are viewed as a single entity that only needs to achieve defined training standards. Their world-views, values, needs, and motivations are considered secondary criteria, although they determine the individual leadership potential of future officers. It is worth noting that authoritarian management methods prevail in handling cadets by the command staff. Relationships are often built on the principle of "superior-subordinate," while transformational, mentoring, and servant leadership are underutilized. This does not contribute to the formation of a democratic, humanistic world-view in cadets. Analysing the experience of leading military educational institutions worldwide provides grounds to propose several ways to improve the leadership development system for HMEI cadets, including enhancing the humanitarian component in professional training by expanding the study hours for disciplines such as organizational psychology, sociology, conflict resolution, rhetoric, leadership ethics, intercultural communication, etc. It is especially important to study real-life cases from the practices of successful contemporary military leaders, their professional activities, and personal traits, which vividly demonstrate exemplary behaviour for future officers and shape their own leadership model. It is also crucial to create conditions for the maximal development of cadets' personalities, taking into account their individual psychological and sociocultural characteristics, and adopting a differentiated approach to organizing the learning process. To identify the leadership potential of all cadets, it is advisable to employ psychodiagnostics, individual and group training sessions, situational exercises, role-playing games, etc. For those who demonstrate the most pronounced leadership qualities, it is necessary to develop a personalized educational trajectory based on a special program. Equally important is the use of interactive teaching methods aimed at developing the creative potential of individuals, fostering critical thinking, and making decisions in uncertain and extreme situations. Innovative pedagogical technologies such as training sessions, business and role-playing games, case studies, project methods,

etc., can be employed. Conducting various competitions, challenges, and team trials that simulate real professional activities of officers will foster strategic thinking and the ability to act in extreme and non-standard situations.

It is essential to strengthen the mentoring functions of the HMEI faculty. They should not only be tasked with teaching cadets military affairs, but also with nurturing their leadership qualities. It is crucial to establish strong moral and psychological connections between mentors and mentees so that the officer becomes an authoritative example for the young leader to follow. Transformational, servant, and mentoring leadership, focused on the development of the subordinate's personality, should be widely implemented. This will enable cadets to demonstrate themselves as leaders, take responsibility, implement their own views, managerial decisions, and tactical means before their subordinates (fellow cadets). Thus, implementing the proposed improvement strategies in the leadership development system for HMEI cadets will contribute to creating favourable conditions for fully unlocking their personal potential, forming leadership thinking, and acquiring skills in democratic military unit management. This will ensure thorough theoretical and practical preparation of a new generation of military leaders who will effectively fulfil combat tasks and achieve high results in managing military units in the future.

Determination of effective pedagogical methods for the development of leadership qualities

In order to identify effective ways of pedagogical influence on the development of leadership potential of HMEIs cadets, it is advisable to use an arsenal of innovative methods of active learning. These methods can be flexibly adapted to the context of military training. An important element of achieving a developmental effect is the introduction of interactive methods such as the case study method, which involves a detailed analysis of specific situations that have arisen in real military units. Cadets have the opportunity to study and discuss the factors that contributed to the successes or failures of leaders, while they can critically analyse, propose their own options for action, and make consensus decisions, which will develop their strategic thinking (Lemler, 2020). The project method involves research activities to solve a specific practically or theoretically significant problem and includes the use of various methods and means of learning. Independent creative work will develop their creative, analytical, critical thinking (Lemler, 2020; Szelwach *et al.*, 2023). Business games simulate the activities of a military unit to develop the professional skills of leaders to make decisions in extreme situations, allocate resources, set tasks for personnel, monitor their implementation, etc. Participation in wargames will build a set of necessary competencies and develop creative thinking. Wargames are an effective simulation training technology that allows simulating tactical and strategic military operations (Elg, 2018). Participation of cadets in wargames will contribute to the development of a number of important leadership competencies: strategic thinking is manifested in the need to develop tactics and an overall strategy to achieve victory over a conventional enemy. It develops the ability to see the situation holistically, predict the development of events and model possible scenarios, and cadets will improve their ability to consider various factors and find non-standard solutions.

Decision-making under conditions of uncertainty, which is typical for wargames, is based on the principle of "fog of war". Participants in this process do not have complete information about the actions and intentions of the enemy, resources are limited, and the situation is constantly changing. This will build readiness to respond quickly, adapt flexibly, and make responsible decisions under stressful conditions. Leadership and teamwork are particularly important aspects when conducting wargames in teams, as this process requires cohesion, clear role assignment, and commitment to the strategy developed. At the same time, everyone can contribute valuable ideas. Such "team challenges" will foster leaders who are able to interact effectively with their subordinates (Elg, 2018). It is also worth noting the importance of computer simulation with a virtual battlefield and detailed models of equipment to practice specific scenarios of real tactical and strategic operations. Beforehand, it is worth explaining the rules of the game to the participants, defining goals, and assigning roles. During the game, it is important to comment on the actions of the players, provide guidance and adjust the course of events. At the end of the game, it is necessary to conduct a detailed analysis of the results, including an assessment of strengths, identification of failures and evaluation of the development of leadership skills of participants. Such an "aftermath" of the wargame will ensure maximum learning effect and help cadets fully understand and consolidate the experience. Trainings focused on the development of communication skills, conflict management and decision-making create unique opportunities for self-discovery and reflection for future leaders. The exercises and tasks of the training help to correct erroneous stereotypes of thinking and attitudes towards other people. The transition to the moderation method is an important stage in the training of future officers. This method allows coordinating the work of community members to solve specific problems and develop action strategies. This approach contributes to the development of social leadership, including the ability to listen, understand others, be tolerant and reach consensus. Additionally, the use of the video case method can significantly deepen the cadets' reflective abilities. It involves watching training films with practical scenarios from the life of real military units. Discussions in conversations and group discussions about the effectiveness of leaders' actions in comparison with various theoretical models will contribute to the development of cadets' reflective abilities (Lemler, 2020).

All these active learning methods are as close as possible to the real conditions of service and combat activities and contribute to the formation of the necessary professional competences of a military leader. These methods

not only increase the motivation of cadets for self-development, but also reveal and develop their leadership skills through active interaction. In addition, they contribute to the development of mobilization readiness for adequate, rapid, and effective actions in the face of surprise, constant change, and uncertainty. These methods also build cadets' hardiness, determination, creative and critical thinking, as well as their resilience to stress and ability to make responsible decisions. This approach to training contributes to the deep and comprehensive development of future officers. Therefore, they are considered to be the most appropriate for implementation in the educational process of HMEIs to train future military leaders.

The data obtained in the course of the study on the gaps and shortcomings of the existing system of cadets' leadership development allow purposefully developing a number of organizational and pedagogical measures to address them. In particular, based on the identified need to strengthen the military-humanitarian component of training, it was proposed to expand the number of training hours to study such subjects as organizational psychology, sociology, conflict studies, rhetoric, etc. that will develop the leader's soft skills. In addition, based on the identified weak focus of the educational process on the individual development of cadets, it was proposed to introduce psychodiagnostics, testing for leadership potential, and individual trajectories for training promising cadets-leaders. In addition, in order to enhance the developmental effect, it is envisaged to strengthen interactive teaching methods, such as the case method, project method, business games, wargames, etc., which create conditions as close as possible to future professional activities, form a set of important qualities – strategic thinking, the ability to make decisions in critical conditions, and communication skills. Therefore, the introduction of these methods into the educational process will contribute to the development of those leadership traits and competencies that are most important for an effective leader.

Furthermore, based on the study, a holistic strategy for the comprehensive improvement of the cadets' leadership development system has been developed, which covers both the substantive (educational) and procedural (methodological) components. With regard to the content component, it is proposed to expand the study of humanitarian disciplines with a leadership focus (conflict management, negotiation, leader ethics, etc.) by cadets. It is also planned to strengthen the individual and psychological component of the training programme: the use of psychodiagnostic techniques, a personality-oriented approach, and leadership potential testing. In terms of the training process, priority is given to active and interactive methods, such as business games, simulations of critical situations, team competitions, etc. Such a comprehensive strategy for improving the development of cadets' leadership potential is a holistic system of interrelated measures and innovations, and its targeted implementation will help achieve the desired changes with a high level of efficiency.

In addition, a system of training quality measures needs to be developed. They will include both "hard" indicators of success – cadets' success in assessing leadership qualities, results of participation in competitions, contests, and the rating of positions of HMEIs graduates when appointed to positions. There are also soft indicators, such as satisfaction with training, level of leadership development, psychological climate in the units of young officers, etc. Periodic tracking of the dynamics of these indicators will allow assessing the effect of introducing innovations, making adjustments, and gradually improving the system of cadet leadership development. This reflective monitoring approach will help to achieve sustainable positive dynamics and continuous improvement of the process of training future military leaders. Thus, the results of the conducted pedagogical research contain a number of practical recommendations for the implementation of a set of organizational, content and methodological innovations in the training of cadets-future officers. Their implementation in the educational process of HMEIs will contribute to the formation of the necessary leadership qualities and competencies in cadets, which ultimately leads to the training of a new generation of military leaders who will be able to effectively perform tasks in difficult, extreme conditions of military service, take responsibility, inspire personnel, and make informed decisions in critical situations.

DISCUSSION

In the study by R. Reimer *et al.* (2021), the authors emphasize the need for targeted development of the leadership qualities of future officers, not just their selection. They rightly note that traditional approaches to training military leaders are too focused on achieving results, controlling, and performing tasks. Instead, the authors suggest that future officers should be taught the importance of moral courage, teamwork, and the creation of mutual obligations between leaders and followers. These ideas echo the findings of this study, which also emphasizes the need for greater attention to developing cadets' soft skills in leadership, shaping a democratic outlook, and encouraging initiative and responsibility. However, unlike the authors mentioned above, this study analyses in more detail the specific shortcomings of the existing training system at HMEIs and suggests quite realistic ways to improve it in the context of this particular educational institution. Another important study on leadership development was conducted by C. Szelwach *et al.* (2023). They rightly point out that the modern, rapidly changing environment requires leaders to be flexible, able to respond quickly, and make decisions in the face of uncertainty. These qualities are also extremely important for officers. This study confirms the relevance of these ideas for the training of HMEIs cadets, as it is the simulation of extreme situations and decision-making in limited conditions that will help future officers gain the necessary experience for real-world tasks. C. Luedtke & C. Miller (2022) address the issue of training military leaders in complex and rapidly changing conflicts. They note that against the backdrop of

rapid technological progress, leadership development remains the key to the success of the armed forces. The authors define a leader with developed moral values as someone who lives honourably, inspires others to improve themselves and raises the effectiveness of the organization to a new level to achieve common noble goals. In this context, the paper analyses the US Air Force Academy's approach to developing "leaders with strong moral values", which includes a combination of academic, military, and sports training with an emphasis on leadership development. Comparing this study with the results of the present study, there is a certain commonality of views on the importance of developing moral values and soft skills of leadership in future officers. Both studies emphasize the need for personal development of cadets, not just professional training. However, unlike the aforementioned article, this study focuses in more detail on analysing the specific shortcomings of the current system in the HMEIs and offers a number of realistic recommendations for its improvement (Luedtke & Miller, 2022).

In their study, S.J. Allen *et al.* (2022) proposed an integrative model of leadership development that combines cognitive, emotional, and behavioural aspects. They showed that such a model allows for more effective development of leadership skills in students compared to traditional education, but their model was developed in the context of general higher education and needs to be adapted to the specifics of military training.

A. Roberts (2019) examines the approach to leadership development for cadets at the United States Air Force Academy. Compared to the results of the current study, the following common features can be noted: a focus on developing leadership skills in military personnel; criticism of traditional approaches to leadership development as insufficiently comprehensive and integrated; emphasis on the need to combine cognitive, emotional, and behavioural aspects in leadership training. In contrast to the traditional approaches described in the current study, the author proposes a specific model for the development of "character leaders" with a clear definition of this concept. The model is based on a combination of character theory, transformational leadership, and the values of the US Air Force. The authors describe in detail the process of leadership development, which includes the formation of a cadet's identity, his or her interaction with the organization, and the development of habits of thought and action. This approach can be more effective than traditional methods. V. Nissinen *et al.* (2022) analyse the approach to leadership development in military education in Lithuania. The following common features can be noted with this study: focus on the application of transformational leadership in military education; criticism of the Soviet leadership model as one that hinders development; emphasis on the need to change the leadership culture in the armed forces. At the same time, unlike this study, which proposes a specific model, the authors focus on analysing the current state of leadership in the Lithuanian Armed Forces. They analyse in detail the historical background of the current leadership model and conclude that changes towards transformational leadership are needed.

The study by T. Woodruff *et al.* (2021) examined the impact of leadership coaching in an intensive leadership development environment. In addition to coaching, participants in this study received academic leadership instruction, mentoring, reflective exercises, assessments, and leadership experience. The authors concluded that leadership coaching created a significant added value for the development of military leaders, complementing the effect of other developmental activities. In particular, compared to the control group, the coaching participants demonstrated greater growth in terms of leadership identity and intellectual humility. The results obtained by this author are consistent with the present study, which also showed the high effectiveness of coaching for the development of cadets' leadership skills. However, unlike the above-mentioned study, the focus was on pedagogical aspects and specific coaching techniques.

The present section has analysed in detail the current scientific approaches and research of leading experts on the development of leadership skills in future military personnel, most of whom rightly criticize outdated Soviet methods as too focused on control and achievement of results without due attention to moral and value aspects and personal development of future officers. Therefore, numerous researchers recommend a comprehensive approach to leadership development that encompasses cognitive, value-motivational, emotional, and behavioural components and includes effective methods of simulating extreme situations, coaching, and mentoring to help cadets gain invaluable practical experience in critical situations and develop a strong leadership identity and habits. The conclusions drawn by the authors are fully consistent with the results of this study and confirm the effectiveness of the proposed model of comprehensive leadership development for HMEIs cadets.

CONCLUSIONS

The study analyses the theoretical foundations and practical aspects of developing the leadership potential of cadets in the process of military training. It is established that the effectiveness of any military organization largely depends on the quality of leadership. Modern scientific approaches emphasize the importance of values, relationships with others, personal development, and the ability to inspire and motivate subordinates. It is proved that the formation of cadets' leadership potential should be based on the inextricable link between theoretical and practical training. It has been established that theoretical training involves a thorough mastery of fundamental knowledge about the essence and models of leadership, its psychological foundations, and methods of motivating subordinates. Cadets study the basic concepts, patterns, and principles of effective management of a military team, which forms a holistic understanding of the phenomenon of leadership and its role in achieving the success of a military organization. Based on the theoretical knowledge acquired, cadets

should gain practical experience in leading units during training sessions, tactical games, and military exercises. It is real-life practice that allows future officers to develop a clear understanding of their strengths and weaknesses as leaders, to acquire and hone their "soft skills" of interpersonal interaction, as well as to make responsible decisions in extreme conditions.

It is determined that the existing system of leadership training in HMEIs has certain shortcomings: insufficient attention is paid to the humanities; reproductive methods of teaching prevail; individual approach to cadets is underestimated. The author suggests ways to improve the leadership development system, in particular, to strengthen the military-humanitarian component of training, use interactive teaching methods, and increase the role of mentoring by command staff. The expediency of using innovative methods of active learning in the educational process to develop cadets' leadership skills is substantiated. Discussion of practical cases will develop cadets' strategic thinking, ability to take into account various factors and find the best solution. The project method (cadets' research work) will help develop their analytical and creative skills. Business games will simulate the activities of military units and practice decision-making skills in extreme situations, which will help develop the necessary leadership competencies. Trainings will develop the communication and management skills of future commanders, as well as the ability to prevent and resolve conflicts. Wargames (simulation games) will effectively train strategic thinking and leadership in extreme situations. Thus, a comprehensive improvement of the system of leadership training in a military educational institution will contribute to the formation of a holistic leadership outlook in future officers, the development of personal qualities, the ability to effectively interact with subordinates and make responsible decisions in extreme conditions. Further study is needed to develop and implement holistic leadership training programmes for different categories of military personnel.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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Сергій Васильович Мельниченко

Старший викладач
Військова академія (м. Одеса)
65009, вул. Фонтанська дорога, 10, м. Одеса, Україна
https://orcid.org/0000-0002-0708-9859

Володимир Анатолійович Овчинник

Викладач
Військова академія (м. Одеса)
65009, вул. Фонтанська дорога, 10, м. Одеса, Україна
https://orcid.org/0000-0003-4523-8015

Сергій Антонович Гудаль

Викладач
Військова академія (м. Одеса)
65009, вул. Фонтанська дорога, 10, м. Одеса, Україна
https://orcid.org/0000-0001-8005-3265

Михайло Леонідович Кулик

Старший викладач
Військова академія (м. Одеса)
65009, вул. Фонтанська дорога, 10, м. Одеса, Україна
https://orcid.org/0000-0002-0734-3837

Педагогічні аспекти розвитку лідерських якостей у курсантів вищих військових навчальних закладів

Анотація. Розвиток лідерських якостей у курсантів військових закладів набуває особливого значення в умовах сьогодення, адже формування нової генерації професійних компетентних офіцерів-лідерів безпосередньо позначатиметься на боєздатності Збройних Сил та обороноздатності держави загалом. Метою дослідження було визначення педагогічних аспектів та шляхів удосконалення системи розвитку лідерських якостей у курсантів Військової академії. В роботі було проаналізовано теоретичні засади проблеми лідерства, узагальнено передовий український та іноземний досвід. Застосовувалися такі методи як: структурно-функціональний метод; аналіз, індукції. В дослідженні також були застосовані наступні методологічні підходи: системний підхід; редукціоністський та холістичний підходи. В результаті дослідження було виявлено, що існуюча в даний час система підготовки військових лідерів у вищих військових навчальних закладів має певні суттєві недоліки, які значно знижують її ефективність, а саме: не приділяється належної уваги військово-гуманітарним дисциплінам, котрі формують соціально-комунікативні якості сучасного лідера; домінують застарілі репродуктивні методики навчання, замість інноваційних інтерактивних; не враховуються в достатній мірі індивідуально-психологічні особливості особистості курсанта та його потенціал; слабо використовується виховний потенціал професорсько-викладацького складу через наставництво; недостатньо розвинена система курсантського самоврядування, в межах якої майбутні офіцери могли б набути реального практичного досвіду лідерства, тому було запропоновано конструктивні шляхи удосконалення наявної системи шляхом посилення гуманітарної складової підготовки, більш широкого використання інтерактивних методів навчання, впровадження індивідуальних освітніх траєкторій, підвищення ролі наставництва з боку старшого командного складу, створення дієвої системи курсантського самоврядування, а також обґрунтовано доцільність застосування інноваційних педагогічних методик активного навчання для ефективного цілеспрямованого формування необхідних лідерських якостей та компетентностей. Результати проведеного дослідження щодо удосконалення системи розвитку лідерства курсантів Higher Military Educational Institutions мають вагоме практичне значення, адже вони можуть бути використані для підвищення ефективності підготовки офіцерів як майбутніх військових лідерів

Ключові слова: варгейми; ділові ігри; наставництво; стратегічне мислення; аналітичні здібності; мотивація особового складу

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Yulia Bilyk*

Postgraduate Student
Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University
21001, 32 Ostrozkoho Str., Vinnytsia, Ukraine
https://orcid.org/0000-0002-0195-7117

The use of Class Dojo in the preparation of future primary school teachers for the organization of distance learning

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*Corresponding author

Abstract. The urgent transition to distance learning has necessitated the preparation of teachers to organize the educational process based on the use of information and communication technologies in emergency situations. Therefore, research on the process of preparing future elementary school teachers for distance learning in higher education institutions using learning management systems, particularly ClassDojo, is relevant. The purpose of the study was to investigate the effectiveness of implementing the ClassDojo platform in preparing teachers to organize distance learning in elementary schools. The methodological basis of the research consisted of basic theoretical (analysis, synthesis, comparison, abstraction, and specification), empirical (observation, surveys, diagnostic practical work methods, pedagogical experiment), and statistical methods (variation characteristics, Student's t-test, Pearson's criterion). The article describes the main characteristics, functions, interface features, and advantages of using ClassDojo in the educational process of elementary school, namely: its positive impact on shaping behaviour, learning motivation, value orientations, character, and emotional intelligence of younger school students. The main ways of preparing future elementary school teachers to use distance learning platforms in their professional activities in higher education pedagogical institutions are presented. Examples of preparing students specializing in "Elementary Education" for organizing distance learning through practical work using the ClassDojo learning management system are described. The results of the research on the effectiveness of using the ClassDojo learning management system in preparing students specializing in "Elementary Education" at the Communal Higher Education Institution "Barsky Humanities and Pedagogical College named after Mykhailo Hrushevsky" are presented, analysed, and summarized. The effectiveness of the teaching methods used by education seekers is statistically verified. The research results demonstrate the effectiveness of the forms, methods, and techniques used in preparing teachers to organize distance learning in elementary school. The practical significance of the research results lies in their applicability by higher education institutions in the professional training of future teachers to organize distance learning and by practising teachers of elementary school classes

Keywords: distance education; primary school; teacher training; digital educational resources; learning management system

INTRODUCTION

The development of digital technologies, innovation, informatization of the educational process, the dynamism, and mobility of modern life are driving the growing popularity of distance learning in the global education system, which has continued to grow in the wake of the Russian-Ukrainian war and the forced quarantine caused by the coronavirus pandemic. For primary schools, distance learning has become a real challenge, as primary school students are not yet sufficiently independent, need adult help with organizational and technical issues, and do not have a sufficient level of information and digital competence (Stakhanova & Yemets, 2023). This necessitates changes in teaching methods adapted to the current conditions of the pandemic, martial law, based on the use of information and communication technologies (ICT) and digital resources, which encourages the pedagogical community to find solutions and strategies for turning distance learning into an interesting, developmental process, establishing fruitful online communication of all participants in the educational process in primary school (Watini *et al*., 2022).

The transition from full-time education to distance education is based on the use of ICT tools, their integration into the teaching of the New Ukrainian School subjects and support for motivation to learn (Alkan, 2022). Among the tools of a modern primary school teacher designed to support distance learning and engage students are categories of resources for: organizing webinars (Zoom, Google Meet, Skype); conducting surveys, testing and controlling knowledge (Kahoot! Quizizz, Quizalize, Classtime, Google Forms); visualization and creation of presentations (Easel.ly, Prezi, Mindmeister, Mindomo, Wordle, Wordwall, LearningApps, etc.); management of collaborative and group work (G Suite, Microsoft Teams), virtual digital whiteboards (Padlet, Miro, Twiddla, IDroo), learning management systems (Classroom, ClassDojo, Human), other web resources, social networks, specialized software and much more (Hrynevych *et al*., 2020). One of the factors in the successful functioning of any school community is the interaction of all participants in the educational process. In the context of distance learning, this important aspect takes place within a virtual communication environment, the construction of which, according to L. Prykhodko & L. Royko (2021), is often hampered by certain problems: technical, organizational, issues of feedback and psychological unpreparedness of students for independent and individual work, and compliance with academic integrity during knowledge control. Therefore, there is a need to train primary education specialists who have the necessary competencies to effectively organize distance learning for primary school students using modern digital tools and ICT.

Practical experience shows that the effectiveness of distance learning and the involvement of students in this process increases if all disciplines are taught on one platform. In conformity with the study by N. Smolianiuk & Y. Domylivska (2021), one of the most convenient e-learning platforms that is widely used in primary school is ClassDojo. According to H. Luthfiah *et al.* (2023), it is most suitable for use by primary school students because the platform is simple and easy to use. ClassDojo is a learning management system built as a virtual classroom designed for communication between participants in the educational process. In addition, thanks to the original feedback system and customization features, this tool is easy and convenient to use not only for distance learning but also for face-to-face learning, as a digital resource during classes. The functionality and capabilities of digital resources in distance learning and the preparation of teachers for their integration into the educational process attracts the attention of both teachers and researchers. The purpose of the article was to study the possibility of using ClassDojo in the educational process of primary school and its effectiveness in preparing future primary school teachers for the organization of distance learning. The tasks included a description of the main characteristics and possibilities of using the ClassDojo platform for teaching primary school students, a description of the ways to prepare future primary school teachers for distance learning using ClassDojo, research and statistical testing of the effectiveness of practical training of students majoring in Primary Education based on ClassDojo.

MATERIALS AND METHODS

To conduct the research, general scientific methods were utilized: analysis, synthesis, comparison, abstraction, and specification were employed to establish the state of the researched issue and form the theoretical basis of the research; observation, methods of practical mastering of the ClassDojo learning management system, surveys, testing, diagnostic control (practical) work methods, and pedagogical experiment were utilized to develop the pedagogical toolkit and verify the effectiveness of the developed methodology for preparing future teachers to organize distance learning in elementary schools based on the use of the ClassDojo platform; mathematical statistical methods (variation characteristics: mean score, range, mean linear deviation, sample variance, standard deviation, coefficient of variation; Student's t-test; Pearson's criterion) were used for quantitative and qualitative analysis, interpretation, and generalization of research results. The participants of the research, which was conducted throughout 2023, were 136 students of the 3rd and 4th years of the educational qualification level "Junior Specialist" and the 1st and 2nd years of the educational level "Junior Bachelor" in the speciality "Elementary Education" at the Communal Higher Education Institution "Barsky Humanities and Pedagogical College named after Mykhailo Hrushevsky."

Surveys using an anonymous questionnaire titled "ClassDojo as an Effective Tool for Organizing Distance Learning in Elementary School" were conducted in both face-to-face and distance formats due to the mixed form of education of seekers for education. Respondents were informed about the purpose and objectives of the research, its structure, and relevance in modern conditions. The

questionnaire contained 14 test questions of various types. Questions 1-2 (open-ended and closed-ended) aimed to identify students' theoretical knowledge and required answers regarding known learning management systems and the principles of the ClassDojo platform. Questions from 3 to 14 provided answers of "yes", "no", or "don't know". Questions 3 and 10 focused on identifying experience with ClassDojo, including during the study of various disciplines. Questions 4, 9, and 13 addressed students' attitudes toward using ClassDojo, interest in its use in professional activities, and its effectiveness as an application for distance learning in elementary school. Questions 6, 8, and 12 covered the impact of the ClassDojo learning management system on increasing the motivation, activity, and positive behaviour of education seekers. Finally, questions 5, 7, and 11 related to the use of ClassDojo during formative assessment, monitoring of student performance and attendance, feedback, and collaboration with parents. During the survey, the authors adhered to all provisions of the Declaration of Helsinki (2013).

Another part of the work involved studying diagnostic practical work and control testing of future teachers to determine their acquired level of knowledge and skills regarding organizing distance learning using the ClassDojo platform. Comprehensive assessments based on survey results, testing, and practical work were converted into a five-point scale and processed using built-in statistical functions of the MS Excel spreadsheet software. During the quantitative analysis, the mean score was calculated, indicating the typical level of knowledge and skills acquired by students. However, as it does not explain how each of the individual results groups around it, variation indicators were used. To preliminarily assess variation, the range was calculated – the difference between the maximum and minimum values of the variant. The mean linear deviation provided us with an idea of the average size of fluctuations in the feature around the arithmetic mean. Variance and its square root, namely the standard deviation, characterize the scattering of values around the arithmetic mean. In the process of finding the ratio of the standard deviation to the mean score, the coefficient of variation was obtained. Calculation of variation indicators allows drawing conclusions about the increased uniformity of the obtained results and, consequently, the effectiveness of the work conducted. To confirm the non-randomness of the results obtained during the research, the Student's t-test was used to compare indicators before and after the experiment, and Pearson's criterion was used to compare the obtained results with the average academic performance of higher education seekers.

RESULTS AND DISCUSSION

ClassDojo is a service that closely simulates the school environment for home learning. It is designed to facilitate communication among participants in the educational process, engage younger school-age students through gamification, animated avatars, and a reward system of positive ratings, which positively impacts students' motivation and activity levels (Shynkarenko *et al.*, 2021; Kholodova, 2023). ClassDojo as an effective educational environment is quite popular in European and North American countries. For example, in the United States, it is used by 95% of elementary and middle school classes, with over 50 million teachers and students using it in 180 countries and in about 35 different languages (Alkan, 2022; ClassDojo, n.d.). The resource is available in a web version on the website or as an app that can be installed on smartphones or tablets (Garcia, 2015; Dillon, 2016). In ClassDojo, users can register as a teacher, student, parent, or school administrator (Soya & Kosovets, 2021). By creating a new class, a teacher adds students, whose avatars initially appear as eggs and hatch into ClassDojo Monsters when students join their class. Students can easily customize the appearance of their monsters as they wish. Each class and each student has their own story, which can be used to convey all kinds of educational information, documentation, and announcements (Barahona Mora, 2020). The app allows teachers to create various types of assignments, through which students can upload videos, photos, files, or their own drawings created in the built-in graphic editor. Students can log into their profiles using a QR code, text code, their own or their parents' Google accounts, or an individual link. For their work, students receive feedback (points, badges) – positive ("Participating", "Making an Effort", "Well Done", which include skills such as helping others, completing tasks, participating, perseverance, teamwork, etc.) and negative. Additionally, the teacher can add their own feedback. These points are automatically saved, analysed, and compiled into student progress reports, which teachers can share with other teachers, parents, and students with appropriate permissions. Daily, weekly, or monthly reports can be viewed and printed in a graphical format (Watini *et al.*, 2022).

Since points are added or deducted based on achievements in class, teachers and parents can take measures to correct students' behaviour (Cetin & Çetin, 2018). Therefore, the collective authors G. Kaplan *et al.* (2021) consider the points system in ClassDojo as a tool for shaping students' behaviour and positive attitude toward learning, providing the opportunity to adapt the program's functions to the emotional development level of younger students. The effectiveness of ClassDojo in maintaining motivation is confirmed by the research of N.P.L. Santos & M.C. Vélez Ruiz (2021). After implementing the learning management system into the educational process, participants, namely elementary school students, demonstrated a significant difference between pre- and post-tests. According to the authors, the ClassDojo program allows education seekers to "learn, interact, and have fun simultaneously". Additionally, the teacher can create portfolios, comment on posts, inform students about assignment deadlines, or share materials and news with parents. The integration of the ClassDojo platform supports transparency in assessment and engages parents in class management. They can track students' scores, activity in class, and behaviour. Parents can be invited to the class by entering their email address or

phone number. In addition to basic functions, the ClassDojo platform also provides additional features to support interactive and effective student learning during lessons. This additional feature has many menu items, such as a timer (which allows students to complete their tasks within a specified time), automatic grouping, music, notes, a voice meter, and random selection (Mashuri *et al*., 2022).

The functionality of the program helps the teacher to manage the class and specific lessons, form subgroups, apply interactive teaching methods, including adapting them to the distance learning format. According to Y. Derkach & Y. Levytska (2022), the ClassDojo platform can also be used as a social network with the ability for students to communicate on the class page: after the teacher creates a post, students can comment on it. This means that one of the advantages of ClassDojo is its ability to instil values through the assessment of behavioural aspects and activity, contribute to character and emotional intelligence formation, which affects the improvement of practical skills in digital learning, not just teaching a specific subject. According to E. Garcia & D. Hoang (2015) and R. Annisa *et al*. (2022), ClassDojo contributes to improving student behaviour precisely through the point accrual (feedback) system, which works when students have a sense of value for such incentive points, which researchers suggest exchanging for prizes or additional leisure time.

Therefore, the use of the ClassDojo learning management system during distance learning for younger students in elementary school has the following advantages:

- ease of use, with a bright, user-friendly, and intuitive interface for both teachers and younger students and their parents;
- free and easy access to the platform via the online version or mobile app from any device: smartphone, tablet, or personal computer;
- different levels of access to the application: student, teacher, parents, or school administrator;
- monitoring and reporting capabilities for student learning outcomes with visual representation in graphical format;
- promotion of students' self-regulation skills;
- participation in the educational process and parental awareness of their child's success and activity through portfolios and newsfeeds;
- gamification of the learning process through an attractive interface, animated student avatars, and class news presented in the form of social media posts;
- quick, instant feedback and convenient commenting on student activities;
- implementation of formative assessment and principles of the new ukrainian school;
- ability to influence behavioural aspects and activity levels of younger students, shaping values through a point-based system for individual students and the class as a whole;
- support for motivation and interest in learning, which is particularly important in times of conflict from a psychological perspective.

One of the important conditions for the effectiveness of distance learning in elementary school, especially during times of conflict, is motivation and interaction, and the use of ClassDojo in elementary school helps maintain motivation and attention, fostering creative abilities, explained by its gamification-based design and effective feedback. The advantages of the ClassDojo platform, based on constructivist philosophy, also include time, cost, and human resource savings, as well as the promotion of digital literacy and creativity among participants in the educational process.

One of the conditions for preparing future teachers to organize distance learning in elementary school is mastery of digital technologies and the formation of information and digital competence and digital literacy. The task of higher education pedagogical institutions to prepare future elementary school teachers for effective and quality organization of distance learning using modern platforms and digital resources. The preparation of future teachers of elementary grades for organizing distance learning at the Communal Higher Education Institution "Barsky Humanities and Pedagogical College named after Mykhailo Hrushevsky" is carried out by expanding the disciplines "Methods of teaching subjects of the informatics educational sector" and "Methods of teaching the subject 'I explore the world: informatics sector'" with sections providing familiarization with theoretical and methodological foundations of organizing distance learning in lectures and seminars, practical classes aimed at developing skills in planning, designing, and filling distance courses, organizing online communication of educational process participants, solving technical problems that arise during synchronous and asynchronous modes of distance learning, taking into account sanitary-hygienic, ergonomic, psychological, age, and health-saving requirements for organizing distance learning of younger students, familiarization with normative-legal principles of distance learning implementation and information security principles, historical and philosophical roots of distance learning in Ukraine and the world, etc.; introducing the course "Organization of distance learning in educational institutions" into the training of junior bachelor's degree students in the speciality "Elementary Education"; using elements of distance education during pedagogical practice in general secondary education institutions (conducting online lessons and educational events), etc. To ensure the teaching of these disciplines, the website and the educational-methodical manual are functioning (Bilyk, 2023; Website of Bilyk Y., n.d.). Informal education is carried out through independent work of students, distance learning on the Classroom platform, completion of online courses (Barna, 2017). Students' readiness for organizing distance learning in elementary school is also promoted by their creation of information and digital products, didactic materials using resources such as LearningApps, Wordwall, Canva, Word Art, Google Forms, practical work with shared Google Documents and virtual boards Padlet, Twiddla, etc. (Fig. 1)

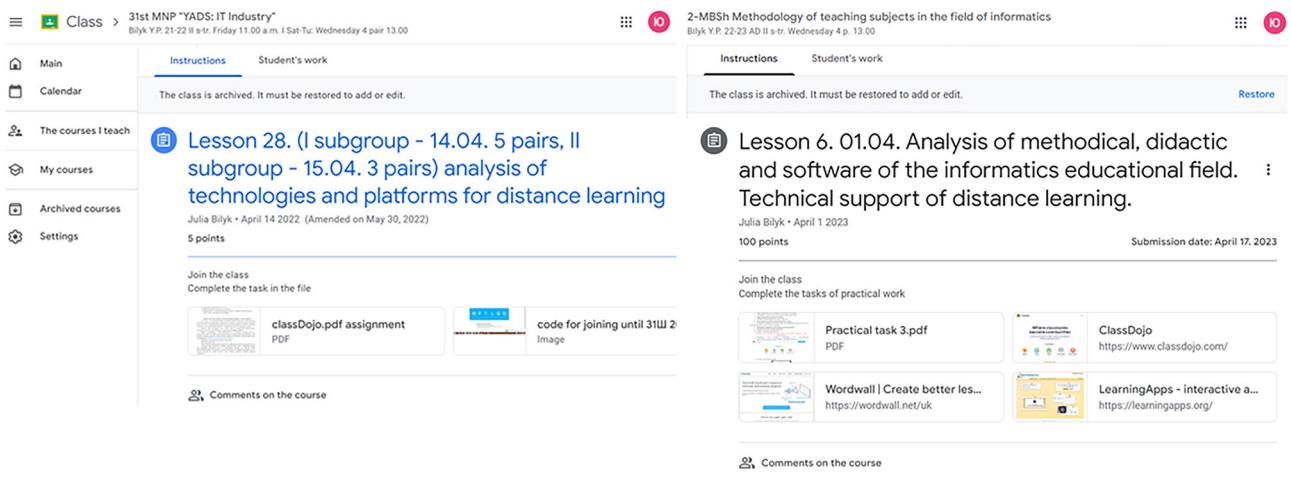

Figure 1. Samples of practical tasks in Google Classroom
Source: developed by the author

In order to develop the information and digital competence of students majoring in "Elementary Education" at the Communal Higher Education Institution "Barsky Humanities and Pedagogical College named after Mykhailo Hrushevsky" and to prepare them for conducting distance learning, a series of practical works has been proposed, including "Designing a Distance Course", "Registration, Course Creation, Adding Students" and "Course Content Development" using the ClassDojo platform, where education seekers needed to register as both teachers and students (Fig. 2). Students create their own virtual classroom, add students – their classmates, create tasks from various school subjects and classes of elementary school, and perform them in the classrooms of their colleagues – future teachers.

Figure 2. Example of classes created in ClassDojo
Source: developed by the author

In order to assess the effectiveness of using ClassDojo in preparing students majoring in "Elementary Education" a study was conducted using the author's questionnaire "ClassDojo as an Effective Tool for Organizing Distance Learning in Elementary School" and evaluating the practical skills of future teachers, namely: the ability to create a class, add students to it, develop tasks of various types, provide feedback, monitor and evaluate student performance. After collecting data using the author's questionnaire and analysing the practical activities of the students, descriptive statistical data comparing academic outcomes before and after the experiment and the average score of students were obtained (Table 1).

Table 1. The value of statistical indicators

Indexes	Before experiment	After experiment	GPA
GPA, $\overline{x}$	1.59	4.59	4.03
Range	4.6	2	2
Average linear deviation, $\overline{l}$	0.58	0.54	0.74
Sampling variance, σ^2	0.68	0.39	0.74
Mean square deviation, σ	0.83	0.63	0.86
Coefficient of variation, V_σ	52%	14%	21%

Source: developed by the author

The increase in the average result (by 65.4%) and a significant decrease in the range (from 4.6 to 2), variance and standard deviation confirm the increase in student activity and performance, and therefore the productivity and effectiveness of the chosen methods and forms of teaching. And since the coefficient of variation is less than 30%, it is possible to conclude that the sample was homogeneous after the experiment. The calculated statistical indicators indicate a positive trend in theoretical and practical skills of students. Comparative analysis using Student's t-test $t_{emp.} = -26.50$ revealed significant differences at $p \leq 0.01$. $t_c = 2.58$ ($p \leq 0.01$), which indicates that the results of the pedagogical experiment are not accidental. Let's check whether the results obtained correlate with the average score of students by calculating the Pearson correlation coefficient (r-Pearson). With the tabulated value of $r_{0.01} = 0.31$, the value of $r_{emp.} = 0.52$ is got, which demonstrates that there is a statistically significant correlation between the parameters at $p \leq 0.01$. The data in Table 1 and the results of comparing the Student's t-test with the critical value indicate the effectiveness of the practical work carried out using ClassDojo in preparing future primary school teachers for the organization of distance learning.

Both Ukrainian and foreign scholars have conducted research on the methodological and practical aspects of using digital resources in distance learning. Most studies on the use of ClassDojo in primary school focus on the impact of the application on the level of learning motivation, activity, behaviour, and academic success in selected subjects studied by primary school students. A study by M.T. Chiarelli *et al.* (2015) examined the use of ClassDojo to determine whether it successfully helps students recognize and self-manage their learning behaviour. The study found that the use of ClassDojo had a positive impact on behaviour and awareness of strategy choices among younger students. The results of the study by N.T. Hong Minh (2022) showed that ClassDojo significantly improves online English language learning interactions in terms of learner-instructor, learner-learner, and learner-content interactions. The majority of learners claimed that using ClassDojo had a wide range of benefits, including improved classroom interaction, increased learning activities, a more comfortable environment, and better management of learner progress. A study by H. Çetin & I. Çetin (2018) aimed to identify the opinions of 206 students about the Class Dojo educational technology used in mathematics teaching. In general, students expressed a positive opinion that the Class Dojo application increases their motivation (61.7 per cent) and activity (79.6 per cent).

The purpose of the study by A. Nuriyawan & S. Wibawa (2021) was to compare the advantages of the Socrative and Classdojo platforms, as well as the features of their use in primary school. The results of the study showed a greater interest among students in using the ClassDojo platform (29%) compared to Socrative (12%). The study by N. Luthfiah *et al.* (2023) also confirms the effectiveness of the ClassDojo platform in distance learning for primary school students, with an efficiency level of 88.9%. And the study by D.K. DiGiacomo *et al.* (2021) is aimed at studying the experience of working with ClassDojo, in particular, participants in the educational process confirmed the overall positive impact of the platform on grades (51.7%), behaviour (65.9%), and student well-being (49%). The work of A. Alkan (2022) studied the impact of using ClassDojo on students' academic achievement. The results of the t-test showed a statistically significant difference between the average scores of the control and experimental groups at the level of $p<0.001$, indicating a significant positive relationship between high academic achievement and the use of ClassDojo.

The positive impact on the performance and behaviour of 75% of students is also described in B. Charles (2019). The positive dynamics of primary school students' performance in learning English and more responsible behaviour in completing tasks was also demonstrated by R. Homer *et al.* (2018), which involved 120 primary school students from eight different grades. However, the researchers found significant positive results of using ClassDojo in grades 3-4, while students in grades 1-2 were equally positive about traditional teaching methods. With regard to teacher training using ClassDojo, the study by S. Watini *et al.* (2022) found that the learning management system received 72% of recommendations from educators as a teacher training programme due to a set of features that facilitate communication between participants in the educational process. These results partially confirm the data obtained in the current study. The analysis of scientific sources shows that there is a lack of research on training future primary school teachers to use ClassDojo in terms of organizing distance learning for primary school students, and therefore the issue of training future teachers to organize distance learning in primary school using digital resources and distance learning platforms, including ClassDojo, remains insufficiently covered in modern Ukrainian pedagogical research.

CONCLUSIONS

Thus, the key advantages of the ClassDojo learning management system for distance learning in primary school are the following: gamification of the educational process; positive impact on the formation of students' behaviour, motivation, and activity; parental awareness of children's activities, performance, and attendance; the possibility of implementing formative assessment and the principles of the New Ukrainian School; a convenient reporting system, etc. The study using the author's questionnaire and analysis of students' practical activities and statistical processing of the results using Student's t-test confirmed the effectiveness of using the ClassDojo platform in preparing students majoring in Primary Education for the organization of distance learning in primary school. The students showed positive feedback on the use of ClassDojo, as this service has a positive impact on behaviour, increases motivation and activity, and improves student performance (by 65.4%). The study also found that the platform has a number of advantages, including: user-friendly and accessible interface, universal access, different levels of access, monitoring and reporting, development of self-regulation, parental involvement, gamification, quick feedback, formative assessment and the principles of the New Ukrainian School, impact on behaviour and motivation, and support in times of war.

Practical mastery of the ClassDojo educational platform in the professional training of future primary school teachers in higher education institutions helps to familiarize higher education students with the main characteristics and capabilities of the ClassDojo platform, the benefits of its use in teaching primary school students, the formation of information and digital competence of future teachers, and the acquisition of skills in organizing the distance learning process using learning management systems. Therefore, the use of the ClassDojo learning management system contributes to the effectiveness of the process of preparing future primary school teachers for distance learning. Prospects for further research are seen in the further testing of forms, methods, and means of forming teachers' readiness to organize distance learning in primary school.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest in relation to this study, including financial, personal, authorship, or any other, that could affect the study and its results presented in this article.

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Юлія Петрівна Білик
Аспірант
Вінницький державний педагогічний університет імені Михайла Коцюбинського
21001, вул. Острозького, 32, м. Вінниця, Україна
https://orcid.org/0000-0002-0195-7117

Використання Class Dojo у підготовці майбутніх учителів початкових класів до організації дистанційного навчання

Анотація. Екстрений перехід до дистанційного навчання зумовив необхідність підготовки вчителів до організації освітнього процесу, побудованого на використанні інформаційно-комунікаційних технологій в умовах надзвичайних ситуацій, тому актуальними є дослідження стосовно процесу формування готовності майбутніх учителів початкових класів до організації дистанційного навчання у закладах вищої освіти з використанням систем керування навчанням, зокрема ClassDojo. Метою роботи було дослідження ефективності застосування платформи ClassDojo у підготовці учителів до організації дистанційного навчання у початковій школі. Методологічну основу дослідження склали основні теоретичні (аналіз, синтез, порівняння, абстрагування і конкретизація), емпіричні (спостереження, анкетування, метод діагностичних практичних робіт, педагогічний експеримент) та статистичні методи (варіаційні характеристики, t-критерій Стьюдента, критерій Пірсона). У статті описано основні характеристики, функції, особливості інтерфейсу, можливості й переваги застосування ClassDojo в освітньому процесі початкової школи, а саме: позитивний вплив на формування поведінки, навчальної мотивації, ціннісних орієнтацій, характеру та емоційного інтелекту учнів молодшого шкільного віку. Наведено основні шляхи підготовки майбутніх вчителів початкових класів до використання платформ дистанційного навчання у професійній діяльності у педагогічних закладах вищої освіти. Описано приклади підготовки студентів спеціальності «Початкова освіта» до організації дистанційного навчання за допомогою практичних робіт з використанням системи керування навчанням ClassDojo. Наведено, проаналізовано й узагальнено результати дослідження щодо ефективності використання системи керування навчанням ClassDojo під час підготовки студентів спеціальності «Початкова освіта» Комунального закладу вищої освіти «Барський гуманітарно-педагогічний коледж імені Михайла Грушевського». Статистично перевірено результативність методів навчання здобувачів освіти. Результати дослідження демонструють ефективність використаних форм, способів і методів у підготовці учителів до організації дистанційного навчання у початковій школі. Практичне значення результатів дослідження полягає в можливості їх застосування закладами вищої освіти у професійній підготовці майбутніх педагогів до організації дистанційного навчання та практикуючими учителями початкових класів

Ключові слова: дистанційна освіта; початкова школа; підготовка учителів; цифрові освітні ресурси; система керування навчанням

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Ting Wu*
PhD in Political Science, Lecturer
Northwest Normal University
730070, 967 Anning East Rd., Lanzhou, China
https://orcid.org/0000-0001-9219-0582

Virtual research laboratory in foreign language teaching: Strategies and role

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*Corresponding author

Abstract. With the growth of technology and the availability of virtual tools, the creation of interactive and dynamic learning environments that increase students' interest and motivation becomes relevant and possible. The study aimed to analyse and evaluate the effectiveness of using virtual laboratories in the process of learning foreign languages. Analytical research methods, generalisation, systematisation, and surveying were used in the research. The study demonstrated that virtual reality (VR) could change the traditional approach to language learning through immersive experiences of students' interaction with language structures. The article highlighted technical and pedagogical challenges that require an integrated approach. The study confirmed that mobile learning and augmented reality (AR) offer new education opportunities, providing interactivity and personalisation. The research concluded that augmented reality could improve the learning of complex concepts and increase student motivation. This article highlighted a need for effective pedagogical strategies for the successful implementation of virtual reality and augmented reality. A survey of students at Northwest Normal University was also conducted. The survey of students who use virtual labs to learn foreign languages indicates that they are more effective and useful for the learning process, including the use of Duolingo, Rosetta Stone, Babbel, Memrise, Busuu, Lingodeer, BBC Languages, and Italki. Although the majority of students have a positive attitude towards this technology, some prefer traditional methods, which indicates the need for additional adaptation and support of virtual resources to ensure their optimal effectiveness. The study findings can be used to adapt existing foreign language curricula and courses to the use of virtual research laboratory tools

Keywords: student motivation; modern educational technologies; digital innovations; immersive learning; interactivity

INTRODUCTION

Traditional teaching methods may not be effective enough in today's world, where students are accustomed to digital technologies. Online laboratories can be an innovative approach to learning that incorporates current trends. Virtual research laboratories allow students to study material independently at their own pace, completing practical tasks and experiments that are tailored to their personal needs and level of knowledge. Foreign language learning requires real-world practical use of the language. Digital labs can create simulations of real-life language situations, allowing students to experience a different cultural context.

The study's problem concerns the lack of educational innovations that can lead to the use of outdated teaching methods that do not meet modern requirements. Given the rapid progress of digital technologies over the past decade, an increase in the use of various methods in language education has been observed. R. Zhang & D. Zou (2022) focused on the potential of modern technologies to address current

and future challenges of society, especially in the context of the education sector. The researchers highlighted four key principles and advantages of the latest educational technologies: stimulation of practical actions, provision of meaningful educational material, intensification of interaction between participants in the educational process, and reorganisation of pedagogical strategies. An in-depth analysis of the use of innovative technological solutions, including virtual platforms, can help adapt educational systems to the requirements of the present and to develop key competencies.

According to a study by C.P. Wang *et al.* (2020), 3D virtual environments have proven to be an effective tool for language learning over the past two decades. Meta-analysis shows a variety of effects depending on different factors, such as specific teaching methods. These results highlight the potential importance of understanding the relationship between different options and the impact of virtual environments on language learning. Thus, research into this aspect could make a significant contribution to the development of language teaching methods and the optimisation of learning processes. According to X. Huang *et al.* (2021), modern technologies, such as augmented and virtual reality (VR), are becoming a significant contributor to innovations in foreign language learning. According to the researchers, these technologies provide new opportunities that were previously unattainable or difficult to implement. Scientists point out that augmented reality (AR) makes it possible to integrate digital elements into the real world, which makes the learning process more interactive and interesting. In the context of language education, AR can be used to create situations of language use in real-life settings. A more comprehensive study of the impact of AR and VR on students' motivation, language acquisition and language skills development are also relevant.

H. Jehma & A. Akaraphattanawong (2023) investigated the potential of VR to improve English listening skills, which indicates the constant evolution of technology in education and its ability to integrate different aspects of language learning. According to the researchers, the VRChat platform can provide an interactive, immersive experience that helps learners immerse themselves in the language environment, which can increase their motivation and interest in learning. The use of virtual platforms in foreign language learning should be further explored.

T. Liu *et al.* (2023) emphasized the key role of teachers in the context of the use of information and communication technologies (ICT) in modern education. According to the researchers' findings, the use of ICTs is becoming increasingly popular in learning processes, including language education. Among the innovative methods highlighted by the researchers are gamification to improve language skills, the use of VR in language teaching, voice recognition tools for language learning, text analysis software and collaborative online resources for collaborative writing. This didactic approach is promising but requires further research to explore the possibilities of virtual communication in education more deeply and comprehensively.

M. Dooly & M. Vinagre (2022) note, that "the essence of virtual laboratories as innovative computer systems or software solutions designed to emulate real laboratory conditions". The researchers are convinced that users have the opportunity to recreate experimental conditions, conduct research and participate in training sessions in a simulated environment, which often includes elements of interactivity. According to scientists, virtual laboratories ensure advanced technologies are used to create virtual analogues of real laboratories where students can effectively learn foreign languages. Employing these innovative systems, as scientists state, students can immerse in simulated laboratory conditions, interact with virtual equipment, and conduct experiments, which opens up new opportunities for in-depth language learning that are worth exploring more thoroughly.

H.C. Yeh *et al.* (2022) argued that the use of VR technology contributes to the improvement of intracultural awareness among foreign language learners. In particular, their observations suggest that the use of VR technologies, such as panoramic images, audio features, interaction, and structuring, contributes to the development of a deeper understanding and testing of intracultural aspects in foreign language learning. According to scientists, one of the key advantages of using VR technology is the ability to create immersive virtual environments that provide students with not only the opportunity to observe but also to actively participate in virtual cultural spaces. They note that the presence of interactive elements, such as interaction with virtual objects or interaction with other virtual participants, enhances the student's active role in the process of learning about cultural differences, which is worth exploring further.

The study aimed to analyse and systematically evaluate the effectiveness of virtual laboratories in the context of their implementation in the foreign language teaching process.

MATERIALS AND METHODS

Analytical research methods, generalisation, systematisation, and surveys were used in the study. These methods were used to increase the scientific validity of obtained results. The analytical research method was used to analyse VR in detail as a potential tool for transforming traditional language learning methods, focusing on deep immersion of students in language structures. The analytical method was used to identify the possibilities and benefits of using mobile learning and AR, as well as highlight the existence of technical and pedagogical challenges that need to be addressed comprehensively. The generalisation method was used to identify the features and roles played by virtual and AR in improving the dynamics and engagement of students in the process of learning foreign languages by providing them with an intensive and multidimensional experience. This method was used to assess the possibilities of creating conditions for virtual experiments, which can significantly increase the accessibility of the learning process. The generalisation method was used to highlight the importance of integrating advanced technologies into teaching to enhance

students' linguistic and cultural competencies. The systematisation method was used to highlight the importance of students' interaction with virtual experimental situations, which can increase their adaptability and responsiveness in learning. The advantages of virtual laboratories as a safe and affordable alternative were highlighted using the systematisation method.

The survey method was employed to obtain responses from students at Northwest Normal University. This method was used to collect primary data directly from the participants of the study, providing an opportunity for a deeper understanding of their views and experiences. The questionnaire included the following questions:

1. Do you actively use virtual laboratories in your foreign language teaching?
2. Do you think virtual labs are useful for improving your foreign language skills?
3. Do you feel that virtual labs help you understand the material better?
4. Do you prefer traditional teaching methods to virtual labs?
5. Has your motivation to learn a foreign language changed since the introduction of virtual labs?
6. Do you find virtual labs easy to use?
7. Do you feel that virtual labs help you to concentrate better on your studies?
8. Do you advise other students to use virtual laboratories to learn a foreign language?

The survey was also used to study specific virtual laboratories used by students in foreign language learning:

1. What specific virtual labs do you use?
2. What types of virtual labs do you prefer?
3. Do the virtual laboratories you use allow you to communicate with native speakers?
4. What is your preferred basis for using a virtual lab?

From 01.12.2023 to 04.01.2024, 2 group surveys were conducted among 100 students from this university, conducted in person and anonymously. All the provisions of the Declaration of Helsinki (2013) were met during the survey. Of this number, 45 participants were male, while 55 were female. This gender balance ensured a diversity of opinions and feedback. Given the age range of respondents varied from 18 to 24 years, the survey presented information on how different age groups perceive these aspects. At the time of the analysis, all respondents were living in Wuhan, China, which provides a specific context for interpreting the data. The information obtained was processed through statistical analysis of students' responses to the proposed survey questions. The survey method and the analysis of statistical data were used to determine the opinions and attitudes of Northwest Normal University students towards the use of virtual laboratories in foreign language teaching. The findings reflect students' attitudes towards the latest technologies in the learning process and their desire to use these technologies to improve the quality of their education. Considering the demographic characteristics of the respondents, such as gender and age range, the research analysis was also carried out considering possible differences in the perception and use of virtual laboratories among different groups of students.

RESULTS

VR is becoming increasingly popular in society, attracting the attention of not only entertainment consumers but also educational researchers. Its potential as a powerful learning tool is sparking lively debate and research by scientists and educators. In language learning, "VR is an invaluable tool in language classrooms" (Parmaxi, 2023). It can transform the traditional approach to learning by providing students with the opportunity to immerse themselves in authentic linguistic environments where they can interact with language structures in real-time. Such immersive experiences can greatly increase student motivation by providing them with more authentic language experiences. However, VR in language classrooms is not a solution to all educational problems. There are several technical challenges related to system setup, compatibility, and potential limitations for users. For example, not all students may have access to the necessary equipment or high-speed internet connection. There are concerns regarding the pedagogical value of VR. However, the availability of the latest technology does not guarantee its effective use for educational purposes. To achieve the best results, it is necessary to develop appropriate pedagogical strategies and techniques that consider the specifics of language learning and the needs of students. Although VR has great potential to improve language learning, its implementation requires a comprehensive approach.

In the context of AR, apps such as Aurasma provide unique learning opportunities, as "educational practices are being developed and diversified by the progress of the millennial generation, which is seeking to use mobile technology in all aspects of their lives" (Taskiran, 2019). Such applications combine the real world with digital content, creating interactive tasks and scenarios. For example, in the study described above, students had the opportunity to practice their speaking and listening skills by collecting the correct item in a virtual "junk room". This task not only increases their motivation to learn but also develops their communication skills by requiring them to listen carefully and understand and use language to achieve a specific purpose. Such techniques demonstrate how modern technology can be effectively integrated into the learning process, providing students with real, engaging, and interactive experiences that promote deeper language acquisition.

Learning a foreign language is not limited to mastering grammar and vocabulary, oral and communication skills are also important. Describing objects or scenarios in a virtual environment can be particularly useful. VR or other simulation technologies can create authentic situations where learners have to describe objects, actions or events using the target language. Such exercises can be part of a game environment where each student is given a task or "mission" to complete while communicating with other

participants. In a game where students need to communicate to achieve a goal, they face real communication challenges: quick and effective thought formation, responding to their partners' responses and adapting their language to the situation. This not only improves grammatical skills but also develops the ability to listen, respond and interact in real-time. Such interactive teaching methods "activate students by making the language learning process more interesting" (Reitz *et al.*, 2019). They allow students not only to learn new words and structures but also to use them in real-life communication situations, which is key to achieving excellent oral skills.

The use of "virtual environments in education plays a key role in improving the quality of the learning process", in particular in the development of language competencies and intercultural understanding of students (Fondo, 2021). Virtual environments, as an innovative tool, create immersive language learning environments, where learners can interact in authentic communicative situations. Virtual environments provide an opportunity for objective assessment of language competencies, where "learners can demonstrate their skills in real or simulated communication tasks" (Kapici *et al.*, 2019). Furthermore, virtual technologies can create interactive scenarios for the development of intercultural sensitivity, where students can learn and understand the cultural characteristics, traditions, and customs of different nations. Considering these aspects, it is possible to conclude that these virtual environments contribute to the more effective and dynamic development of students' language skills and intercultural competence, making the learning process not only productive but also interesting. VR opens up significant opportunities in the learning process. Its ability to immerse users in various environments creates unique conditions for active and effective learning. However, considering the specific needs of other study fields, such as science, technology, and engineering, it becomes clear that the potential of VR and AR can be expanded through virtual laboratories.

Virtual laboratories allow students to interact with complex scientific experiments without leaving the classroom. This is especially useful in foreign language learning, where practice and immersion in a language environment can play a critical role in building language skills. Virtual laboratories that simulate the reality of language situations allow students to test their knowledge and skills in real-time, receiving immediate feedback and the opportunity to correct their mistakes. Thus, from VR to virtual laboratories, there is a gradual shift from immersive learning to the practical implementation of acquired knowledge. In the context of foreign language learning, this approach can be an answer to the need for deeper and more targeted learning, supporting students in their constant pursuit of differences in language performance. Virtual laboratory activity is an innovative approach to computer activities aimed at facilitating students' experimental research in a virtual or real environment. Such laboratory activities serve not only as a supplement to traditional laboratory practices but also as a tool for enhancing the learning process and deepening students' knowledge. The use of online laboratories allows students to have flexibility in conducting experiments, promoting their independence, and developing critical thinking. "The introduction of digital laboratories also has a positive impact on the cost-effectiveness of the educational process" (Kapilan *et al.*, 2021). Since virtual laboratories do not require specialised equipment, staff, maintenance, and other operating costs, they become more accessible and cost-effective than standard laboratory facilities.

Digital laboratory activities open up new opportunities in the field of pedagogical training of students (Porat *et al.*, 2023; Schwartz *et al.*, 2023). A mixed laboratory that combines elements of virtual and traditional laboratory techniques can be considered the best option for a laboratory environment for teaching undergraduate students. The use of digital technologies in the educational process not only increases the interactivity and accessibility of educational material but also creates an opportunity for a more integrated study of the subject (Wang *et al.*, 2018). The mixed laboratory, combining the advantages of both approaches, provides a balance between theoretical knowledge and practical skills, making the learning process more effective and adapted to the needs of modern students. A survey of students who use virtual laboratories in foreign language teaching was conducted (Table 1).

Table 1. Results of the survey of students at Northwest Normal University

No.	Criteria	Yes	No
1	Do you actively use virtual laboratories in your foreign language teaching?	83%	17%
2	Do you think virtual labs are useful for improving your foreign language skills?	90%	10%
3	Do you feel that virtual labs help you understand the material better?	65%	35%
4	Do you prefer traditional teaching methods to virtual labs?	30%	70%
5	Has your motivation to learn a foreign language changed since the introduction of virtual labs?	45%	55%
6	Do you find virtual labs easy to use?	85%	15%
7	Do you feel that virtual labs help you to concentrate better on your studies?	73%	27%
8	Do you advise other students to use virtual laboratories to learn a foreign language?	89%	11%

Source: compiled by the author

The analysis of the respondents' answers shows a generally positive attitude towards the use of virtual laboratories in the process of teaching a foreign language. The advantages identified include the active use of this technology by students, which underlines its widespread use in the academic environment. Given the modern requirements for education and the rapidly changing landscape of technological innovation, the study of the effectiveness and relevance of interactive technologies in the learning process is becoming an important component of the pedagogical approach. Some responses highlight the need for further adaptation and support of this technology. Some students highlighted the need for additional support or learning resources to make effective use of virtual laboratories. This may indicate that further development and refinement are required to fully meet student needs and make optimal use of the technology. However, it is worth noting that the majority of survey participants still express confidence in the convenience and effectiveness of virtual laboratories. They note the comfort and effectiveness of this technology for users. The observation that virtual laboratories help students to concentrate better on their studies is also an important aspect that indicates their relevance for increasing concentration during the learning process.

Modern virtual laboratories focus on several key aspects. They attempt to simulate real laboratory conditions as accurately as possible, where students can conduct virtual experiments. These laboratories are highly accessible: available online from anywhere in the world, providing access anytime. At the same time, safety is an important advantage, as virtual laboratories can be used to conduct research without the real risks associated with hazardous substances or equipment. Furthermore, they often offer interactive tools and scenarios that promote active user interaction with the virtual environment. Virtual laboratories play an important role in education: they demonstrate concepts, develop practical skills, and stimulate students' interest in the subject matter. Virtual laboratories are widely used in a variety of industries, including education, science, engineering, and medicine, allowing research and training to take place in a simulated environment. To improve the learning process and ensure high-quality education, it is recommended to focus on the following aspects. It is necessary to ensure support from university structures, develop additional learning resources, conduct training for teachers and students, and regularly evaluate the effectiveness of virtual laboratories. Such a comprehensive approach will maximise the benefits of virtual technologies in foreign language teaching and meet the needs of the modern educational process.

In the modern world, where technological progress is steadily moving forward, educational approaches are also undergoing radical changes. The digital age generation constantly seeks ways to integrate mobile technologies into all areas of their lives, including education. This phenomenon has led to the emergence of a new approach to education – mobile learning. Mobile learning opens up many opportunities for educators and students. In particular, in the context of learning English as a foreign language, mobile technologies are becoming an indispensable tool. AR is one of the key technologies in this context. AR can integrate digital content such as video, audio, and images into the real world, expanding it and adding new dimensions. In the context of learning, AR can create interactive scenarios where students can interact with virtual objects or characters, gaining new knowledge and enjoying the process. One of the key benefits of using AR in mobile learning is to increase student motivation. Interactivity and visualisation in AR create an engaging learning environment that stimulates interest in the subject. In addition, AR can adapt to individual student needs by providing personalised tasks and materials. It is also important to note that AR can make it easier to learn complex concepts or topics. Visualisation through AR can contribute to a better understanding of the material, especially in the context of language learning, where correct pronunciation, accentuation, and melody are important. In general, AR in mobile learning opens up new horizons for the educational process. It combines technological progress and pedagogical innovations to create an effective, engaging, and interactive learning environment.

The study also examined which virtual labs are used by students to learn a foreign language. The survey found that modern students use many different virtual laboratories and online resources that provide opportunities for language learning. In particular, Duolingo, Rosetta Stone, Babbel, Memrise, Busuu, Lingodeer, BBC Languages and Italki (Table 2).

Table 2. Virtual laboratories used by students at Northwest Normal University

No.	Virtual laboratories	Type	Native speaker communication	Price
1	Duolingo	Feedback and games	No	Free, premium available
2	Rosetta Stone	Immersion method	No	High
3	Babbel	Online courses, grammar	Yes	Payment required; free trial available
4	Memrise	Flash-cards, games	No	Free, premium available
5	Busuu	Community and tasks	Yes	Free, premium available
6	Lingodeer	Games and interactive lessons	No	Free, premium available
7	BBC Languages	Audio and video lessons	No	Free

Source: compiled by the author

Following the survey results, it is worth noting that students who learn foreign languages using virtual laboratories reflect on the positive aspects of this tool. Let us consider the main scientific aspects that they note in their experience. Students note that virtual laboratories create an interactive environment that encourages students to engage in active learning. This is especially important for the formation of a student's active attitude towards learning foreign languages, as they have the opportunity to choose their tasks and actively participate in the learning process (Huang & Wu, 2023). The use of virtual laboratories allows students to study at their own pace, anywhere, anytime. This encourages independence in learning and flexibility of schedule, which is important in the context of modern requirements for educational technologies. Interaction with other users in virtual labs helps students develop their language skills. This includes the ability to communicate and use the language in practical situations, which improves their communication and language use skills in real-life situations. Students emphasise the accessibility of virtual laboratories, expressing satisfaction with the possibility of using free or trial options. The level of support students receive through these platforms is also considered important. Students' perception is that virtual laboratories significantly increase the effectiveness of their learning and make the process more convenient. The high evaluation of their effectiveness demonstrates their belief in the importance and benefits of using this tool.

Thus, the survey results indicate that virtual laboratories are a significant tool for learning foreign languages in the modern educational environment, promoting active and effective learning that meets the requirements of the modern educational process.

DISCUSSION

Virtual research laboratories in foreign language teaching are a relevant and promising area that attracts the attention of scientists from all over the world. Different approaches and strategies proposed in research can play a key role in shaping optimal teaching methods. The positions of researchers should be studied and compared with the study results for a thorough analysis.

According to N. Enzai *et al.* (2021), significant changes in educational processes have occurred under the influence of the Covid-19 pandemic, in particular, the transition to online distance learning. Of particular interest is the possibility of using AR, which can overlay multimedia content in the real world using common web devices such as smartphones and tablets. This provides flexibility and accessibility to the learning process anywhere and anytime. According to the researchers, the use of AR can not only increase student engagement and motivation but also help overcome the financial and space constraints associated with scientific and technical equipment in laboratories. Given the above studies and the findings of this paper, it can be argued that the use of AR in education has great potential to improve the learning process, in particular in ensuring accessibility, motivating students and optimising the use of resources.

The study conducted by L. Canals (2020) on the use of virtual environments for foreign language learning revealed several important aspects. According to the results, the virtual learning environment has proven to be an effective tool for stimulating the development of students' oral language skills. Particular emphasis is placed on identifying the positive impact of this approach on stimulating students' motivation to actively concentrate on learning a foreign language. The author notes that virtual learning has contributed to the formation of students' sense of purpose, as well as the desire to cooperate with peers in performing communicative tasks. The analysis of the study results indicates that the effectiveness of the virtual environment was particularly pronounced among those students who started their studies with a lower level of language proficiency. This may be because the virtual environment provides additional opportunities for individualising the learning process and adapting to the characteristics of each student. As such, the researcher's study confirms the importance of using virtual technologies in modern education, especially in the context of foreign language learning. Compared with the results of this study, it is worth noting that virtual learning can effectively combine technological and pedagogical aspects, contributing to a deeper understanding and mastery of the language by students of different levels of knowledge.

One of the key aspects of a study by I. Bagea (2023) is the consideration of students' motivation in the language learning process. She pointed out that a deep cultural understanding can be an additional incentive for students, which can make the learning process more enjoyable and effective. Furthermore, the style of communication and perception of the language and culture being studied also change as students develop deeper cultural understanding. Ultimately, the researcher's study highlights not only the importance of language learning in the context of globalisation but also the need to integrate cultural aspects into the learning process, which helps students gain a deeper understanding and appreciation of cultural diversity, an essential component of modern international interaction. Compared to the results of this study, it is worth noting that technology alone does not ensure success – it is also necessary to integrate cultural aspects into the learning process. In summary, although virtual learning has many technological advantages, the researcher emphasises that cultural context is a key factor in ensuring the success of this learning approach.

Over the past decades, virtual learning environments have played a key role in modernising approaches to foreign language learning. R. Hampel & U. Stickler (2012) focused on the revolutionary opportunities that these technologies offer for advanced language acquisition, considering them from a psycholinguistic and sociocultural perspective. The central aspect of this approach is the mediation of language learning through active interaction with experts and peers. Scientists emphasise that the use of various artefacts, including technological solutions, contributes to the creation of complex

mechanisms for learning a foreign language. According to the researchers, students actively integrate and adapt different modes of communication to maximise the effectiveness of the learning process and create deep linguistic meaning. It is worth noting that modern online video conferencing, which is a multimodal platform, opens up new perspectives in foreign language teaching. Both teachers and learners are adapting to this dynamic environment by exploring and adapting new strategies of communication and interaction. Thus, this innovative pedagogical paradigm opens the door to new models of communication, enriching the process of learning foreign languages and increasing students' motivation to actively participate in the learning process.

According to pedagogical expert M. Hamilton (2013), the concept of digital learning, which focuses on learners' autonomy, increased choice, and independence, seems attractive and logical at first glance. However, the author emphasises that a detailed analysis of this model turns out to be much more complex and nuanced than it might seem at first glance. M. Hamilton emphasises the need for an in-depth study of the theories behind the development of autonomy in the context of virtual language learning. The researcher also suggests that a deeper understanding of the relationship between the concept of autonomy and the use of technology in the learning process can have a significant impact on methodological approaches to language teaching. Compared to the results of the present study, it is worth noting that such an understanding is critical for all participants in the educational process, from academic researchers to teachers, providing the basis for effective and innovative learning in the modern world.

M. Rahimi & J. Fathi (2022) analysed the impact of using electronic tools on the development of English as a foreign language (EFL) students' speech competency. The researchers focused on such aspects of speech activity as fluency and coherence of utterances, vocabulary, grammatical rank of expressiveness and its accuracy, as well as the phonetic side of speech. According to the results of the experiment, the researchers found that both learning formats, traditional and using electronic tools and digital innovations, contributed to the improvement of students' speaking skills. However, a detailed analysis showed that the group that used electronic tools demonstrated a higher level of speaking competence compared to students who were traditionally taught. This indicates that the use of modern technologies in the learning process can have an additional encouraging effect on the development of students' language skills. In particular, the researchers note that students who learnt a foreign language using a digital interface showed greater readiness and confidence in their ability to communicate in English. It is worth noting that additional practice in virtual communication contributes not only to formal language learning but also to the development of communicative competencies, which are an important aspect of foreign language acquisition.

Virtual learning environments created new horizons in foreign language learning by offering comprehensive approaches to language skills acquisition through active interaction and integration of technologies. Researchers note the positive impact of using electronic tools on the development of various aspects of students' language competence. In particular, studies have shown that digital technologies help improve students' communication skills, motivation, and readiness for intercultural communication. This approach to teaching opens up prospects for innovative and effective foreign language learning in the modern world.

CONCLUSIONS

The study determined that VR could transform the traditional approach to language learning by providing students with an immersive experience of interacting with language structures. However, there are technical and pedagogical challenges that require an integrated approach. Mobile learning and AR open up new opportunities for education, providing interactivity, visualisation, and personalisation of the learning process. AR can improve the learning of complex concepts and help increase student motivation in language learning. For the effective implementation of technologies such as VR and AR in the educational process, it is important to develop effective pedagogical strategies that consider the peculiarities of language learning and the needs of students.

The study highlights that technologies such as AR and VR significantly improve the effectiveness and engagement of foreign language learning by creating immersive and interactive experiences for students. Virtual laboratories are a promising tool for areas of study that require real laboratory conditions, allowing for research and experimentation in a simulated environment. The integration of the latest technologies into the educational process contributes to the development of students' language and intercultural competencies, making learning more dynamic, interesting, and effective. Virtual labs are becoming a key tool in education, allowing students to interact with complex experiments in a virtual environment. They offer a safe, accessible, and interactive alternative to traditional labs, supporting student flexibility and autonomy. Mixed labs, which combine virtual and traditional methodologies, are considered the optimal solution for deep and integrated learning.

A survey of students studying foreign languages using modern technologies was conducted. The survey results show that virtual laboratories are widely used and highly appreciated by foreign language students. The majority of respondents note the usefulness of this technology in improving their knowledge and understanding of the material. However, there is a certain proportion of students who prefer traditional teaching methods. Students' motivation to study can change under the influence of virtual labs, with both positive aspects (feeling more focused) and possible problems that require additional support and resources. Students indicated that they most often use Duolingo, Rosetta Stone, Babbel, Memrise, Busuu, Lingodeer, BBC Languages and Italki platforms. In general, the respondents' answers confirm the potential of virtual labs as an effective

tool for learning foreign languages but also point to the need for further adaptation and support of this technology to maximise its potential. Further studies should focus on the possibilities of using artificial intelligence in a virtual research laboratory in foreign language teaching.

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CONFLICT OF INTEREST

None.

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Тін У

Кандидат політичних наук, викладач
Північно-Західний педагогічний університет
730070, Аннінг Іст Роуд, 967, м. Ланьчжоу, Китай
https://orcid.org/0000-0001-9219-0582

Віртуальна дослідницька лабораторія у викладанні іноземних мов: стратегії та роль

Анотація. З розвитком технологій та доступності віртуальних інструментів стає актуальним і можливим створення інтерактивних та динамічних навчальних середовищ, які підвищують зацікавленість та мотивацію студентів. Метою дослідження було провести аналіз та оцінку ефективності використання віртуальних лабораторій у процесі вивчення іноземних мов. У дослідженні були використані аналітичні методи дослідження, узагальнення, систематизація та анкетування. Дослідження продемонструвало, що віртуальна реальність може змінити традиційний підхід до вивчення мови через імерсивний досвід взаємодії студентів з мовними структурами. Дослідження висвітлило технічні та педагогічні виклики, які потребують комплексного підходу. Дослідження підтвердило, що мобільне навчання та доповнена реальність пропонують нові можливості для освіти, забезпечуючи інтерактивність та персоналізацію. У дослідженні зроблено висновок, що доповнена реальність може покращити вивчення складних концепцій та підвищити мотивацію студентів. Це дослідження підкреслило потребу в ефективних педагогічних стратегіях для успішного впровадження віртуальної та доповненої реальності. Також було проведено опитування студентів Північно-Західного нормального університету. Опитування студентів, які використовують віртуальні лабораторії для вивчення іноземних мов, свідчить про те, що вони є більш ефективними та корисними для навчального процесу, включаючи використання Duolingo, Rosetta Stone, Babbel, Memrise, Busuu, Lingodeer, BBC Languages та Italki. Хоча більшість студентів позитивно ставляться до цієї технології, деякі надають перевагу традиційним методам, що свідчить про необхідність додаткової адаптації та підтримки віртуальних ресурсів для забезпечення їх оптимальної ефективності. Результати дослідження можуть бути використані для адаптації існуючих навчальних програм та курсів з іноземних мов до використання віртуальних дослідницьких лабораторних інструментів

Ключові слова: мотивація студентів; сучасні освітні технології; цифрові інновації; імерсивне навчання; інтерактивність

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Mykola Matkivskyi*

PhD in Technical Sciences, Associate Professor
Vasyl Stefanyk Precarpathian National University
76018, 57 Shevchenko Str., Ivano-Frankivsk, Ukraine
https://orcid.org/0000-0001-5039-0260

Tetiana Taras

PhD in Chemical Sciences, Associate Professor
Vasyl Stefanyk Precarpathian National University
76018, 57 Shevchenko Str., Ivano-Frankivsk, Ukraine
https://orcid.org/0000-0002-5801-1285

Methods and technologies for evaluating the quality of higher education in the context of international standards: A comparison of the Ukrainian and Polish experience of creating ratings

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*Corresponding author

Abstract. The need to study the methods and technologies used to assess the level of educational services is primarily due to constant transformations in educational processes, improvement of the system of criteria used to rank higher education institutions. The purpose of this study was to analyse the tools used to assess the performance of higher education institutions in the context of international standardization of educational processes. The main methods used in the study were statistical analysis, comparative and contrastive and analytical and synthetic methods. The comparative and contrastive analysis revealed that research activities were among the main indicators that influenced the creation of the rankings: Times Higher Education University Impact Rankings (60%), TOP-200 Ukraine (42%), Perspektywy (42%), and prestige and reputation: QS World University Rankings (40%), Times Higher Education University Impact Rankings (30%), TOP-200 Ukraine (12%). The methods used to create the rankings included statistical, pedagogical analysis, analytical and synthetic methods, and surveys. To create the Ukrainian ranking, 6 international (Webometrics, Scopus, Times Higher Education World University Rankings, Times Higher Education University Impact Rankings, UniRank, QS World University Rankings) and 4 national (participation in research project competitions, number of patents received, awards for young scientists, the ratio between the number of applications and the competition score) indicators were used. The Polish ranking was based on 29 indicators divided into groups: prestige, scientific effectiveness, scientific strength, scientific and educational potential, internationalization, graduates on the labour market, innovation, study conditions, and economic cooperation. In Poland, there was a balance between international and national criteria, while in Ukraine, about 70% of international criteria and 30% of national criteria were used. This work can be used in the future to improve national and international systems for assessing the quality of higher education, and to develop a unified mechanism for creating ratings

Keywords: prestige; weighting; scientific activity; national experience

INTRODUCTION

The study of methods for assessing the quality of educational services in terms of international standards is necessary, given the constant changes taking place in educational processes and the transformation of approaches to mechanisms for assessing the quality of higher education, in particular, through its internationalization. Since there is still no clear tool for creating international and national rankings, it is important to study different technologies and identify key indicators that affect the ranking of higher education institutions in ascending order.

A comparative analysis of the main criteria for creating a ranking of higher education institutions, including international and national ones, allows for determining which indicators of education quality are prioritized according to international standards and which are underestimated. In particular, the correlation between such parameters as prestige and reputation, quantitative and educational indicators, research activities, student employment, international prospects, financial indicators, and technical capabilities was necessary to understand what factors primarily determine the place of a higher education institution in international and national rankings. According to L. Klochek *et al.* (2022), the study of the peculiarities of the quality of national education is built within the international context. In particular, among the key parameters, the authors name research, ensuring the implementation of innovative projects and their adaptation at the national level. However, the paper did not discuss in detail the differences between national and international rankings. Ideas for developing new digital methods for evaluating educational programmes are presented in the work by V. Pysarkova (2023). The study proposed a form of learning that would combine both online and traditional methods. The author considered gamification as one of the forms of active involvement of students in the educational process. This study focused on curriculum improvement, but other aspects of education quality were not considered. Education quality management in Ukraine was considered by N. Bakhmat *et al.* (2022) through the prism of regulation and organization of the educational process in higher education institutions. The study examined the education system within the framework of ethical principles and European standards, but did not provide a comprehensive analysis of methods and technologies for monitoring the level of educational institutions.

The development of a model for quality control of the educational process is presented in the paper by I. Kolodii *et al.* (2021). In particular, the main quality indicators were identified as follows: monitoring the level of students' knowledge, methods of knowledge assessment, the possibility of practical implementation of professional skills, features of improving pedagogical skills, and the image of the educational institution. The study carried out a comprehensive analysis of the indicators of the level of education in educational institutions, but did not consider the comparison of the specifics of national and international ranking of universities. In the monograph by S.A. Moroz (2022), the author dealt with management in the field of higher education quality assurance. In particular, a temporal and spatial analysis of the main elements of the educational system was carried out, and key generalizations were formulated regarding the provision of quality higher education and the state instruments that ensure it in Ukraine. However, the study did not compare several technologies for assessing the quality of education. The purpose of this study was to examine the methodological and technological foundations used to monitor the level of educational services in accordance with international standards. Among the national rankings, the Polish one was chosen for comparison with the Ukrainian one, given the kinship of Polish and Ukrainian higher education traditions, which were separated in the early twentieth century. In accordance with the purpose of the study, the following tasks were set: comparative analysis of the Polish and Ukrainian approach to ranking higher education institutions, a comparison of priority indicators of higher education quality in national and international higher education institutions.

MATERIALS AND METHODS

This study used the results of both international rankings: QS World University Rankings, Times Higher Education World University Rankings, and national rankings, in particular the Polish Perspektywy and the Ukrainian TOP-200 Ukraine. The analysis of the methods and technologies used to create these rankings was based on the concept of a set of indicators of higher education quality. After a detailed analysis of each system, the criteria for assessing the quality of higher education in key categories were compared.

The benchmarking analysis in this study was used to consider national and international approaches to assessing the quality of educational services. The comparison was carried out by analysing a set of key indicators and their percentage. In particular, the comparison was based on the study of key indicators of national and international rankings grouped into the following categories: prestige and reputation, quantitative and educational indicators, research activities, student employment, international perspectives and indicators, financial indicators, and technical capabilities. Thus, the comparative analysis was carried out in two directions: comparison of national and international criteria, comparison of Ukrainian and Polish experience in creating national educational rankings. Statistical analysis in this study was used to calculate the quantitative correlation between the main indicators of national and international ranking of the quality of educational services in higher education institutions. Initially, the percentage correlation between the quality indicators of higher education in accordance with the technology of creating specific rankings, including international ones, was studied: QS Top Universities, Times Higher Education World University Rankings, Polish Perspektywy and Ukrainian TOP-200 Ukraine. The evaluation was based on the following parameters: prestige

and reputation (academic reputation, teaching, prestige), quantitative and educational indicators (ratio of students per faculty, learning environment), research activities (citations in international scientific journals, research potential, research efficiency, Scopus, Webometrics, UniRank), student employment (reputation among employers, graduates in the labour market), international perspectives and indicators (international faculty coefficient, international perspective, QS World University Rankings, Times Higher Education World University Rankings), financial indicators (industry income, awards of the President of Ukraine and the Verkhovna Rada of Ukraine for young scientists, number of patents obtained by university scientists), technical capabilities (innovativeness). The results of the statistical analysis of indicators and categories of higher education quality are presented in tables and figures.

The analytical and synthetic analysis in this study was used to study the theoretical literature related to the creation of national and international systems for assessing the quality of education, the development of new strategies for ranking universities, a model of higher education sustainability, the study of the relationship between the university community and the labour market, and factors contributing to the development of the educational environment, the introduction of a system of weighting indicators, parameters of academic and non-academic education. Based on the analytical and synthetic method, the experience of different countries in improving and diversifying the quality indicators of higher education was studied to create objective national and international rankings.

RESULTS

There is no general concept of quality assurance of educational processes within the framework of international standards, but there is a need to develop a general structure of the model of quality assurance of higher education (Ryan, 2015). The methods of education quality assessment in this article are the means of studying various scientific and educational indicators from open sources (questionnaires, surveys, statistical analysis, analytical and synthetic analysis, pedagogical analysis), and the technology is a set of methods and the sequence of their use to obtain the required results. The study was based on the comparison of the percentage ratio between the criteria related to research and education, international cooperation, and financial indicators.

One of the most important technologies for assessing the quality of education in line with international standards is the QS World University Rankings, which is calculated using the methodology of the British company Quacquarelli Symonds. It was developed jointly with the British publication Times Higher Education. The volatility of the QS World University Rankings results is much lower than in other rankings, which indicates the reliability of this technology. Every year, the technology is used to evaluate 2,500 world-class higher education institutions, which is used to compile a ranking of the world's top 500 universities. It also creates rankings for individual disciplines. The QS World University Rankings uses a statistical analysis method to assess the quality of education, and the data is taken from the largest database of scientific publications, Scopus, and a survey of representatives of academic communities around the world. The QS Global Academic Survey involves professors and university administrators with an average of 19.6 years of experience. Each of the survey participants can name 30 universities in the world, but without specifying the higher education institution where they work. The assessment was carried out in the following fields of knowledge: natural sciences, humanities and arts, social sciences, life sciences, engineering, and technology. Representatives of several thousand companies located in 90 countries took part in the QS Global Employer Survey.

The main criteria for this ranking are: academic reputation, reputation among employers, student to faculty ratio, citations, ratio of foreign teachers, ratio of foreign students, international research network, employment outcomes, and sustainability. The components of the indicators have the following quantitative ratio: academic reputation – 40%, reputation among employers – 10%, faculty student ratio – 20%, citation – 20%, international faculty ratio – 5%. Thus, this ranking shows the quantitative and qualitative correlation between all participants of the educational process: the academic community, students, parents, and employers. Figure 1 shows that the world's leading universities in the field of academic knowledge are mainly those in the US (Massachusetts Institute of Technology, Harvard University, Leland Stanford Junior University) and the UK (University of Cambridge, University of Oxford, Imperial College London, University College). The ranking of the top 15 universities also includes higher education institutions in Switzerland (ETH Zurich), Singapore (The National University of Singapore) and Australia (University of Melbourne). Among the Ukrainian universities, the list of the best includes Taras Shevchenko National University of Kyiv (681-690), V.N. Karazin Kharkiv National University (691-700) and National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (731-740), National Technical University "Kharkiv Polytechnic Institute" (901-950) and Lviv Polytechnic National University (951-1000). Among the Polish higher education institutions, the best were identified as the University of Warsaw (262), Jagiellonian University (304), Warsaw University of Technology (571), Adam Mickiewicz University (731-740), University of Life Sciences in Poznan (801-850) (QS World University…, 2024) (Fig. 1).

The Times Higher Education World University Rankings 2023 (2024) is based on the new WUR 3.0 methodology, which includes 18 key criteria for educational effectiveness, divided into 5 areas: teaching, research environment, research quality, industry, and international outlook. About 134 million citations and 16.5 million publications were analysed. The ranking includes 1906 universities from 108 countries. The main methods used to collect the necessary data were statistical analysis, sociolinguistic surveys, and the analytical and synthetic method (generalization

and systematization of data). At the same time, teaching accounts for 30% of the total score, citations (research impact) – 30%, research (volume, income, and reputation) – 30%, international perspective – 7.5%, and industry income – 2.5%. The detailed ratio is presented in Table 1. However, the Times Higher Education World University Rankings did not include important parameters of education quality in the era of globalization and digitalization, such as providing online teaching in the context of COVID-19 and the declaration of martial law (Ma *et al.*, 2023), and determining the level of digital technology adoption (Ch'ng & Cai, 2020).

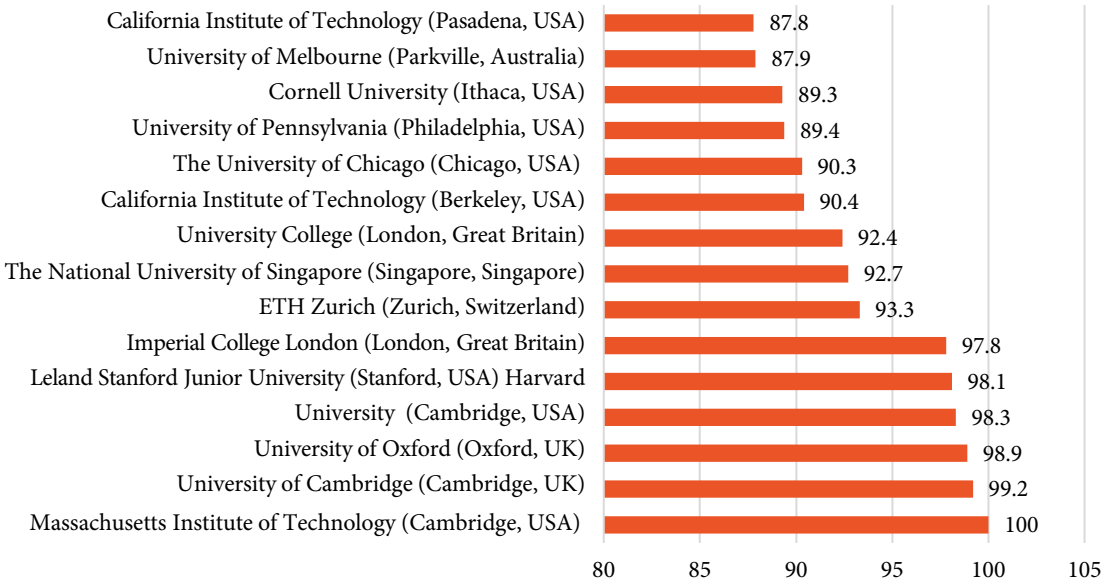

Figure 1. The best universities in 2024 according to the QS World University Rankings
Source: prepared based on QS World University Rankings 2024: Top global universities (2024)

Table 1. Correlation between the main criteria for evaluating the quality of education according to the Times Higher Education World University Rankings of 2023

The income of the industry is innovation	
Income from scientific research in industry	2.5%
International perspective (staff, students, research)	
Ratio of international and local staff	3%
The ratio between foreign and local students	2%
International cooperation	2.5%
Teaching is a learning environment	
Reputation survey	15%
Awards of doctors of philosophy	6%
Admission statistics	4.5%
Income per academician	2.25%
Awarding of Doctor of Science and Bachelor degrees	2.25%
Research — volume, revenue, and reputation	
Reputation survey	19.5%
Income from research	5.25%
Reports of scientific and pedagogical workers	4.5%
Citations — research impact	
Citation Impact (Average)	32.5%

Source: prepared given the materials of the World University Rankings 2023 (2024)

The best universities according to the Times Higher Education World University Rankings 2023 (2024) are the University of Oxford (98.5 points), Leland Stanford Junior University (98.0 points), Massachusetts Institute of Technology (97.9 points), Harvard University (97.8 points), University of Cambridge (97.5 points), Princeton University (96.9 points), California Institute of Technology (96.5 points), Imperial College London (95.1 points), The University of California (95.1 points), Yale University (94.2 points). The best Ukrainian universities were Sumy State University (401-500), Lviv Polytechnic National University (601-800), Kharkiv National University

of Radio Electronics (1001-1200), Ivan Franko National University of Lviv (1201-1500), National Technical University "Kharkiv Polytechnic Institute" (1201-1500) and others. Among the Polish universities, the best were recognized as Wrocław Medical University (351-400), Jagiellonian University (601-800), Medical University of Łódź (601-800), Medical University of Gdańsk (801-1000), University of Warsaw (801-1000).

The annual Ukrainian university ranking "TOP-200 Ukraine" has been developed for 17 years by the Centre for International Projects "Euroeducation" and the international group of experts IREG Observatory on Academic Ranking and Excellence. It is worth noting that the 2023 ranking took into account important trends in Ukraine's development after the full-scale invasion of the Russian Federation and the consequences of the COVID-2019 pandemic. The basis for this ranking were the results of the international conferences IREG 2022 (Warsaw Conference: "Academic Rankings at the Crossroads", 23-24 June 2022), IREG 2023 (Tashkent-Samarkand Conference: "Rankings and University International Exposure", 26-28 April 2023) and the Berlin Principles on Ranking of Higher Education Institutions (2006), approved by the participants of the second IREG meeting (Berlin, Germany, 18-20 May 2006). The study is based on the Delphi method, which involves systematic collection of information for forecasting the situation based on expert interviews and data synthesis.

Ukrainian higher education institutions were evaluated according to 6 international and 4 national criteria. The international indicators include the following: QS World University Rankings, Times Higher Education World University Rankings – academic activity, Scopus – research and publishing activity, Webometrics – assessment of scientific achievements by monitoring websites, Times Higher Education (THE) University Impact Rankings – achievements of higher education institutions (HEIs) in the context of the 17 United Nations Sustainable Development Goals (UN Sustainable Development Goals) – quality of presentation and popularity of HEIs in the Internet space based on independent webometric indicators.

Among the national criteria, the following were taken into account: the effectiveness of participation of Ukrainian HEIs in competitions of scientific projects (international and Ukrainian), awards of the President of Ukraine and the Verkhovna Rada of Ukraine for young scientists (educational and scientific work), the number of patents obtained by university scientists (inventive activity), the weighted average for the ratings of HEIs by the number of applications submitted by applicants and the average competitive score (attractiveness of the university for applicants). We took into account data that was publicly available and whose validity could be verified. The sum of all the weighting factors was equal to 1, and the resulting ranking was defined as the inverse of the University Index (Fig. 2).

Figure 2. Weight of indicators according to Times Higher Education World University Rankings (2023)
Source: prepared based on QS World University Rankings 2024: Top global universities (2024)

The top ten universities are as follows: National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (sum of indices – 4.09), Taras Shevchenko National University of Kyiv (4.46), V.N. Karazin Kharkiv National University (5.61), Lviv Polytechnic National University (5.62), Ivan Franko National University of Lviv (5.95), Sumy State University (5.97), National Technical University "Kharkiv Polytechnic Institute" (6.98), National University of Life and Environmental Sciences of Ukraine (9.59), Kharkiv National University of Radio Electronics (9.94), Yuriy Fedkovych Chernivtsi National University (10.72).

The Perspektywy Educational Foundation is engaged in the ranking of higher education institutions in Poland, in particular, separate rankings are created for public, private higher education institutions and state vocational schools. The main methods used were statistical analysis, pedagogical analysis, analytical and synthetic method, and survey method. The indicators for determining the ranking of public institutions were grouped by the following parameters: prestige, graduates in the labour market, scientific potential, innovation, scientific efficiency, learning environment, internationalization. The quantitative expression of the indicators is shown in Figure 3. According to these indicators, the best higher education institutions were identified as Jagiellonian University (100), University of Warsaw (99.6), Warsaw University of Technology (88.0), Adam Mickiewicz University (83.6), Kraków Scientific and Technical University named after S. Stashitsa (83.1) (Rating of higher…, 2024).

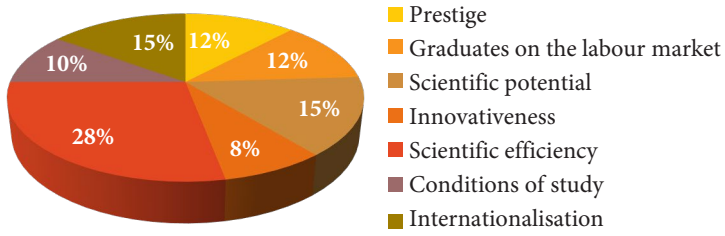

Figure 3. Technology for calculating the rating of academic universities for 2023
Source: prepared based on the materials of Perspektywy (Rating of higher …, 2024)

The prestige criterion includes two main parameters: the assessment of the teaching staff based on the CAWI survey and international recognition. The level of a higher education institution in terms of graduates' placement in the labour market shows their earnings relative to the average earnings in the area of residence and the possibility of employment (according to a national survey). The scientific potential consists of indicators such as the evaluation of scientific activities, the saturation of the staff with people of the highest qualification, habilitation qualifications, and doctoral qualifications. Innovativeness is focused on the number of patents and protection rights in Poland, patents, and protection rights abroad, and the contribution of university research to the implementation of the UN Sustainable Development Goals. Scientific effectiveness includes a number of parameters: the effectiveness of attracting financial resources for research, development of own personnel, degrees awarded, publications, Field-Weighted Citation Impact (FWCI), Field-Weighted View Impact (FWVI), top 10 (publications in the top 10 percentile journals).

The training conditions include two parameters: availability of highly qualified staff and accreditation. The internationalization parameter includes numerous criteria: the number of students studying in foreign languages, foreign teachers, exchange of academic staff (trips) under the Erasmus+ programme, strategic partnership projects in which the university is a leader under the Erasmus+ programme, student exchange, multiculturalism of the student environment. For non-public institutions, the main criteria are prestige, graduates in the labour market, scientific strength, educational potential, innovation and economic cooperation, internationality (Fig. 4), and for public vocational institutions – prestige, graduates in the labour market, educational potential, economic cooperation, internationality (Fig. 5).

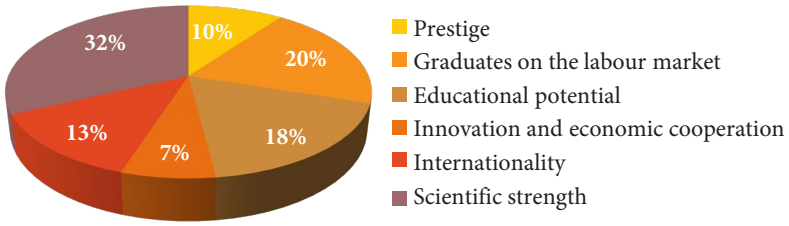

Figure 4. Technology for calculating the rating of private universities in Poland for 2023
Source: prepared based on the materials of Perspektywy (Rating of higher …, 2024)

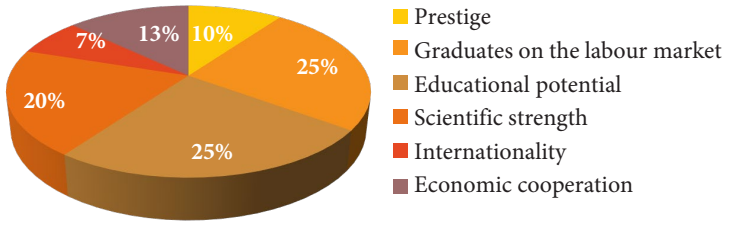

Figure 5. Technology for calculating the rating of professional higher education institutions in Poland for 2023
Source: prepared based on the materials of Perspektywy (Rating of higher …, 2024)

International rankings with ready-made citation results are used to evaluate higher education institutions in Ukraine: Webometrics, Scopus, UniRank, and general scientific and educational achievements: QS World University Rankings, THE University Impact Rankings, and national indicators (participation in research project competitions, number of patents obtained, ratio between the number of applications and the competition score, number of awards for young scientists), a total of 10 indicators. When determining key indicators for monitoring the quality of educational services, it would be advisable to consider the academic performance indicator, not just quantitative

indicators (the ratio between students and teachers) (Buza & Istrate, 2022). When determining the ranking of Polish universities, the number of criteria was higher (29 indicators), divided into groups: prestige, scientific strength, scientific potential, scientific efficiency, educational potential, innovation, internationalization, graduates on the labour market, economic cooperation, and learning environment. It is important to note that specific international rankings with ready-made figures were not considered in Poland, as in the Ukrainian ranking, although international cooperation was an important component of the calculation in both cases. It is worth noting that in the Polish ranking, some groups of indicators were not formulated clearly enough and could be duplicated ("scientific strength", "scientific efficiency"). One of the ways to improve the quality of Polish education is to reform higher education institutions in the direction of increasing autonomy in each university (Urbanek, 2018).

Table 2 presents the percentage correlation between the key parameters of international standards, as well as Ukrainian and Polish technologies for calculating the percentage correlation between national and international indicators. The indicators were grouped by prestige and reputation, quantitative and educational indicators, research activities, student employment, international prospects, financial indicators, and technical capabilities.

Table 2. Ratio of indicators of international standards for Ukrainian and Polish technologies

Indicator	QS World University Rankings	Times Higher Education World University Rankings	"TOP-200 Ukraine" ("Euroeducation", Ukraine)	Perspektywy (Poland)
Prestige and reputation				
Academic reputation	40%			
Teaching		30%		
Prestige			12%	
In total	40%	30%	12%	
Quantitative and educational indicators				
The ratio of students of the faculty	20%			
The weighted average value for the ratings of higher education institutions by the number of applications submitted by applicants and the average competitive score				4%
Study conditions			10%	
In total	20%		10%	4%
Research activities				
Citation	20%	30%		
Research		30%		
Scientific potential			15%	
Scientific efficiency			28%	
Effectiveness of participation of higher education institutions of Ukraine in competitions of scientific projects				6%
Scopus				14%
Webometrics				14%
UniRank				10%
In total	20%	60%	42%	42%
Employment of students				
Reputation among employers	10%			
Graduates on the labour market			12%	
In total	10%		12%	
International perspectives and indicators				
The ratio of international teachers	5%			
International perspective		7.5%		
Internationality				
QS World University Rankings				15%
THE University Impact Rankings				10%
Times Higher Education World University Rankings				15%
In total	5%	7.5%		40%

Table 2. Continued

Indicator	QS World University Rankings	Times Higher Education World University Rankings	"TOP-200 Ukraine" ("Euroeducation", Ukraine)	Perspektywy (Poland)
Financial indicators				
Industry income		2.5%	15%	
Prizes of the President of Ukraine and the Verkhovna Rada of Ukraine for young scientists				6%
The number of patents received by university scientists				6%
In total		2.5 %	15%	12%
Technical capabilities				
Innovativeness			8%	
In total			8%	

Source: prepared from materials Ranking of universities of Ukraine "TOP-200 Ukraine" (2023), Rating of higher educational institutions (2024), World University Rankings 2023 (2024), QS World University Rankings 2024: Top global universities (2024)

For the QS World University Rankings (2024), prestige and reputation were the most important (40%), for the Times Higher Education University Impact Rankings 2023 (2023) – research (60%), for the TOP-200 Ukraine (Ranking of universities…, 2023) – research (42%), for the Polish Perspektywy (Rating of higher…, 2024) – research (42%) and international prospects (40%). It is worth noting that the growth of international cooperation between universities has a positive impact on the exchange of educational experience and allows university graduates to expand their job search opportunities in the international labour market, which generally leads to a gradual increase in the efficiency of educational services (Grudowski & Szczepańska, 2021). Quantitative and educational indicators and employment indicators were considered most of all in the QS World University Rankings, TOP-200 Ukraine, financial indicators – in Perspektywy, technical capabilities – in TOP-200 Ukraine. Since higher education institutions in the context of globalization are constantly in need of technological innovations in the educational sphere, there is a gradual increase in the need to monitor the technical capabilities of universities (Bullock & Ory, 2000).

Thus, when comparing national (Ukrainian, Polish) and international experience in creating rankings, it was shown that there are no clearly defined criteria for assessing the quality of education, and they differ significantly from each other. However, when comparing Ukrainian and Polish rankings, in Ukraine, international criteria are more important than national ones, while in Poland, both national and international indicators are considered equally. In other words, the Ukrainian system of education quality assessment is a combination of several international assessments, and national criteria have much lower weighting.

DISCUSSION

This paper analyses the key indicators used by national and international education quality assessment systems, in particular, for creating rankings. The main indicators of the quality of education were divided into the following groups: prestige and reputation, quantitative and educational indicators, research activities, student employment, international perspectives and indicators, financial indicators, and technical capabilities. According to A.A. Makki *et al.* (2023), meeting the criteria of international rankings may not lead to the achievement of certain strategic goals of a higher education institution. This study was about developing a new approach to assessing the quality of education based on a combination of international ranking systems and the achievements of national universities in relation to their strategic goals. The study showed that national rankings take into account both national and international evaluation criteria. For example, the Ukrainian higher education ranking "TOP-200 Ukraine" is based on a combination of 6 international and 4 national criteria, which allows for an objective assessment of the performance of educational institutions both in Ukraine and abroad.

The higher education sustainability model, developed by C. Cao *et al.* (2023), was tested in nine countries using 13 indicators of education quality and sustainability. By analysing these parameters, the authors show that each educational system has its own advantages, in particular, Australian higher education institutions are characterized by a high level of academic integrity, British ones by sustainability and prestige, and American ones by numerous patents per capita. Based on the study of educational indicators of Ukrainian education, it is possible to trace high indicators of technological sophistication of the educational process, the ratio of students to teachers, and scientific potential, but the level of international cooperation and citations in international journals is lower than in other European countries.

When studying the factors that contribute to the development of the educational environment, N.Y. Dwaikat (2021) came to the following conclusions: input-based factors have a stronger impact on output-based factors, and process-based factors have less of an impact on output-based factors. Therefore, factors such as international pedagogical standards, educational infrastructure and

learning environment have a significant impact on parameters such as student quality and teacher quality, as well as on the quality of academic programmes. When analysing the Ukrainian quality of education in the context of international standards, the following interrelated factors were identified: in particular, academic reputation is influenced by the ratio of foreign students, citations, and student employment rates. It should be noted that the national ranking of Ukraine was significantly influenced by the results of international rankings, in particular QS World University Rankings, THE University Impact Rankings, THE World University Rankings. It can be concluded that the assessment of the quality of education in national states is significantly influenced by international indicators.

The development of a methodology for assessing the quality of education of higher education institutions and their ranking in the work by Z. Lazis *et al.* (2021) was based on a survey of stakeholders and the identification of quantitative indicators of the effectiveness of the educational process. According to the authors, the ranking systems of educational institutions should be based on weighting coefficients. The weighting system was successfully used to create the TOP-200 Ukraine ranking. However, the national ranking of Polish educational institutions and international rankings used a percentage ratio between different criteria for evaluating higher education institutions. Thus, the methodology of weighting coefficients is not yet a priority in the international context. Another study suggests the priority of using weighting indicators for attributes and sub-attributes that are included in the list of important educational indicators. In the study by K.F. See *et al.* (2022), the following observation was presented: in developing countries, funding is a priority for the development of education, while in developed countries, strengthening international relations, communication in academic circles and practical application of theoretical ideas are prioritized. It was also pointed out that Asian countries also tend to follow Western priorities in education. The analysis of Ukrainian and Polish educational rankings shows the importance of internationalization, economic cooperation, and increasing citations in scientific databases, i.e. they are focused on increasing the international community's interest in the scientific work of national educational institutions. However, the Polish ranking of educational institutions includes more national indicators, while the Ukrainian ranking is more focused on international rankings and the assessment of Ukrainian educational institutions in the world.

Since the basis of quality education is primarily the level of teaching, H. Wu (2023) expanded and described the technology for researching the quality of learning based on big data. The absolute difference between the author's algorithm and the existing ones was 18.23 %. The author noted such problems in assessing the quality of education as the lack of feedback monitoring, common evaluation criteria and the use of the most accessible methods to determine the level of an educational institution. Based on the analysis of the Ukrainian experience of creating a ranking of higher education institutions, the following problems can be noted: the use of the results of several international rankings leads to duplication of many criteria, and the focus on international standards leads to neglect of certain national criteria. At the same time, international rankings also differ significantly in the number and priority of criteria, which hinders the objective ranking of higher education institutions in the world. The analysis of the quality of higher education in Romania is devoted to the article by S. Stanciu & V. Banciu (2012), in particular, the article deals with the relationship between university communities and the labour market. The paper examined issues related to students' readiness for practical work and the development of strategies to increase students' social participation in the labour market. Thus, the authors' research focused on the analysis of the student employment parameter. Comparison of international and national rankings showed that the employability criterion is not a priority and accounts for only 10-12% of the result. Compared to the parameters of citation, internationalization, and academic reputation, this criterion is not a priority for determining the university ranking.

The theoretical understanding of the key concepts, methods, strategies, and structure of higher education is discussed in the article by M. Kayyali (2023). The author's work focuses on the study of academic and non-academic parameters of education quality assessment, identification of priority strategies for internal control of educational institutions aimed at curriculum development and teacher development. Regional differences and the importance of international initiatives were also studied. A comparative analysis of the creation of national and international rankings has shown that the highest priority parameters are research activities and academic reputation, i.e. academic criteria. At the same time, much less attention is paid to non-academic criteria. It should be noted that the researcher's strategy is appropriate from the point of view that it is the non-academic parameters that relate to the practical implementation of the theoretical knowledge gained.

An analysis and synthesis of modern approaches to the study of national and international experience is presented in the work by O. Vorobyova *et al.* (2020). The study focuses on indicators and criteria for the quality of higher education, as well as on the identification of assessment mechanisms in different countries. In particular, such issues as the application of the rating system at the global and regional levels, tools for the internationalization of higher education, and the social responsibility of the university were considered. The results of the study of Ukrainian and international experience in creating rankings showed that national evaluation mechanisms are built in accordance with international standards. However, it is important to pay attention to national indicators that demonstrate the effectiveness of education in a particular country, based on globally accepted criteria. Thus, the bulk of modern pedagogical research on education quality assessment has focused on issues related to the development of new strategies for ranking higher education institutions, and the

identification of key indicators that should be included to objectively determine the level of education quality. Another important issue is the correlation between national and international indicators used to create rankings. In general, based on the research, it is possible to note the priority of international standards in creating national rankings.

CONCLUSIONS

Among the methods used to assess the quality of education in higher education institutions were statistical, pedagogical analysis, analytical and synthetic method, questionnaires, and surveys. The results of the statistical analysis showed that the correlation between national and international criteria for determining the quality of education by different technologies is as follows. The group of indicators that had the greatest impact was scientific activity (citations in webometric databases, research, scientific potential, scientific efficiency). In particular, according to a set of criteria, scientific activity was used as the basis for evaluation in three rankings: THE University Impact Rankings (60%), TOP-200 Ukraine (42%), and Perspektywy (42%). The indicators of the category "prestige and reputation" had the greatest weight for international rankings (QS World University Rankings, THE University Impact Rankings). Indicators related to increasing the authority of higher education institutions among the international community had the highest coefficient in the Perspektywy ranking (Poland). For the Ukrainian TOP-200 Ukraine ranking, financial indicators and technical capabilities were important factors.

When comparing Ukrainian and Polish experience, it was found that 6 international (Webometrics, Scopus, UniRank, QS World University Rankings, Times Higher Education World University Rankings, THE University Impact Rankings) and 4 national (participation in research project competitions, the ratio between the number of applications and the competition score, the number of patents obtained, the number of awards for young scientists) criteria, and the Polish ranking took into account as many as 29 indicators, which were divided into several groups: prestige, scientific potential, scientific efficiency, scientific strength, educational potential, internationalization, innovativeness, graduates on the labour market, study conditions, economic cooperation. In general, the results of the analysis of the ranking in Poland showed a balance between national and international criteria, while the ranking in Ukraine was based on about 70% of international criteria and 30% of national criteria.

The priority areas for further research will be to study key criteria and improve technologies for creating national and international rankings, form a unified system for assessing the quality of education, and introduce new concepts of education quality based on the experience of different countries.

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CONFLICT OF INTEREST

None.

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Микола Петрович Матківський
Кандидат технічних наук, доцент
Прикарпатський національний університет імені Василя Стефаника
76018, вул. Шевченка, 57, м. Івано-Франківськ, Україна
https://orcid.org/0000-0001-5039-0260
Тетяна Миколаївна Тарас
Кандидат хімічних наук, доцент
Прикарпатський національний університет імені Василя Стефаника
76018, вул. Шевченка 57, м. Івано-Франківськ, Україна
https://orcid.org/0000-0002-5801-1285

Методи та технології оцінювання якості вищої освіти в контексті міжнародних стандартів: порівняння українського та польського досвіду створення рейтингів

Анотація. Необхідність дослідження методів та технологій, що використовуються для оцінювання рівня надання освітніх послуг, зумовлена передусім постійними трансформаціями в освітніх процесах, удосконаленням системи критеріїв, за якими здійснюється ранжування вищих навчальних закладів. Метою цього дослідження стало проведення аналізу використаних інструментів для оцінювання роботи вищих навчальних закладів в умовах міжнародної стандартизації освітніх процесів. Основні методи, які використовувалися в дослідженні: статистичний аналіз, порівняльно-зіставний та аналітико-синтетичний методи. У ході порівняльно-зіставного аналізу було виявлено, що серед основних показників, які впливали на створення рейтингів, були наукова діяльність: Times Higher Education University Impact Rankings (60 %), "TOP-200 Ukraine" (42 %), Perspektywy (42 %) та престиж і репутація: QS World University Rankings (40 %), Times Higher Education University Impact Rankings (30 %), "TOP-200 Ukraine" (12 %). Серед методів, які застосовувалися для створення рейтингів, були статистичний, педагогічний аналіз, аналітико-синтетичний метод, опитування. Для створення українського рейтингу бралося 6 міжнародних (Webometrics, Scopus, Times Higher Education World University Rankings, Times Higher Education University Impact Rankings, UniRank, QS World University Rankings) і 4 національних (участь у конкурсах наукових проектів, кількість отриманих патентів, премій для молодих учених, співвідношення між кількістю заяв абітурієнтів та конкурсним балом) показники. Польський рейтинг було засновано на 29 показниках, розподілених за групами: престиж, наукова ефективність, наукова сила, науковий та освітній потенціал, інтернаціоналізація, випускники на ринку праці, інноваційність, умови навчання, економічна співпраця. У Польщі спостерігався баланс між міжнародними та національними критеріями, а в Україні використовувалося близько 70 % міжнародних критеріїв та 30 % національних критеріїв. Цю роботу можна використовувати в подальшому для вдосконалення національних та міжнародних систем оцінювання якості вищої освіти, розробки єдиного механізму для створення рейтингів

Ключові слова: престиж; вагові показники; наукова діяльність; національний досвід

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Oksana Kovalenko*

PhD in Philologycal Sciences, Associate Professor
Simon Kuznets Kharkiv National University of Economics
61001, 9A Nauky Ave., Kharkiv, Ukraine
https://orcid.org/0000-0002-3432-2601

Online learning in Ukraine: Challenges and tools for identifying difficulties in adaptation and socialization of Chinese students in a university environment: A case study

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*Corresponding author

Abstract. This research addressed the critical topic of Chinese students' adaptation at Simon Kuznets Kharkiv National Economic University, focusing on online learning. The study assessed the effectiveness of support tools using structured questionnaires to measure professional and academic adaptation levels of Chinese students, revealing associated challenges. The research methodology integrates surveys, observation, and statistical data analysis to objectively assess comfort levels, identify critical issues, and evaluate the effectiveness of support tools, contributing to enhanced professional and academic standards. In research was employing surveys, observations, documentary analysis, and a review of official documents, and explored various facets of adaptation, including general issues and social interactions in the online environment. Data analysis uncovers key challenges during adaptation, leading to specific recommendations for improving online learning. Challenges faced by students adapting to remote education in a Ukrainian higher education institution are identified, including language barriers hindering language learning and communication for Chinese students, and cultural differences complicating adaptation and technology integration. The results highlight aspects complicating Chinese students' adaptation to the online environment, such as language barriers, cultural differences, and technology adaptation. Despite high technological literacy, it remains crucial to tailor educational materials and platforms to the specific needs of Chinese students. The study addresses significant challenges, providing recommendations as a foundation for support programs and optimizing conditions for online learning among Chinese students in a university setting, ultimately enhancing their professional and academic success. The findings contribute significantly to the scientific discourse, offering valuable insights to inform the development of strategies aimed at improving conditions for students' adaptation to the university environment, especially within the online format

Keywords: cultural differences; educational process; language barriers; surveys; technology integration

INTRODUCTION

The escalating number of Chinese students opting for higher education in Ukraine underscores the critical importance of delving into and comprehending the adaptation process within Ukrainian higher education institutions (HEIs). The relevance of this study was grounded in the imperative of successfully adapting international students, particularly from China, to the university environment, thereby contributing to the enhancement of the quality of the educational process and fostering international understanding as a significant rise in the number of Chinese students pursuing higher education in Ukraine was observed.

This assertion finds support in the works of V. Kiktenko & O. Drobotiuk (2021) and A.Z. Goncharuk *et al.* (2016), highlighting the pivotal need to understand international students' challenges during the adaptation process. Critical aspects addressed in this research include language barriers, cultural shock, and social relations that may impact the adaptation of Chinese students at Kharkiv National University of Economics (KhNUE), as indicated by A. Yanovskyi (2020) and N.P. Volkova (2018). The study by A.A. Alasmari (2023) on the adaptation of international students in Saudi Arabia highlights similar challenges that students from other countries may face, such as language barriers, cultural shock, and stress. Analysing these aspects provided valuable insights into optimal strategies for facilitating adaptation and enhancing the overall educational experience for international students. The surge in the number of Chinese applicants to Ukrainian higher education institutions can be attributed to various factors, such as the quality of education meeting international standards, the reputation of universities in the global market, international cooperation and exchange programs, language preparation, and cultural diversity, as noted by S. Yatzjun (2017), A.Z. Goncharuk *et al.* (2016), and A. Yanovskyi (2020). The interest in exploring a new culture and studying in an international environment also plays a significant role in this trend.

Acknowledging that the socialization of Chinese students in Ukrainian HEIs within an online environment presents challenges and difficulties is crucial. Understanding the impact of these difficulties on Chinese students' learning and socialization processes is imperative, as outlined in the Regulation on the Organization of the Educational Process at Simon Kuznets Kharkiv National University of Economics (2020). The Regulation on the Organization of the Educational Process using Distance Learning Technologies at Simon Kuznets Kharkiv National University of Economics (2020). Additionally, it is critical to develop and implement tools to identify these difficulties and formulate strategies to overcome them. By addressing these issues, the study contributed to the broader discourse on international education, providing valuable insights for educators, policymakers, and institutions aiming to create inclusive and supportive learning environments for students from diverse cultural backgrounds.

This study aimed to analyse the challenges faced by Chinese students and faculty at Simon Kuznets Kharkiv National University of Economics (KhNUE) during online learning and to explore practical tools for identifying and overcoming these difficulties, promoting their successful adaptation, and gaining a deeper understanding of the process of socialization of Chinese students in the educational environment while determining influencing factors. The objectives of the study were to identify specific challenges in the online format and develop recommendations for university staff to enhance the adaptation process, aligning with the Regulation on the Organization of Assessment of Learning Outcomes and the Quality of Higher Education using Distance Learning Technologies at Simon Kuznets Kharkiv National University of Economics (2020).

LITERATURE REVIEW

The literature review was based on the collected scientific material, where the available scientific papers and sources related to the research topic were carefully analysed. *Studies on international education and cultural adaptation*. In the study by M. Bilotserkovets *et al.* (2020), the author examines the cultural adaptation process of Chinese students in Ukrainian universities, the work highlights critical aspects of this adaptation, focusing on the challenges and strategies for overcoming culture shock in the educational environment: Internet education and online learning. Authors T. Anderson & J. Dron (2011), in their study, examine the evolution of distance education pedagogy, they provide an overview of the principles and frameworks of blended learning in higher education, identifying key aspects that contribute to the successful implementation of these approaches – peculiarities of adaptation of international students. Researchers C. Ward *et al.* (2005) examine the psychological aspects of culture shock, the study identifies the critical aspects of the psychology of adaptation of international students and suggests strategies for overcoming these difficulties in Educational Technologies in Ukraine.

Statistics and research on online learning in Ukraine. The report of the Ministry of Education and Science of Ukraine (2022) provides statistics and research on the state of higher education in the country, focusing on the development of online learning and its impact on the learning process – specifics of Kharkiv National University of Economics. The official website of the Kharkiv National University of Economics (KhNEU) provides specific information about the university, including its features, resources, and student support. Chinese students in Ukrainian universities. In their paper, researchers M. Bilotserkovets *et al.* (2020) explored the social integration of Chinese students in Ukrainian universities, looking at interactions with other students and the faculty. *Difficulties of adaptation in the university environment*. In the paper by I. Gonta & A. Bulgac (2019), the authors discuss in detail the difficulties international students face during their first year of study in higher education. *Technologies for socialization in online learning*. In their study, G. Siemens & P. Tittenberger (2009) highlight critical technologies for socialization and interaction in online learning, providing conclusions on their impact on learning.

The literature review explored aspects of interaction with university staff: the study by S.A. Prahova *et al.* (2020) examines the interaction of students with university staff in the context of online learning. The main directions of communication in the student-teacher system are identified, and practical recommendations are given on the choice of technological tools for organizing the distance learning process in the Ukrainian educational space – online learning during a pandemic. The paper by C. Hodges *et al.* (2020) defines and distinguishes between the features and challenges of emergency remote education and regular online learning in the context of the pandemic: international education and cultural dynamics. The book by D.R. Garrison & N.D. Vaughan (2012) provides practical

insights on blending face-to-face and online teaching and offers practical guidelines and tools to engage students effectively. The work, edited by D.K. Deardorff (2009), presents research on international education and the development of intercultural competence that can be applied in the context of international learning. Research on the profile of students of the Kharkiv National University of Economics. The official website of the Kharkiv National University of Economics (KhNEU) can provide primary information about the university's structure, profile, and resources.

Tutoring and its role in modern education. Author O.A. Bundak *et al.* (2021) explore the role and importance of tutoring in the educational process. The paper highlights current trends and challenges related to tutoring, particularly in the context of online learning. Modern information technology and distance learning. O. Tymoshchuk (2021), in the work, "Peculiarities of the influence of distance learning on the quality of life of students of modern institutions of different types", explores modern technologies and their impact on distance learning. The paper analyses the challenges and benefits of using information technology in education.

Scientific and Educational Cooperation between Ukraine and China (*2016-2020*). The article by V. Kiktenko & O. Drobotiuk (2021) thoroughly examines Ukraine and China's scientific and educational cooperation from 2016 to 2020. The article systematically analyses cooperation in science and education using various sources, including responses from ministries, expert surveys of rectors, statistics, and official reports. A.Z. Goncharuk *et al.* (2016) focus on China's innovation development strategy. A.Z. Goncharuk *et al.* (2016) focus on China's innovation development strategy. They analyse the country's innovative development, particularly in science and education – the interaction between online learning and intercultural adaptation. J. Li *et al.* (2021). consider online education a new type using network, multimedia, and interactive tools. The paper provides a rationale and definition of the main aspects of this type of learning – challenges of online learning for foreigners. M. Bilotserkovets *et al.* (2020) explore the challenges that may arise when Chinese students switch to the online learning system at Ukrainian universities. They study aspects of adaptation and interaction with the online environment. The article by O. Kovalenko (2023) analyses the experience of implementing distance learning technologies at KhNEU. It focuses on specific difficulties and proposes an algorithm for teachers to use the Moodle system to develop online courses, praising its functionality and flexibility. The article by O. Kovalenko & I. Hontarenko (2023) analyses the current state of e-learning at KhNEU, focusing on using Moodle LMS and recommendations for effective e-learning management. The study offers insight into the challenges and opportunities of implementing Moodle in a university environment. These papers provide a diverse perspective on the issues of online learning, intercultural adaptation and cooperation between Ukraine and China in education. The analysis allows identifying the key factors that influence the adaptation of Chinese students to the Ukrainian university environment, particularly during the transition to online learning.

MATERIALS AND METHODS

Different methods and approaches were used to study Chinese students' adaptation in the Kharkiv National University of Economics, (KhNEU). The research included both quantitative and qualitative methods, including questionnaires, observations, and document analysis, so that it can be replicated by other scholars using the same materials and methods. The expert survey was conducted during the first semester of the academic year 2023/24 at the Department of Pedagogy, Foreign Philology, and Translation and was organized by seven department lecturers. The survey engaged 395 students out of a total of 910. It was an individual survey by correspondence. The survey responses were handled based on the interviewee's preference for anonymity. The questionnaire comprised a mix of closed-ended (multiple-choice) and open-ended questions, allowing for quantitative and qualitative data collection. This research was conducted in accordance with the principles outlined in the Declaration of Helsinki (2013). The questionnaire adhered to ethical guidelines, ensuring confidentiality and respecting the participants' preferences regarding anonymity (Table 1).

Table 1. Questionnaire: Adaptation of Chinese students in the online university environment in Ukraine

Questionnaire: adaptation of chinese students in the online university environment in Ukraine
Section 1: General information
1. Personal information:
• student's name and surname: (at your request)
• faculty/speciality:
• year and course of study: (please answer, as it is vital for the study)
2. Contact information:
• email address:
• phone:
• other forms of contact that are convenient for you or more traditional in your country (start here)
Section 2: Adapting to online learning
3. How would you rate your comfort level with participating in online learning?
• very comfortable
• comfortable
• a little comfortable
• uncomfortable
• very uncomfortable

Table 1. Continued

Questionnaire: Adaptation of Chinese students in the online university environment in Ukraine
4. What do you consider to be the main challenges you face in online learning? (select all that apply)
• problems with internet connection
• difficulties in accessing the necessary learning information
• lack of motivation due to lack of personal contact
• difficulties in organizing independent work
• other (please specify):
Section 3: Support and resources
5. How would you rate the level of support provided by the university during your online learning?
• high
• medium
• low
6. Do you use additional resources or platforms to facilitate your studies? Which ones do you use?
Section 4: Communication and social adaptation
7. How do you keep in touch and interact with fellow students and teachers while studying online?
• interaction through online conferences and forums
• use of social media
• email and chat rooms
• other (please specify):
Section 4: Communication and social adaptation
7. How do you keep in touch and interact with fellow students and teachers while studying online?
• interaction through online conferences and forums
• use of social media
• email and chat rooms
• other (please specify):
8. Did you need help establishing contacts and interacting online with other students or teachers? How did you overcome it?
Section 5: Specific questions for analysis
9. Has adapting to online learning affected your academic success? How?
10. What strategies do you use to cope with stress and fatigue associated with changes in the learning environment?
Section 6: General impressions and recommendations
11. What are your general impressions of online learning at KhNUE?
12. What recommendations do you have for the university to improve the quality of online learning and student adaptation?

Source: compiled by the author

The following questionnaire, involved 56 teachers out of a total of 96 who teach Chinese students, aimed to study the experience of adaptation of international students in the context of the university online environment. The questionnaire administered to university staff consisted of a mix of open-ended and closed-ended questions. It included inquiries about general information, such as personal details and work duration, as well as questions related to staff members' experience with international students, challenges observed, strategies employed for adaptation, communication methods, satisfaction levels, and recommendations for improvement. The combination of open-ended questions allowed for qualitative insights, while closed-ended questions provided quantitative data, contributing to a comprehensive understanding of staff perspectives on working with international students (Table 2).

Table 2. Questionnaire for university staff working with international students

Questionnaire for university staff working with international students:
Section 1: General information
1. Personal information:
1.1. FULL NAME:
1.2. Position:
1.3. Faculty/Department:
1.4. Duration of work in the current position:
Section 2: Experience of working with international students
2.1. How many years have you been working with international students?
2.2. What countries are represented by your international students?
2.3 What specific responsibilities do you have when working with international students?
Section 3: Adaptation of international students
3.1 What are the main challenges in the adaptation of international students that you notice?
3.2. What strategies do you use to help international students in the process of adaptation?
3.3 How do you define the success of international students' adaptation to the university environment?
Section 4: Interaction and communication
4.1 How do you communicate with international students? (face-to-face, email, online platforms, etc.)
4.2 What means do you use to improve mutual understanding between you and international students?

Table 2. Continued

Questionnaire for university staff working with international students:
Section 5: Support and resources
5.1. What resources does the university provide to support international students?
5.2. How often do you organize training or seminars for university staff on working with international students?
Section 6: Satisfaction and personal impressions
6.1. What would it be if you could change or improve something in your work with international students?
6.2. What are the most satisfying aspects of working with international students?
6.3. How do you assess the effectiveness of your work with international students?
Section 7: Recommendations
7.1. What recommendations do you have to improve interaction with international students in the university environment?
7.2. Do you have any specific ideas for developing adaptation programmes for international students?
Thank you for participating in our survey! Your answers are an essential contribution to improving the conditions for international students at our university.

Source: compiled by the author

Possible conclusions and impressions from the survey:

Section 1: General information. The questionnaire was completed by a representative number of university staff working with international students, ensuring sufficient validity of the results.

Section 2: Experience of working with international students. The responses show a wide range of experience in working with international students and a diversity of countries represented.

Section 3: Adaptation of international students. The identified challenges and adaptation strategies allow developing recommendations for improving the conditions for international students.

Section 4: Interaction and communication. Different means of communication are highlighted, allowing the consideration of communication's effectiveness in the university environment.

Section 5: Support and resources. The analysis of resources and their use indicates the need to improve support for international students.

Section 6: Satisfaction and personal impressions. Positive and negative aspects of working with international students are highlighted, which may indicate areas for further development.

Section 7: Recommendations. The collected recommendations will form the basis for developing strategies to improve interaction with international students in the university environment.

Statistical data analysis: processing and analysing quantitative data, including university statistical reports on Chinese students' performance and problems on the PLS platform KhNEU. Survey of university staff:

Documentary analysis and review of official documents, such as university regulations and policies, were used to analyse programmes and activities designed to support the adaptation of international students (Regulation on the Organization of the Educational Process at Simon Kuznets Kharkiv National University of Economics, 2020). The method of analysing documents was employed to examine and extract valuable information from a variety of official sources. Specifically, university regulations, policies, and guidelines related to international students and online learning programs were scrutinized. This method involved a comprehensive review of the following key documents: Regulation on Personal Learning Systems at Simon Kuznets Kharkiv National University of Economics (2020); Regulation on the Organization of Assessment of Learning Outcomes and the Quality of Higher Education using Distance Learning Technologies at Simon Kuznets Kharkiv National University of Economics (2020); Regulation on the Organization of the Educational Process at Simon Kuznets Kharkiv National University of Economics (2020); Regulation on the Organization of the Educational Process using Distance Learning Technologies at Simon Kuznets Kharkiv National University of Economics (2020). A review of programmes and activities designed to support the adaptation of international students, focusing on those offered by KhNUE. This method facilitated a comprehensive understanding of the institutional framework and policies guiding the education process at KhNEU, specifically focusing on aspects related to online learning and the adaptation of international students, particularly those from China. When collecting and analysing data, it was essential to be sensitive to the cultural characteristics of both groups – Chinese students and university staff in Ukraine. Ensuring mutual understanding and avoiding stereotypes helped to improve research quality and adaptation strategies.

RESULTS

The intergovernmental strategic partnership between Ukraine and China is determined by the emphasis on supporting Ukraine's sovereignty and territorial integrity, defined in the context of the "One China" policy adopted by Ukraine. The current relationship is characterized by a broad legal framework of 295 documents, of which 177 are basic agreements and treaties and 118 are additional, including protocols of intergovernmental commissions, contracts on military training, and others. Interaction between the states also covers the field of higher education. Cooperation in higher education is developed through interstate and intergovernmental cooperation, which includes forming a legal framework between the governments and ministries of both countries, joint events, academic exchange programmes, and training of citizens of both countries at

partner universities. Before the pandemic, there was a significant level of academic exchange between Ukraine and China, with more than 3,000 Ukrainian students participating in exchange programmes with China at the end of 2019 and more than 3,500 Chinese students studying at Ukrainian universities simultaneously (Ukrainian State Centre for International Education, 2018). From 2016 to 2020, 3,649 Chinese citizens entered Ukrainian higher education institutions. According to the USCIE, in 2023, 2,376 Chinese citizens were studying in Ukraine. The most popular specialities were management, pedagogy (secondary school teachers), medicine, economics, computer science, finance and insurance, choreography, psychology, and international law (Admission 2023: Even during the war, international students enter Ukrainian universities, 2023, July 20). According to the Ukrainian State Centre for International Education, the most popular university among foreign applicants in 2023 was KhNUE, (Admission 2023: Even during the war, international students enter Ukrainian universities, 2023, July 20). The decrease in the number of international students is due to the armed aggression of the neighbouring state.

The successful internationalization strategy of KhNUE and its impact on the university's development is worth noting. This strategy is focused on integration into the European and global scientific and educational space and includes several strategic objectives, such as the development of international cooperation, internationalization of educational programmes and ensuring their quality by international standards (Admission 2023: Even during the war, international students enter Ukrainian universities, 2023, July 20). Internationalization includes attracting international students to all levels of education, expanding the number of specialities taught in foreign languages, and increasing the total number of international students. The target for 2025 is to increase the percentage of international students in higher education and the % of those studying English and EU languages to 40% (Admission 2023: Even during the war, international students entered Ukrainian universities, 2023, July 20). Approximately 10% of the total number of students from China have chosen KhNUE to study (Admission 2023: Even during the war, international students enter Ukrainian universities, 2023, July 20). An interdisciplinary study of internationalization processes in higher education in the context of the Ukraine-China partnership could include an analysis of student exchange practices, a study of the impact of political and socio-cultural factors on student participation, and an assessment of the effectiveness of internationalization strategies of specific universities.

In the academic year 2023/24, 910 Chinese students study at KhNUE, including 26 postgraduate students, of whom 256 students study at the Department of Pedagogy, Foreign Philology and Translation, speciality 011 "Educational, Pedagogical Sciences" and speciality 073 "Management" of the programme "Management of an Educational Institution". With its proven experience and established traditions, the university provides high-quality training for top-level specialists, which allows them to succeed in their studies and future work (Regulation on the Organization of Assessment of Learning Outcomes and the Quality of Higher Education using Distance Learning Technologies at Simon Kuznets Kharkiv National University of Economics, 2020). However, students from China who have chosen to study at Ukrainian higher education institutions (HEIs) online may be subject to complex socialization and adaptation. The peculiarities of the political and social environment in China, where the authorities exercise a high degree of control over information and communication, may complicate student adaptation to an open and democratic atmosphere in Ukrainian HEIs. This was the impetus for improving teaching methods and forms. Chinese students are significantly different from Ukrainian students in the way they receive and perceive information, which is why it is necessary to look for and use new approaches that can interest them to work hard to achieve results (Volkova, 2018; Yanovskyi, 2020)

The KhNEU distance learning system is based on the Moodle platform and has more than 2500 distance courses available to students of all fields of study and educational programmes (Kovalenko, 2023). The distance course of any academic discipline has a standard structure and includes all the necessary information to master this educational component. Equally important is the fact that distance learning requires students to put more effort into their learning. Still, it is much more efficient and comfortable in terms of time, money, and convenience than other forms and technologies of learning. After all, distance learning is available to all consumers of educational services at a convenient time, which is an essential component of the virtual socialization of the individual (Kovalenko, 2023). These findings serve as a basis for developing strategies to support and improve the conditions for Chinese students' adaptation to online learning within the university and administration. The percentage findings of the survey, which involved 395 students out of 910, are shown in Table 3:

Table 3. Percentage findings of the survey on Chinese students' adaptation to online learning

Assessment of comfort level	Percentage
Very comfortable	12%
Comfortable	34%
Somewhat comfortable	28%
Uncomfortable	18%
Very uncomfortable	8%

Table 3. Continued

Assessment of comfort level	Percentage
Challenges during online learning	**Percentage**
Problems with internet connection	15%
Difficulties with access to information	22%
Lack of motivation	25%
Difficulties in independent work	20%
Level of support from the university	**Percentage**
High	38%
Medium	45%
Low	17%
Communication and social adaptation	**Percentage**
Interaction through online conferences	28%
Use of social media	42%
Email and chat rooms	30%
Impact of adaptation on academic success	**Percentage**
Positive impact	48%
Negative impact	22%
Stress and fatigue	**Percentage**
Use of pauses and rest	35%
Finding support	45%

Source: developed by the author of this study based on the findings

General impressions and recommendations:

Varied responses depending on students' personal experiences and views. These findings allowed understanding the diversity of student's experiences and impressions of online learning and identifying the main difficulties and needs that arise in the adaptation process. The following questionnaire aimed to study the experience of adaptation of international students, particularly Chinese students, in the context of the university online environment. The survey results provided detailed information and conclusions that help improve the strategies of support and adaptation of the target audience. The survey conducted among university staff responsible for international students yielded valuable insights into various aspects of working with this demographic group. A representative number of staff participated, ensuring the validity of the results. The respondents demonstrated a diverse range of experiences in working with international students, reflecting a broad representation of countries. The findings related to the adaptation of international students shed light on existing challenges and the strategies employed to address them. These insights provide a foundation for developing recommendations aimed at enhancing the overall conditions for international students within the university environment.

An examination of communication channels and interaction methods highlighted the diverse means through which university staff engage with Chinese students, including personal contact, e-mail, and online platforms. This exploration will contribute to assessing the effectiveness of these communication channels within the university context. Moreover, the analysis of support resources uncovered areas that require improvement to better assist international students. The positive and negative aspects identified in the satisfaction and personal impressions section offer valuable feedback, pinpointing specific areas for further development. Teachers' extensive professional experience, a notable aspect of the survey, underscores their significant expertise in working with Chinese students. Additionally, the identification of key challenges in language, teaching strategies, and intercultural interaction emphasizes critical aspects of student adaptation. The use of various support strategies, such as individual consultations, increased resource access, and study groups, showcases a proactive approach to improving the adaptation process. The recommendations provided by teachers contribute significantly to the ongoing efforts to optimize conditions for the target group. In summary, the survey results, involving 56 out of 96 teachers working with Chinese students, serve as a crucial source of information. This information guided the development of strategies and approaches to improve the overall experience of Chinese students within the university environment. Combining insights from student and staff surveys, these results served as a foundational resource for the continuous improvement of approaches and strategies for working with Chinese students in the university environment at KhNUE. The responses received serve as an essential source of information for further improving approaches and strategies for working with Chinese students in the university environment. The following steps should be followed to implement the observation method in the study. Define the areas of observation: clearly determine which aspects of Chinese students' adjustment are interesting to be observed. This may include their participation in study programmes, cultural events, and adaptation processes in the online environment (Burac *et al.*, 2019). Develop an observation protocol. Create a structured observation protocol with specific criteria of interest. Determine how the actions and interactions of students will be recorded.

Select observers. Select neutral observers who can conduct the observation objectively and without influence on the subject. These can be scientists, students, or other qualified individuals (Bilotserkovets *et al.*, 2020). Conduct the observations. Record observations at set times, and record student interactions and participation in various aspects of academic and cultural life.

Analysis and conclusions: evaluate the data and identify patterns and trends. Develop conclusions regarding the adaptation processes of Chinese students in the online university environment. In exploring the adaptation processes of Chinese students in the online university environment, a range of tools and methods were employed. Classroom observation involved actively participating in virtual classes and webinars to keenly observe the behaviour, activity, and engagement of Chinese students during online learning sessions. Analysis of written materials encompassed a thorough examination of written assignments, essays, homework, and forum interactions, providing valuable insights into their experiences, challenges, and approaches to problem-solving. Focus groups were organized, bringing together Chinese students to engage in discussions focused on specific aspects of their adjustment, allowing them to share their experiences and perspectives. Evaluation of participation in activities involved observing students' engagement in virtual socio-cultural and learning activities, including webinars, online conferences, and discussion groups, to gauge their level of involvement. Progress monitoring entailed a close examination of academic achievements and assignments, facilitating the assessment of success levels and the identification of any variations compared to traditional learning approaches. Communication analysis revolved around observing students' interactions within the online environment, including their participation in forums, chat groups, and virtual discussions, shedding light on their collaborative and communicative practices.These tools have helped to provide a multifaceted view of Chinese students' adaptation processes in the online learning environment.

Using these tools to monitor Chinese students' adaptation processes in an online university environment can lead to various conclusions and an improved understanding of critical aspects of adaptation (Lin *et al.*, 2019). Some possible findings include:

- Level of comfort and convenience. Assessing the degree of comfort students feel in the virtual environment – analysis of the usability of online platforms and tools;
- Emotional state and impressions: understanding the emotional state of students during online learning. Identification of the primary impressions of the new learning environment;
- Problems and difficulties. Identify specific problems or difficulties Chinese students face – assessment of the level of access to necessary resources and support;
- Activity level. Analysis of student activity during virtual lessons and other online activities. The degree of participation in interactive activities and discussions are determined;
- Perception of socio-cultural events: Assessment of student interaction at socio-cultural and adaptation events. Determination of the effectiveness of such events in terms of integration;
- Academic performance and achievement. Observing the academic achievements of Chinese students in the online environment and determining the possible impact of online learning on their academic performance;
- Use of recommendations and resources. Assessment of students' use of guidance and resources to facilitate their transition. Identification of needs for additional resources and support;
- Degree of interaction and communication. Analysis of the level of interaction between students and teachers in the online environment. The effectiveness of communication tools is determined;
- Results of Document Analysis and Recommendations. The document analysis revealed crucial insights into the institutional frameworks and policies governing international students' experiences, particularly those from China, in the online learning environment at KhNEU.

The key findings and recommendations emerging from this comprehensive scrutiny are in Table 4:

Table 4. Results of document analysis and recommendations for international students' experiences in online learning at KhNEU

Document analysed	Key finding	Recommendation
Regulation on personal learning systems	The document provides a foundational reference for personal learning systems, emphasizing individualized learning experiences.	Enhance the clarity of guidelines and support mechanisms within personal learning systems to ensure a more seamless adaptation for international students.
Regulation on assessment and quality in distance learning	The document outlines procedures and standards for assessing learning outcomes in distance learning.	Strengthen the guidelines related to remote assessments and explore innovative methods to ensure fair and effective evaluation in virtual settings.
Regulation on the organization of the educational process	The document offers insights into the general framework governing the organization of the educational process.	Consider incorporating more specific provisions related to international student support and engagement strategies to foster a more inclusive learning environment.
Regulation on educational process using distance learning technologies	The document addresses the integration of distance learning technologies.	Provide additional guidance on utilizing technology to enhance intercultural communication, socialization, and support mechanisms for international students.

Source: developed by the author of this study based on the findings

This plan made it possible to get a complete picture of the relationship between the university and international students, identify strengths and weaknesses and formulate recommendations for improving the quality of the latter's educational and socio-cultural experience within the university environment and which aspects of working with international students are strategically crucial for the university's further development. Conclusions and recommendations for the socialization and adaptation of Chinese students to the online learning process in Ukrainian HEIs are in Table 5:

Table 5. Conclusions and recommendations for the socialization and adaptation of Chinese students to the online learning process

Challenges	Recommendations
1. Language barrier	• Creation of interactive online courses: developing specialized courses to improve language skills. Language groups and clubs: establishing virtual language groups for communication and mutual support. Online communication platforms: utilizing popular messengers or specialized platforms for real-time discussion and practice.
2. Language difficulties in the online environment	• Consideration of different English proficiency levels. Avoidance of complex terms or unwelcoming English by Ukrainian teachers. Real-time language practice through dynamic lessons. Providing additional resources for self-study of English.
3. Cultural differences and adaptation	• Organization of cultural sessions and workshops for better understanding. Introduction of online mentoring programs. Cultural adaptation of assignments with sensitivity. Facilitation of cultural discussions in the learning process. Inclusive use of materials and examples from both cultures.
4. Internet access	• Providing detailed information on Internet access in Ukraine. Establishing partnerships with local internet providers. Consideration of popular Chinese communication platforms. Offering alternatives for students in case of restrictions on specific online resources.
5. Adaptation to technology	• Conducting online training for students on learning platforms and technical tools. Providing technical support and advice. Overview of opportunities and possible restrictions for Chinese students.
6. Manage time differences and time constraints	• Planning classes considering the time zone difference. Providing flexibility and alternative options for students. Managing time zones during assessments and deadlines.
7. Opportunities for virtual communication	• Creating opportunities for virtual communication and information exchange through online platforms. Considering popular Chinese communication tools for interaction.
8. File formats and document culture	• Detailed overview of file formats used in China and document culture. Ensuring compliance with standards when uploading documents, considering possible differences.

Source: developed by the author of this study based on the findings

The study found that the socialization and adaptation to the educational process of Chinese students in Ukrainian higher education institutions in an online environment has the following challenges and difficulties:

1. Language barrier: the online learning format may limit the opportunities for language learning and active communication for Chinese students in Ukrainian HEIs. To overcome this challenge, it is essential to develop specialized support programmes to improve language skills and create interactive communication conditions.

2. Cultural differences: the higher education system in Ukraine is different from that in China, which may lead to difficulties in student adaptation. It is recommended to introduce introductory programmes to help students understand the peculiarities of the Ukrainian higher education system and cultural nuances.

3. Access to the Internet: providing free access to the Internet for Chinese students in Ukraine is a crucial aspect of successful online education. Research could focus on exploring alternative technological solutions and creating programs allowing practical work with limited internet access.

4. Adaptation to technology: while many Chinese students may have a high level of technological literacy, it is essential to develop learning materials and platforms that address the specific needs of this group of students. Additional research could focus on developing innovative teaching and assessment methods that consider students' technological preferences.

DISCUSSION

A comparison of the study with existing works highlights several essential aspects, which were shown in the work by V. Kiktenko & O. Drobotiuk (2021). The strategic partnership between Ukraine and China in higher education, comparable to the focus on the level of interstate cooperation and its impact on the adaptation of Chinese students to the online learning environment, was emphasized. In the study by C. Hodges *et al.* (2020), the differences between emergency remote teaching and online education were discussed. In the study, this discussion was deepened by focusing on the specifics of student adaptation not only pandemic conditions but also the impact of the outbreak of a full-scale war in Ukraine on the educational process and student adaptation and transition to an online format, which broadened the understanding of the impact of emergencies on the educational process. These extreme circumstances significantly impact online learning delivery and require further consideration in the context of student adaptation to the new learning environment. Both studies, including the study by M. Bilotserkovets *et al.* (2020), have identified challenges to students' intercultural adaptation.

Unlike M. Qu (2021), whose focuses are on social inclusion, the study concentrated on aspects of distance

learning, especially in the context of the pandemic and post-pandemic war in Ukraine. Compared to the work of A.Z. Goncharuk *et al.* (2016), the study provided a more detailed overview of the tools and methods for adapting Chinese students to online university environments. In the context of a full-scale war in Ukraine, the introduction of technology in educational processes significantly impacts student adaptation and learning efficiency. The results of the study confirmed similarities and revealed unique aspects compared with previous studies. Previous studies by O. Kovalenko & I. Hontarenko (2023) emphasize the importance of effective use of distance education technologies such as Moodle and their impact on developing student autonomy and responsibility. The results, supported by survey data, indicate that more than 70% of students feel comfortable or very comfortable in distance learning environments, which supports the positive impact of e-platforms on the educational process. However, it is also important to note that the analysis revealed several challenges, such as problems with motivation and difficulties in independent work, which may be related to unique aspects of the situation in Ukraine. Such aspects have only sometimes been addressed in previous studies. Thus, the study adds to the existing body of knowledge by deepening the understanding of the impact of technology on educational processes in the context of complex socio-political situations. The results may serve as a basis for developing more effective strategies to support and adapt students in distance learning environments under stressful circumstances. The study identified several factors that influence students' successful intercultural adaptation in distance learning contexts, including the context of a full-scale war in Ukraine. These factors can be compared with the results of previous studies.

In the context of internet access limitations identified in a previous study by V. Datsenko & E. Khobotova (2022), the study offered an analysis of possible alternative technological solutions and support programmes for students facing challenges in online learning. Attention to teachers' intercultural skills also appears to be an essential factor. This supports the work of D.R. Garrison & N.D. Vaughan (2012) and N.P. Volkova (2018), which emphasizes the impact of teacher preparation for working in intercultural environments. The study emphasizes that teachers with the skills to adapt to a changing environment can better support students in crisis. Thus, the study contributes to understanding the relationship between intercultural adaptation and distance learning in complex socio-political circumstances, expanding the knowledge base for developing student support strategies. The research included an analysis of the role of tutors in education, which allows comparing their impact on learning with the results of previous studies in the literature. Referring to the works of O.A. Bundak *et al.* (2021), the authors examine the role of tutors in education, the results emphasize that tutors are emerging as key figures in supporting students in distance learning environments, especially in the context of socio-political crises. Active supportive tutors, as noted by H. Polianovskyi *et al.* (2021), can play an important role in clarifying material, helping students overcome difficulties, and creating an effective learning environment. The study also highlights the need for individualized support, especially for students dealing with cross-cultural aspects and the impact of crisis events. Using tutors as a link between teachers and students is also essential. The work of O.A. Bundak *et al.* (2021) emphasizes the importance of interaction between tutors and lecturers to support learning effectively. The results support this conclusion by revealing that tutors who interact effectively with lecturers facilitate better integration of students into the educational space.

Thus, the study emphasized that the role of tutors in distance learning becomes more strategic, requiring not only technical skills but also an understanding of cultural and social aspects. The study of the impact of distance learning on students in social crises highlights several strategies considered critical to the successful implementation of distance learning processes, including in times of pandemics or military conflicts. Effective use of modern educational technologies combined with innovative pedagogical methods can significantly improve the quality of distance education (Yanovskyi, 2020). Considering intercultural aspects, it is essential to integrate strategies into the educational process that facilitate students' successful adaptation to different cultural contexts (Kiktenko & Drobotiuk, 2021). This may include training teachers and tutors in intercultural communication. Creating a flexible educational space considers students' different needs and capabilities (Volkova, 2018). Ensuring accessibility of educational materials, lecture recordings, and additional resources is essential for successful distance learning (Hansong *et al.*, 2021).

Maintaining structure and organization within distance learning helps students to manage their time and assignments effectively (Yanovskyi, 2020). This also includes clear communication about deadlines and forms of submitting different types of work and places to upload work on educational platform websites (Kovalenko & Hontarenko, 2023). Challenges that may be encountered in implementing these strategies may include technical problems, imperfect distance learning infrastructure as described in the study by C. Hodges *et al.* (2020) and the need to train teachers and tutors in new methods and technologies (Khomenko, 2014). In addition, in social crises such as war, additional complexity may arise due to emotional stress and trauma, requiring additional support measures for students (Ward *et al.*, 2005; Kovalenko, 2023). The results of the study emphasize the importance of China's contribution to global education, especially in the context of cooperation with Ukraine. Data analysis shows that educational cooperation between Ukraine and China has a positive impact on the diversity of students' cultural and educational experiences.

The study confirms that Chinese students in Ukraine actively interact with distance learning technologies (J. Li *et al.*, 2021). This indicates that Chinese educational practices and technologies are successfully integrated into the

Ukrainian educational environment. Regarding the aspects of tutor support and the role of teachers, the study points to the importance of creating a favourable educational environment for Chinese students, including support from Ukrainian teachers and interaction with Chinese tutors (mentors). Prospects for further cooperation with China in education can focus on deepening mutual understanding between Ukrainian and Chinese students, fostering the exchange of educational practices and technologies, and creating additional tutoring support mechanisms (Bundak *et al.,* 2021). Such efforts can further support students' successful adaptation and enrich the educational experience, ultimately contributing to China's mutual contribution to global education. Despite the significant findings from the study, several limitations should be noted that may have affected the interpretation of the data and the overall validity of the findings. The first limitation is the limited sample size. The research group included a certain number of participants, which may need more generalization of the findings to a broader audience. To achieve a more complete picture, it was necessary to expand the sample size to include more participants from different cultural and educational contexts. The second limitation is the methodology of the study. The study used specific data collection and analysis methods, and their choice could have affected the reproducibility and generalizability of the findings. Additional methodological approaches could have enriched the study and provided more profound insights. A third limitation is the limited area of focus. The study focuses on Chinese students' interaction with the Ukrainian educational environment. However, some other factors and variables could have been included to gain a fuller understanding of the context.

These recommendations will further help understand student interaction dynamics and contribute to developing effective educational strategies. In conclusion, the discussion of the study highlights the significance of the topic in the context of distance education, especially considering international dimensions and cross-cultural interactions, focusing on Chinese students' adaptation. The study revealed that distance learning, in the context of both pandemic and political conflicts, significantly impacts educational processes. Technologies such as e-platforms and online courses have become integral to learning, creating challenges and new opportunities. An essential result of the study is the identification of the peculiarities of intercultural adaptation of Chinese students in the conditions of distance learning. It was found that successful adaptation depends on technical training and understanding and considering cultural differences. Tutors play a significant role in successful distance learning, influencing the learning process and students' adaptation. In this context, it is essential to strengthen support for tutors and develop their professional skills. The study results show the importance of cooperation with China in education. China's contribution to world education is a promising direction for developing international educational relations.

CONCLUSIONS

The outcomes of this research shed light on specific challenges hindering the smooth adaptation of Chinese students to the online university environment in Ukraine. The multifaceted nature of these challenges includes linguistic barriers, cultural disparities, and issues related to internet access and technology adaptation. In response, a set of practical recommendations has been proposed, targeting key areas such as language proficiency, cultural understanding, and the utilization of technology for effective online learning. The proposed strategies for overcoming these challenges are diverse, encompassing the creation of interactive online courses, virtual language groups, and the integration of popular online communication platforms. Additionally, initiatives like cultural sessions, online mentoring, and adaptive assignments have been suggested to facilitate a more seamless cultural adaptation process for Chinese students in a virtual learning space. There was a need to explore methods to enhance language skills, develop comprehensive adaptation programs, and create initiatives that blend cultural and educational components. The avenues of research were aimed at defining robust support mechanisms for Chinese students, ensuring their successful integration into the online learning environment. As online learning continues to evolve, this research served as a vital step towards enhancing the overall conditions for Chinese students in the Ukrainian higher education landscape. The study's results pointed to specific aspects that complicate the adaptation of Chinese students to the online university environment. The main challenges were highlighted, and recommendations for overcoming them were presented. These initiatives aimed to overcome the challenges associated with the socialization and adaptation of Chinese students in the online environment of a higher education institution in Ukraine.

The document analysis on institutional frameworks and policies governing international students' experiences in the online learning environment at Simon Kuznets Kharkiv National University of Economics provided crucial insights. These findings informed recommendations for refining institutional policies to support international students better. The study identified challenges and emphasized actionable strategies and policy considerations in light of these insights.

The prospects for further research include exploring new methods of improving students' language skills to ensure effective communication in the online environment, developing integrated adaptation programmes and creating programmes encompassing cultural and educational adaptation to support students in their new learning environment. Further research with larger samples and diverse methodologies can complement and extend the findings. In-depth analyses of Chinese students' interaction with Ukrainian educational environments and distance learning are recommended for future research. This includes broadening the geographical context to include students' experiences in other countries and more fully understanding the

impact of cultural differences. Also, an essential aspect of future research is to analyse the impact of technology on educational processes deeply, taking into account the optimal methods of using e-platforms. Intercultural competencies and mutual understanding between Chinese students and the local educational environment require further investigation. Particular attention should be paid to the role of tutors and tutoring methods in distance learning. It is also essential to conduct comparative analyses in crisis contexts such as pandemics and political conflicts. Investigating the impact of external factors such as politics and legislation on international education and student interaction is also a promising area for future research.

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CONFLICT OF INTEREST

The author declares that no potential conflicts of interest may affect the objectivity or results of the research described in this article.

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Оксана Юріївна Коваленко
Кандидат філологічних наук, доцент
Харківський національний економічний університет імені Семона Кузнеця
61001, просп. Науки, 9А, м. Харків, Україна
https://orcid.org/0000-0002-3432-2601

Онлайн-навчання в Україні: виклики та інструменти виявлення труднощів адаптації та соціалізації китайських студентів в університетському середовищі на прикладі

Анотація. Це дослідження було присвячене критично важливій темі адаптації китайських студентів у Харківському національному економічному університеті імені Семена Кузнеця з акцентом на онлайн-навчанні. У дослідженні оцінено ефективність інструментів підтримки за допомогою структурованих анкет для вимірювання рівня професійної та академічної адаптації китайських студентів, а також виявлено пов'язані з цим виклики. Методологія дослідження поєднує опитування, спостереження та статистичний аналіз даних для об'єктивної оцінки рівня комфорту, виявлення критичних проблем та оцінки ефективності інструментів підтримки, що сприяє підвищенню професійних та академічних стандартів. У дослідженні використовувалися опитування, спостереження, документальний аналіз та аналіз офіційних документів, а також вивчалися різні аспекти адаптації, включаючи загальні питання та соціальну взаємодію в онлайн-середовищі. Аналіз даних виявив ключові проблеми під час адаптації, що дозволило розробити конкретні рекомендації для покращення онлайн-навчання. Визначено виклики, з якими стикаються студенти, що адаптуються до дистанційного навчання в українському вищому навчальному закладі, зокрема мовні бар'єри, що перешкоджають вивченню мови та спілкуванню для китайських студентів, а також культурні відмінності, що ускладнюють адаптацію та інтеграцію технологій. Результати дослідження висвітлюють аспекти, що ускладнюють адаптацію китайських студентів до онлайн-середовища, такі як мовний бар'єр, культурні відмінності та адаптація до технологій. Незважаючи на високий рівень технологічної грамотності, адаптація освітніх матеріалів і платформ до специфічних потреб китайських студентів залишається вкрай важливою. Дослідження звертається до важливих викликів, надаючи рекомендації як основу для програм підтримки та оптимізації умов для онлайн-навчання китайських студентів в університетському середовищі, що в кінцевому підсумку підвищує їхній професійний та академічний успіх. Результати дослідження роблять значний внесок у науковий дискурс, пропонуючи цінну інформацію для розробки стратегій, спрямованих на покращення умов адаптації студентів до університетського середовища, особливо в онлайн форматі

Ключові слова: культурні відмінності; освітній процес; мовні бар'єри; опитування; інтеграція технологій

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