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НАУКОВИЙ ВІСНИК МУКАЧІВСЬКОГО ДЕРЖАВНОГО УНІВЕРСИТЕТУ

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Gamification in maritime English language assessment in the context of STEM education

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Abstract. Maritime English is one of the key tools in STEM (Science, Technology, Engineering, Mathematics) education of future ship engineers, as it provides access to technical literature and professional communication. The article's goal was to find the ways to use gamification in Maritime English assessment. The research methodology was based on a combination of theoretical analysis of scientific works in the field of pedagogy and linguistic didactics, the study of international standards (in particular, STCW), as well as experimental verification of the effectiveness of implementing gamification in the process of formative assessment. The methods of pedagogical observation, questionnaires and analysis of the results of students' educational activities were used. It was found that gamification, defined as the use of game mechanics in a non-game educational context, contributes to increasing motivation, activating cognitive activity and developing interdisciplinary competencies. Its integration into the assessment of maritime English allows you to simulate professional situations – communication in emergency conditions, preparation of technical reports, and interaction in an international crew. Such tasks develop not only linguistic, but also socio-communicative and cognitive skills important for the profession. The results of the study showed that gamification can transform traditional assessment and make it more flexible, student-centred and responsive to the requirements of the modern maritime industry. The practical significance of the research results lies in the possibility of their use in the maritime education system: in the training courses "English for Professional Purposes" in maritime academies and colleges, during the training and retraining of fleet engineering personnel, as well as in corporate training programmes for shipping companies

Keywords: maritime establishments; personalised space; digital surroundings; LMS MOODLE; e-learning; ship engineers

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INTRODUCTION

To obtain quality maritime education and training (MET), English is essential for all future seafarers. Namely, ship engineers need maritime English to communicate with engine room crew, read manuals, fill in necessary documents (e.g., log books, record books, various checklists), and others. English is also essential to implement best practices in the marine industry. Communication and access to global opportunities to master – English allow STEM (Science, Technology, Engineering, Mathematics) students to participate in international conferences, exchange ideas, and work on joint projects. The ability to communicate in maritime English opens the door to global educational resources for seafarers, such as online courses, scientific databases, and learning platforms. This improves the learning process and contributes to developing skills necessary for a successful career in a highly competitive environment.

Different scientists studied the issue of STEM education for future seafarers. Indonesian educators O. Wahyuni & M. Iing (2021) implemented the STEM for the Sea Project in their research, which significantly improved the performance preparing them more effectively for shipboard training. The following key findings were approved by the researchers mentioned above: the STEM for the Sea Project can improve cadets' performance; STEM project-based learning approach can lead cadets to better performance while maritime education and training. Similarly, M.B. Simanjuntak (2024) explored the integration of ethnomathematics and design research into STEM curricula within maritime educational institutions, emphasising the role of contextualised mathematics in enhancing cadets' skills. The problem-solving skills were enhanced by the following methods: linking mathematical principles to the cadets' cultural background and professional environment; showing the practical application in the maritime field.

Maritime robotics as part of STEM programmes at high school level was studied by L. McCue *et al.* (2022; 2023). Their works demonstrated how robotics can foster early interest in maritime technologies and stimulate teamwork, engineering design, and computational thinking among students. They also have developed a successful STEM outreach programme for high school students (grades 9-12) that introduces biologically inspired underwater robotics using lighter-than-air vehicles. The issue of STEM for developing energy literacy in maritime vocational education was examined by D. Wang (2023), who argued that sustainable development goals in shipping cannot be achieved without STEM-based training in energy awareness and environmental responsibility. Engineering cadets' energy literacy was object of his research and he managed to find out the ways how STEM-based instructions can help to develop it.

Other scholars also contributed to this field. W. Walker *et al.* (2025) stressed the broader theoretical foundations of STEM, highlighting its interdisciplinary nature. He has also shared some effective STEM strategies, curricula, and resources to engage students (e.g. lessons that integrate multiple STEM disciplines). M. Chu (2025) pointed to the significance of teamwork, technology, and engineering design methods in maritime-related STEM problem-solving. The scientist was using tech (AI, VR/AR, robotics, IoT, etc.) to solve domain-specific STEM challenges. X. Fazio (2024) suggested that the context-dependent prominence of each STEM discipline can be particularly useful in maritime settings, where engineering and technology often dominate in real-world contexts. His main idea was to use curriculum to promote STEM literacy for decision-making. Recent studies by R. González Vallejo (2024) further emphasised the importance of integrating advanced technologies such as simulations, AR and gamification into maritime education to improve learning outcomes and career readiness. Gamification in complex with AR will definitely promote cooperation, critical thinking, motivation, and meaningful learning. The results of his study included the following: increased creativity, autonomy, digital skills. But the author has also mentioned some drawbacks: risk of overemphasis on numerical assessment vs. actual learning. The last one has created scepticism in some higher education contexts. The purpose of the article was to summarise the ways gamification is used in Maritime English assessment in connection with STEM education.

MATERIALS AND METHODS

The research was conducted using a combination of theoretical and empirical methods in order to explore the potential of gamification as a tool for maritime English language assessment in the context of STEM education. The choice of methods was determined by the interdisciplinary nature of the study, which required both analysis of pedagogical frameworks and examination of practical applications within Maritime Education and Training (MET). The study adopted a quasi-experimental design, integrating gamified elements into formative assessment tasks for cadets of marine engineering programmes. The study sample consisted of 130 second-year cadets (66 cadets in experimental group and 64 cadets in control group) majoring in "Operation of Ship Power Plants". It included applicants from two educational institutions: the Maritime Applied College (MPK) and the Kherson State Maritime Academy (KSMA). The main selection criteria were: second-year study, completion of the English for Special Purposes course (marine engineering), willingness to participate in the experiment, and an appropriate level of English proficiency. The age ranged from 18 to 20 years. The initial level of English proficiency was determined by the results of diagnostic testing and corresponded to levels A2-B1 according to the CEFR. The participants were randomly assigned to groups, and prior to the start of the experiment, there were no significant differences between the groups in terms of their initial level of knowledge, skills, or motivation.

The questionnaire and experimental work were conducted during the 2023-2024 academic year. To create tasks used in future professions, two courses described in

the research: English for Special Purposes at KSMA and Introduction to Maritime English at Lithuanian Maritime Academy (LMA). The experimental group studied according to a modified programme that included the integration of English with professional disciplines, the use of gamification, digital tools (interactive platforms, online tests, virtual simulators) and elements of blended learning. Particular attention was paid to the formation of evaluative competence by introducing parity formative assessment, self-assessment and peer assessment in professionally orientated tasks. The control group worked according to the traditional methodology of teaching English in a professional direction, which was based on lectures and practical classes using printed materials and standard forms of knowledge control (oral survey, written tests, final papers). It did not systematically use interactive technologies, gamified elements or innovative assessment methods. Thus, the key difference was the use of modern pedagogical factors and assessment tools in the experimental group, which allowed to test their impact on the motivation and level of formation of the cadets' English-language professional competence. The data collection tools were complex and combined tests, questionnaires, and pedagogical observations. Pre- and post-testing were used to determine the level of knowledge. The first allowed for assessing the initial level of English proficiency and motivation of the cadets, while the second measured changes after completing gamified tasks (Fig. 1).

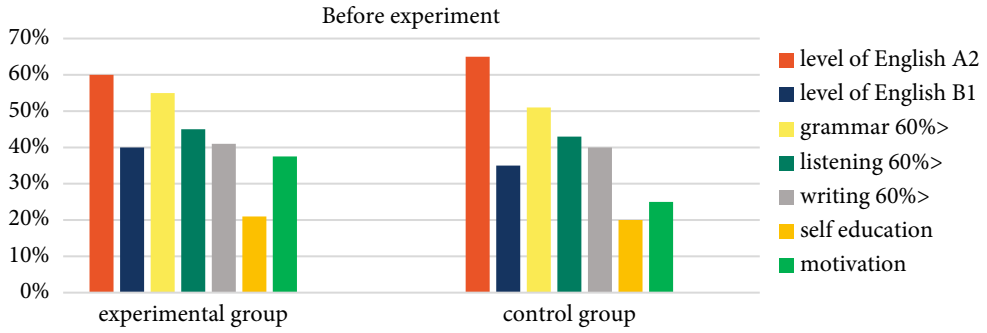

Figure 1. Data before experiment in two groups

Source: developed by the authors

Test tasks included listening to professional dialogues, working with English technical documentation and writing responses to simulated production situations. The questionnaire contained both closed and open questions. Examples are: "Rate on a scale of 1 to 5 how much the game tasks increased your motivation" and "What elements of gamification do you consider the most effective?". Observation protocols were used to record behavioural aspects, taking into account the level of involvement, initiative and ability to perform role-playing tasks in English. Statistical data processing employed both descriptive and inferential methods. For quantitative indicators, mean values and percentage distributions were calculated, enabling the analysis of dynamics in motivation and test performance. To verify the reliability of observed differences, a t-test was applied with a significance threshold set at $p < 0.05$. In parallel, qualitative data collected through open-ended questionnaires and observation protocols were examined using thematic analysis. This approach made it possible to capture the cadets' subjective evaluations and to reveal emerging trends regarding the effectiveness of the applied methods. All procedure carried out in the study adhered to established ethical standards and respected the honour and dignity of all participants. The psychological characteristics of the students, including their age, were duly taken into account. Throughout the experiment, participants' rights were fully safeguarded, and anonymity was maintained in accordance with ethical guidelines for pedagogical research issued by leading professional bodies, such as the American Educational Research Association (2011) and the British Educational Research Association (2018).

RESULTS

STEM education (Science, Technology, Engineering, Mathematics) involves mastering complex technical knowledge, which is often presented in English. Most textbooks, scientific articles, technical documentation, and research materials are written in this language, which makes it an important tool for obtaining a quality education. The same thing is concerning MET. English is the language of international science, allowing students to read modern sources, analyse innovative research communicate, and implement best practices in the marine industry. Communication and access to global opportunities to master English allow STEM students to participate in international conferences, exchange ideas, and work on joint projects. The ability to communicate in English opens the door to global educational resources, such as online courses, scientific databases, and learning platforms. This not only improves the learning process but also contributes to the development of skills necessary for a successful career in a highly competitive environment. English is a key tool in STEM education, as it provides access to technical terminology, which is a common language for scientists and professionals around the world. Learning English allows students to better understand engineering, mathematics,

science and technology concepts, using international textbooks, articles and standards. Teaching English to STEM students faces a few specific challenges. The main problem is the integration of technical terminology into the learning process, as traditional textbooks often do not cover the highly specialised vocabulary required for ship engineering or maritime disciplines. Also, students focused on technical subjects often show less interest in learning the language, which requires the development of motivational techniques and interactive tools. Another challenge is the need to develop interdisciplinary skills, where Maritime English serves as a means of communication for solving complex technical tasks. Assessing English knowledge of STEM students also has its own characteristics. Conventional testing methods do not always allow for an adequate assessment of language proficiency in professional situations (bunkering, replacing pump parts, firefighting, etc). It is important to create tasks that simulate real maritime language, but this requires additional resources and time. In addition, there is the problem of adapting international assessment standards to local curricula, which makes it difficult to compare results at the global level.

Gamification, i.e., the use of game design elements in the educational process, is a tool for engaging students in active learning. It helps create a motivating environment where students feel more interested and satisfied with completing tasks. Thanks to interactive activities, such as competitions, points, achievements, or levels, students are involved in the learning process in a natural way, perceiving it as a game. This is especially effective in teaching technical disciplines, where students often encounter complex concepts and need additional motivation. Gamification helps improve the assimilation of material by actively involving students in solving practical tasks and simulating real-life situations. Game elements allow teachers to create conditions for the gradual development of skills, giving students the opportunity to independently evaluate their achievements and correct their own progress. This approach also stimulates teamwork, critical thinking and adaptation to new challenges, which makes the educational process more effective and focused on real professional needs (Boeru, 2023). Gamification is the introduction of game elements and mechanics into non-game contexts, particularly in education, to increase engagement and motivation (Leon & Peña, 2022). The main elements of gamification are: points (the accrual of points for completing tasks, which stimulates the achievement of set goals); levels (gradual progress with the discovery of new stages or opportunities that reflect the growth of competence); competition (a spirit of rivalry among students or groups, which promotes increased activity); rewards (encouragement in the form of certificates, medals or other symbols of achievement); feedback (immediate feedback on successes or mistakes, which helps to learn faster and correct mistakes). The goal of gamification in the educational process is to increase student motivation for active participation, create an interesting and dynamic environment for the acquisition of knowledge and skills. In the context of assessment, gamification allows you to reduce the stress associated with traditional forms of testing and stimulates students to improve their results through an interactive approach. It also promotes the development of self-reflection, critical thinking, and collaboration skills that are essential in professional activities. As for the advantages of gamification in the educational process, it can be noted that it increases motivation, develops critical thinking and collaboration skills, and focuses attention on achieving specific goals.

Assessment in STEM education has its own unique features that distinguish it from other disciplines. One of the key aspects is the emphasis on professional terminology since the possession of specialised vocabulary is important for understanding technical concepts and effective communication in a professional environment. Assessment tasks often include work with real cases, technical texts, or simulations, which allows students to test their ability to apply terminology in the context of real-life situations. STEM education is focused on solving practical tasks that require the integration of knowledge from several disciplines. It should equip ship engineers with knowledge of the main parts of a two-stroke engine and knowledge of its operational process step by step. Additionally, they should be familiar with the schematics of all diesel engines, including the start and stop points. Assessment should consider not only the correctness of the answer but also the student's ability to apply theoretical knowledge in practice, solve problems, work in a team, and use innovative approaches. Such an interdisciplinary approach requires the creation of tasks that cover several fields of knowledge, for example, combining physics, mathematics and engineering, and also stimulate the development of analytical thinking and creativity. Using Interactive platforms such as Quizizz (Degirmenci, 2021), Kahoot! (Kohnke & Moorhouse, 2022) and Duolingo (Shortt *et al.*, 2023) for Schools are effective tools for creating tests that not only assess knowledge but also make the learning process more interesting. Such platforms allow teachers to organise assessments in a game format, involving students in completing tasks in real time. This makes it possible to quickly receive feedback and adapt the learning process depending on the results. In addition, these tools allow to store statistics of results and assess student progress, which makes the process more structured and focused on achieving specific learning goals.

Interactive learning can include STEM quests which allow students to complete a series of tasks related to different stages of a STEM project (from research to testing). Each stage will be performed in English, which allows participants to simultaneously develop skills in using professional maritime vocabulary. A team competition for solving technical cases can be structured as a group task, where teams must use specialised terminology to analyse and solve practical problems. This format allows students to test both their English language skills and ability to work together and apply professional knowledge. A STEM game, where success depends on correct communication in

English, allows to create a learning environment in which students must actively use language to achieve goals. This can be a game in which students have to solve problems or participate in scientific debates. The use of role-playing games in learning allows one them to assess the level of knowledge and skills of students in real or simulated professional situations. For example, a simulation of a conference where students have to present their research in English, or a scientific council where they discuss new technical solutions, allows to assess their ability to communicate effectively and use professional terminology. Such scenarios help students feel part of a professional community and allow them to develop skills important for their future careers. Thereby, the experience of two maritime higher education institutions, Kherson State Maritime Academy (KSMA), Ukraine, and Lithuanian Maritime Academy (LMA), Lithuania, were studied. Both institutions use LMS MOODLE as a platform to collect all necessary materials for all courses. Figure 2 represents part of a course that reflects real Standard Marine Communication phrases needed on the ship to communicate with other crewmembers, shore, port state, etc.

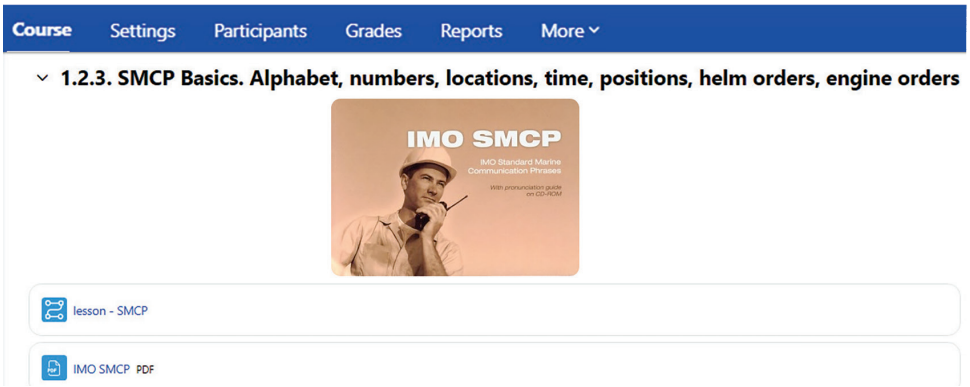

Figure 2. Introduction to Maritime English course
Source: IMO SMCP materials added on LMS MOODLE of LMA (Kudriavtseva & Shvetsova, 2019)

Gamification encourages students to actively participate in the learning process, turning tasks and assessments into interesting and dynamic activities. The use of game elements, such as competitions and points, motivates students to actively interact with the learning material, which improves their involvement and responsibility. KSMA is a temporarily relocated higher education institution in Ukraine. It was relocated to Odesa from Kherson due to martial law. Nowadays educational process is conducted in remote mode. LMS MOODLE, Zoom, corporate mail, repository and other digital tools have become efficient while e-learning. Foreign partners have opened many online resources for KSMA for free (e.g., Ocean Learning Platform (n.d.), a library of the University of Plymouth (n.d.), English4Ukraine). LMS MOODLE provides various gamification elements to be used by teachers in their courses (Kononova & Yurzhenko, 2021). Maritime English teachers use digital badges to encourage cadets to achieve progress. Figure 3 represents MOODLE settings on the list of badges: their names, badge status (available/unavailable), criteria to achieve a badge, number of cadets who have already achieved badges, actions (disable access, edit, copy, delete).

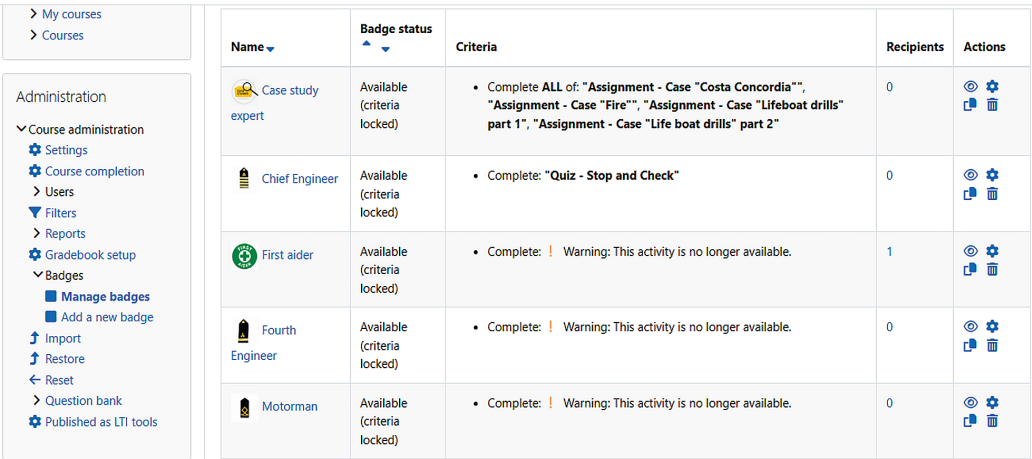

Figure 3. KSMA MOODLE badges (English for special purposes course)
Source: LMS MOODLE of KSMA

The first badge is called Case Study Expert and is given in case the cadet has done three assignments which represent authentical texts with the following news: Costa Concordia disaster, Fire on Maersk container carrier, and Lifeboat drills. All texts are followed with a list of questions (e.g. What was done wrong in the situation described; What had to be done to change the result of a situation; Whose actions were inappropriate). All texts represent real cases and help future ship engineers know what to do in their future profession (Saleem *et al.*, 2022). The other gamification elements used on MOODLE while English for special purposes are the following: levels and missions, maps, Easter eggs, etc. Thanks to gamification, assessment becomes less stressful and more exciting for students. Game mechanics make the assessment process interactive and help to change the perception of tests as a routine and stressful activity to an exciting game in which new results can be achieved. Another example of gamification assessment is leaderboards which can be created on LMS MOODLE (Yurzhenko *et al.*, 2022). LMA activities to receive a credit contain the following: Presentation of self-study practice, tests and exercises. To collect cadets' presentations on the LMS MOODLE assignment activity module was added to the "Introduction to Maritime English" course (Leon & Peña, 2022). It contained complete activity instructions, an additional file with a PowerPoint presentation template, availability dates (soft and hard deadliness), maximum grade, and two feedback types (comments and files). In such a way, using the Assignment cadet uploaded his presentation and had a chance to receive the teacher's comments and correct mistakes until the soft deadline before the online defence using Google Meet (hard deadline). All MOODLE activities with grades can be added as leaderboards using blocks (items added to the side inside the block drawer of MOODLE course). The example of leader boards (Upload presentation activity) can be seen in Figure 4.

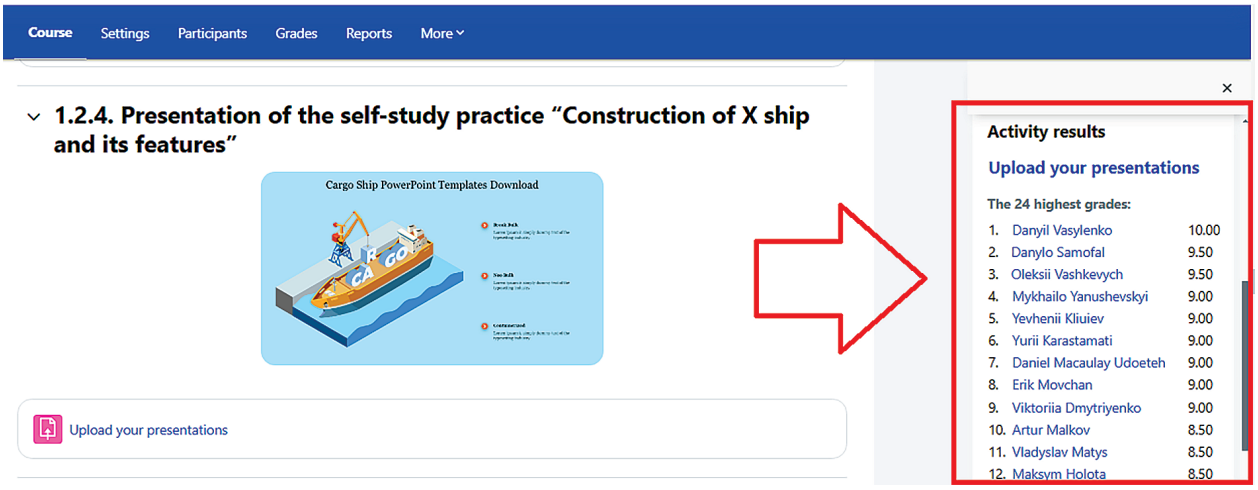

Figure 4. LMA's example of leader board

Source: LMS MOODLE of LMA

The findings of this study confirm that the integration of gamification into Maritime English language assessment contributes significantly to higher levels of motivation, engagement, and improved performance among cadets. Compared with traditional assessment formats, cadets demonstrated greater willingness to participate in tasks, more active collaboration during team-based exercises, and stronger retention of technical vocabulary (Fig. 5).

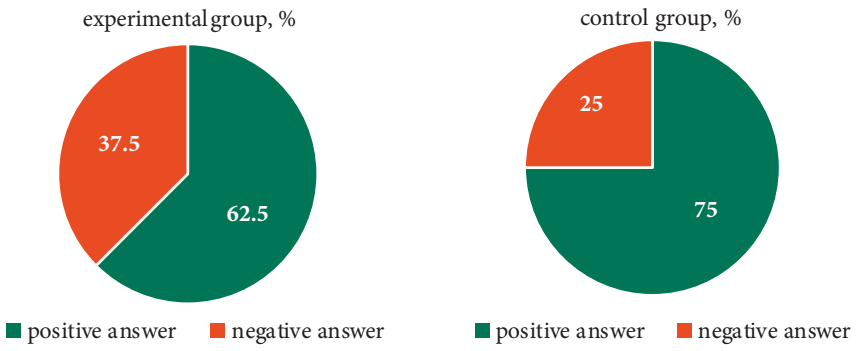

Figure 5. Survey result

Source: developed by the authors

These results show that gamification is not only a way to diversify learning, but also a tool that strengthens the link between language acquisition and professional training in maritime contexts. One of the most important contributions of gamification is the stimulation of creativity in problem-solving. Traditional assessment methods often limit students to following standard instructions or reproducing fixed answers. Such an approach does not always encourage flexibility or adaptability. By contrast, gamified assessment tasks challenge cadets to explore alternative solutions, test different options, and find original approaches to professional problems. This type of thinking is crucial in maritime practice, where unexpected situations frequently occur and require quick, inventive responses. Through simulation-based games and scenario tasks, cadets learn to approach technical and communicative challenges in a flexible and confident way.

Gamification also supports the growth of autonomy in learning. In a gamified environment, cadets have opportunities to choose their own paths, strategies, and learning speeds. This independence reflects the professional reality on board a ship, where engineers are often responsible for making operational decisions and solving problems without constant external guidance. The ability to monitor personal progress through levels, points, or achievements fosters a sense of ownership and responsibility. As a result, cadets not only complete tasks but also learn how to manage their own learning process, which is an essential skill for lifelong professional development. Another valuable effect is the creation of sustainable motivation. Maintaining interest in language learning is often a challenge, especially when technical training competes for students' time and attention. Gamification provides visible rewards, clear feedback, and opportunities for healthy competition, which sustain enthusiasm even during intensive study periods. Awards, leaderboards, and progress charts give cadets a tangible sense of achievement and recognition. This helps to maintain engagement across the semester and supports long-term commitment to improving English for professional purposes. The survey results further confirm this tendency (Table 1).

Table 1. Comparative table of results

Indicators	Experimental group, %		Control group, %	
	Before	After	Before	After
A2 level	60	35	65	55
B1 level	40	65	35	45
Grammar	55	88	51	52
Listening	45	90	42	55
Writing	41	89	40	50
Self-education	21	77	21	22
Motivation	37,5	78	25	32

Source: developed by the authors

In response to the question about motivation to learn English, 37.5% of the participants in the experimental group gave a positive answer, whereas only 25% of the control group responded in the same way. However, after the experiment the level of motivation to learn English increased significantly: 78% of the cadets in the experimental group reported high motivation, compared to only 32% in the control group. Before the experiment, both groups had similar results. The level of English remained mostly at the A2 level (60-65%), some of the cadets reached B1 (35-40%). The indicators of grammar, listening and writing fluctuated within 40-55%. Motivation and independent learning were at a low level (about 20%). As can be seen from the Table 1, after the experiment, the results of the experimental group increased in almost all categories. The B1 level rose to 65%, while the A2 level decreased to 35%, which indicates a gradual shift of the participants to a higher level of language proficiency. More than 85-90% of the cadets completed tasks in grammar, listening and writing, which is 30-40% higher than before the experiment. The indicators of self-education (up to 77%) and motivation (up to 78%) increased especially noticeably, which indicates the formation of a stable interest in learning. In the control group, the changes were much less pronounced. Although the number of cadets with a B1 level increased slightly (from 35% to 45%), and the share of those who demonstrated success in grammar, listening and writing rose to 50-55%, the level of self-education and motivation remained almost unchanged (20-30%).

During the experiment, qualitative changes in the behaviour and learning activity of the cadets were confirmed. If at the initial stage only a small part of the students showed initiative in discussions or role-playing games, then after the introduction of gamification elements, the number of voluntary responses and active speeches increased significantly. The cadets began to participate in group tasks more often, offered their own solutions, showed willingness to perform additional interactive exercises and initiate discussions in English. Such behavioural manifestations indicate the formation of stable internal motivation and positive learning dynamics. The results obtained are closely related to the research

methods used, which ensures their empirical validity. The testing data confirmed the increase in the level of foreign language competence, the questionnaire showed an increase in motivation and satisfaction with learning, and pedagogical observations reflected changes in the behaviour and involvement of the cadets. Thus, the combination of quantitative and qualitative methods allowed not only to record progress in results, but also to explain the mechanisms of its achievement, which gives the research a comprehensive and evidentiary nature. Thus, the experiment proved the effectiveness of using gamification: it contributed to improving the level of English, expanding communicative and professional skills, and forming greater motivation and readiness for self-education. The control group, which studied using traditional methods, did not demonstrate a similar qualitative leap.

Despite these advantages, gamification also faces certain challenges. Technical limitations, such as the availability of reliable devices or stable internet connections, can reduce the effectiveness of online games and simulations. Organisational issues must also be considered: integrating gamified tasks into the curriculum requires careful planning to ensure they complement, rather than distract from, the main learning objectives. There are also methodological concerns. Not every student responds positively to gamification. Some may find the competitive format stressful, while others may not immediately recognise its value for professional growth. This means that instructors must strike a balance between the engaging elements of game design and the fundamental educational goals of the course. Gamification itself is based on the intentional use of mechanisms originally developed for games – such as scores, levels, badges, challenges, and rewards – in settings that are not games. Its aim is to transform learning environments that might otherwise appear routine or rigid into dynamic spaces that are interactive, motivating, and enjoyable. By turning assessments into engaging experiences, cadets become more active participants, rather than passive recipients, of the learning process. This change in methodology is particularly important in the maritime industry, where students must combine a wide body of theoretical knowledge with practical skills. Traditional tests can measure vocabulary or grammar, but they rarely capture the complex interaction between communication, technical knowledge, and decision-making that is essential in real shipboard operations. Gamified assessments, on the other hand, allow cadets to practice these interactions in conditions that replicate professional scenarios. For example, a game might simulate a communication drill during an emergency, requiring cadets to use both technical terminology and quick problem-solving skills under pressure.

Gamification also makes learning more student-centred. Instead of passively receiving knowledge, cadets engage in interactive quizzes, role-based simulations, and tasks that provide immediate feedback. This interactivity helps maintain focus over long periods, while the constant feedback loop encourages students to correct mistakes and improve performance on the spot. Importantly, the sense of competition and teamwork fostered by gamified exercises mirrors the real-life environment of ship crews, where collaboration and communication are critical for safety and efficiency. In summary, the integration of gamification into Maritime English assessment is not a superficial attempt to make learning entertaining. Rather, it is a thoughtful pedagogical approach that combines the motivational power of games with the rigour of professional training. Gamification fosters creativity, autonomy, sustained motivation, and collaborative learning. It helps cadets build confidence in using English in professional contexts, supports the transfer of knowledge from theory to practice, and prepares them for the communicative and technical demands of maritime work. While challenges remain – such as technical access, curriculum design, and student diversity – the evidence from this study demonstrates that gamification can play a transformative role in Maritime Education and Training, especially within STEM-focused programmemes.

Results show substantial gains in the experimental group across language attainment (grammar, listening, writing), self-regulated learning and motivation, with only marginal change in the control group. These findings align with a growing body of recent research indicating that gamified and game-supported approaches can boost engagement, achievement and assessment performance in STEM-orientated language learning settings. Studies in Maritime English specifically echo the outcomes. C. Christodoulou Rafits *et al.* (2024) reported that introducing gamification mechanics in Maritime English LMS courses (badges, points, missions, leaderboards) increased motivation and supported the formation of communicative competence among future ship engineers; this directly parallels post-test improvements and the large rise in self-education/motivation indicators in the experimental group. Similar conclusions were reached in a companion article that details concrete gamified activities for Maritime English m-learning in Moodle, again pointing to positive shifts in engagement – consistent with questionnaire data (Kayisoglu *et al.* 2022).

Beyond the maritime domain, recent syntheses in STEM education corroborate the efficacy of games and gamification for learning and assessment. S.R. Mohd Rosedi (2024). concluded that gamification in STEM reliably increases student motivation and improves STEM abilities and related soft skills; data showed strong gains in motivation and collaborative performance during simulations in the experimental group are in line with these claims. Likewise, V. Ponnusamy & F. Manzil (2025) highlighted improvements in performance and engagement, reinforcing the notion that well-designed game elements could translate into measurable assessment gains – again mirroring grammar/listening/writing ≥60% growth. When specific classroom tools used in the intervention are considered, their alignment with recent evidence becomes evident. In the case of game-based quizzing, J. Wooten (2022)

reported that Kahoot! enhances motivation and contributes to improved academic performance in engineering and computing education. These findings correspond to the post-test advantages observed and the positive attitudes of students toward gamified quizzes. For lexical development, I. Mykytka (2023) study showed Quizlet significantly enhances vocabulary learning; writing and listening improvements likely benefitted from these vocabulary effects, and learners reported high satisfaction with spaced, game-like drills. I.S. Verdú *et al.* (2024) demonstrated that audience-response systems such as Wooclap, when applied formatively, increase motivation and achievement while enabling deeper debriefings. This function corresponds to their role within the formative assessment cycles, where they supported processes of self- and peer-evaluation. The context of the learning management system represents a decisive factor in shaping educational outcomes. Research T.E. Kim *et al.* (2021) on gamified Moodle environments consistently demonstrated their capacity to strengthen learner motivation, increase persistence, and encourage active participation. These results align with the survey data showing measurable motivational gains and the sustained engagement recorded throughout the semester. In the specific domain of maritime education, analytical scholarship underscores the central role of simulation-based training and its integration into the curriculum. The present design reflected this trend by embedding gamified scenarios and simulator-like tasks into the assessment process, thereby bridging theoretical instruction with practice-orientated learning experiences.

Nevertheless, findings across the literature are not uniformly positive. M. Sailer & L. Homner (2020) cautioned that gamification may generate unintended side effects, such as shallow participation or a focus on extrinsic rewards. To mitigate these risks, game elements were deliberately aligned with clear assessment criteria, each quiz was accompanied by structured debriefing and systematic error analysis, and motivational tools such as badges and leader boards were used to reinforce progress in mastering the material, rather than speed or superficial competition. Post-test data provided evidence of statistically significant improvements in core competencies, while qualitative observations confirmed the adoption of deeper learning strategies. These results indicate that the design avoided the common pitfalls highlighted in earlier investigations. A distinctive feature of this study lies in the integration of assessment for learning and assessment of learning. Whereas many prior investigations in language and STEM education concentrate on discrete skills or short-term outcomes, the present intervention combined formative cycles – facilitated through tools such as Wooclap, Kahoot, and Quizlet – with summative evaluation in the form of post-tests. This methodological integration enabled the demonstration of transfer from gamified practice to summative performance, thereby extending the evidence base in a dimension rarely quantified in previous research.

CONCLUSIONS

The results of the study showed that the use of gamification in the assessment process significantly influenced the formation of foreign language professional competence of future specialists in technical specialities. In particular, in the experimental group, the number of cadets who demonstrated a high level of proficiency in English-language technical terminology increased from 28% at the beginning of the experiment to 61% after its completion. In the control group, the same indicator increased only from 30% to 38%. In addition, observations during classes confirmed the increase in voluntary participation of cadets in discussions, more active use of digital tools and greater willingness to take on the role of leader in group tasks. A particularly important result was the improvement in the mastery of technical terminology in the fields of engineering and marine technologies. Cadets demonstrated not only better memory for specialised terms, but also greater confidence in using them during simulations of professional situations, such as role-playing games on ship safety or simulations of emergency protocols. The majority of cadets in the experimental group were able to complete the tasks of keeping a logbook and preparing English-language reports without significant errors, while in the control group, this figure was 23% lower.

Interactive assessment tasks contributed to the development of teamwork, communication skills and critical thinking. Cadets noted that working with Kahoot, Quizizz, and Wooclap motivated them to navigate technical information faster, find solutions to simulated problem situations and interact with each other more effectively. This is confirmed by the survey data: 72% of the participants in the experimental group admitted that their confidence in working with English-language professional materials had increased significantly thanks to gamified assessment forms, while only 41% of the respondents in the control group gave a similar answer. The generalised results confirmed the conclusions of international studies that gamification increases student satisfaction, reduces class absences, and improves academic achievement in various disciplines. Gamification has the potential to transform assessment practices, making them more flexible, student-centred and aligned with modern educational goals. Further research should focus on the long-term impact of gamification on the development of professional competence, as well as on testing adaptive models that integrate artificial intelligence and virtual reality into assessment environments.

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Гейміфікація під час оцінювання в морській англійській мові в контексті STEM-освіти

Анотація. Морська англійська мова є одним з ключових інструментів у навчанні майбутніх суднових інженерів за напрямом STEM (наука, технологія, інженерія, математика), оскільки вона забезпечує доступ до технічної літератури та професійного спілкування. Мета статті – знайти способи використання гейміфікації в оцінюванні рівня володіння морською англійською мовою. Методологія дослідження базувалася на поєднанні теоретичного аналізу наукових праць у галузі педагогіки та лінгвістичної дидактики, вивченні міжнародних стандартів (зокрема, STCW), а також експериментальній перевірці ефективності впровадження гейміфікації в процесі формувального оцінювання. Використовувалися методи педагогічного спостереження, анкетування та аналізу результатів навчальної діяльності студентів. Було встановлено, що гейміфікація, яка визначається як використання ігрових механізмів у неігровому освітньому контексті, сприяє підвищенню мотивації, активізації пізнавальної діяльності та розвитку міжпредметних компетентностей. Його інтеграція в оцінювання морської англійської мови дозволила моделювати професійні ситуації – спілкування в екстрених умовах, підготовку технічних звітів, взаємодію в міжнародному екіпажі. Такі завдання розвивають не тільки мовні, а й соціокомунікативні та когнітивні навички, важливі для професії. Результати дослідження показали, що гейміфікація може трансформувати традиційне оцінювання та зробити його більш гнучким, орієнтованим на студентів і чутливим до вимог сучасної морської галузі. Практичне значення результатів дослідження полягає в можливості їх використання в системі морської освіти: на навчальних курсах «Англійська мова для професійних цілей» у морських академіях і коледжах, під час навчання та перепідготовки інженерно-технічного персоналу флоту, а також у корпоративних навчальних програмах для судноплавних компаній

Ключові слова: морські навчальні заклади; персоналізований простір; цифрове оточення; LMS MOODLE; електронне навчання; суднові інженери

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Development of reflexive skills in schoolchildren in the context of a competence-based approach

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Abstract. The purpose of the study was to substantiate and develop an integrative model for the development of reflexive skills in schoolchildren in the context of combining European educational guidelines and Bulgarian national traditions. To achieve this goal, a logical and semantic analysis of scientific sources, a comparative analysis of international and national approaches, and a method of theoretical modelling were used. The results of the study showed that it is advisable to build the development of reflexive skills at three interrelated levels: individual, collective, and metacognitive. Individual tools (student portfolio, self-assessment diaries, formative assessment) developed students' ability to introspect, analyse their own achievements, and realise their personal progress. Collective practices (group discussions, peer-to-peer discussions, analysis of personal results) transformed individual reflection into social interaction, contributing to the development of communication skills, critical thinking, and empathy. These practices are important in the Bulgarian educational context, where the values of cooperation and mutual respect have historically been cultivated. The metacognitive level provides a transition from partial skills to strategic self-management of learning activities, including planning, monitoring, and evaluating own thinking. The combination of these three components created a synergistic effect, which is reflected in the ability of students to learn throughout life. A factor in the effectiveness of the model was the role of a teacher, who in the Bulgarian context combines the functions of a moderator of collective practices and a facilitator of individual autonomy, and institutional support that ensures the adaptation of European innovations to local conditions. It was generally found that the proposed model integrates European innovations and Bulgarian traditions, creating conditions for improving the quality of Education. The results can be used by teachers and methodologists to update the content of curricula, implement effective reflection tools, and develop students' key competencies

Keywords: self-observation; critical comprehension; analysis of personal results; self-assessment; development mechanisms

INTRODUCTION

The development of students' reflexive skills becomes relevant in the process of modernising the content of education and directing it to the formation of key and subject competencies. Reflection is a mechanism for the student's awareness of their own activities, which provides the ability to self-correct and improve themselves. This approach can contribute to the development of skills in planning, analysing results and highlighting conclusions, which affects the quality of educational achievements. As a result, reflexive skills are integrated into the structure of competence-based learning as a necessary component of the student's personality development. According to the relevance of these skills, the methods of purposeful development of reflexive skills of schoolchildren are not sufficiently

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developed in pedagogical practice. There is a gap between the theoretical substantiation of the role of reflection in learning and the real possibilities of its implementation in the classroom system. The lack of coordinated approaches to diagnosing the levels of development of these skills makes it difficult to include them in the curriculum.

A number of researchers interpreted the concept of reflection and determined its place in the development of all competencies of educational applicants, in particular, M. Barr *et al.* (2025) conducted a longitudinal study of the development of reflexive practice in educational applicants involved in a work-oriented programme in software engineering. They tracked the dynamics of reflexive skills over time and described data collection techniques focused on combining questionnaires and analysis of written reflections. The paper presented a model of the stages of development of reflection practice in the context of professional training. The researchers documented changes in the nature of participants' reflexive statements during the follow-up period. H. Machost & M. Stains (2023) described the main approaches to the introduction of reflexive practices in the educational process of biological sciences. The same researchers systematised the key concepts and structures of reflection for practitioners and gave examples of pedagogical tools. They used a synthesis of available research and methodological materials to derive practical recommendations. The paper contained examples of the use of reflexive techniques in classroom practice. Manifestations of student agency in primary education within the framework of competence-based learning by J. Ponomariovienė & D. Jakavonytė-Staškuvienė (2025) explored through goal setting, implementation, and reflection. They applied empirical methods to analyse goal-setting processes and reflexive practices in workbooks and classroom activities. The researchers described the types of activities through which student agency manifested itself, and the tools that allowed it to be recorded. Data on the relationship between goal setting, task completion, and students' reflexive notes were presented.

Issues of ensuring the quality of education through the development of professional competence of teachers were analysed by A.K. Egamberdiev (2023). The study examined the mechanisms of teacher development that correlated with the transformation of the educational process. The researcher reviewed professional development policies and practices and described competence assessment tools. The conclusions outlined the areas for integrating professional competence into quality assurance systems. E. Zerdali & E. Eğmir (2025) investigated the relationship between reflexive thinking for problem solving and metacognitive awareness among high school students. The publication described the procedure for collecting data in secondary schools and statistical methods for processing results. The correlation between reflexive thinking and metacognitive indicators of respondents was documented. The impact of keeping reflexive journals on the speech performance of primary school students in the context of writing skills was studied by V. Pham & T. Tran (2022). They described a pedagogical intervention that included regular reflection logs in writing lessons and measured writing speed and quality before and after the intervention. The researchers presented a methodology for assessing written fluidity and procedures for analysing letter samples. E. Todorova *et al.* (2020) applied the adapted ALACT (a look at critical thinking) model to create conditions for reflection in computer science teaching and described this experience in the proceedings of the conference on synergetics and reflection in mathematical education. The researchers detailed the modifications of this model for the computer course and the procedure for its implementation in training sessions. Examples of reflexive tasks and approaches to their integration into practical work were documented. The paper presented a methodology for evaluating implementation results. D. Izvorska (2022) considered the practice of reflection in mathematical training. The researcher described the pedagogical procedures that were used to stimulate mathematical reflection, and the mechanisms of their influence on educational processes. The researcher gave examples of tasks and forms of reflexive activity that were used in mathematics courses. The paper outlined tools for recording and analysing students' reflexive statements.

A reflexive approach to the development of personal and social competencies through educational content was studied by S. Chavdarova-Kostova (2022). The paper described examples of training modules and tasks aimed at developing empathy and social reflection. G. Sherwood (2024) considered reflexive practice and knowledge development in the context of transforming research for practice-oriented disciplines. The paper described the theoretical framework that links reflection to the generation of practically oriented knowledge. The researcher outlined methodological approaches to integrating reflection into research programmes for practitioners. In the above-mentioned studies, insufficient attention was paid to the systematic integration of reflexive skills into various academic subjects. There was also a lack of unified tools for diagnosing the level of development of reflexive skills, which made it difficult to compare results between different educational contexts. The purpose of the study was to substantiate the essence and structure of reflexive skills of educational applicants in the context of the competence approach. Research objectives: to determine the typology of reflexive skills, their place and role in the development of key and general education competencies of schoolchildren; to compare national and international approaches to the development of reflexive skills; to create a generalised conceptual scheme for the development of these skills, which integrates European innovative practices and the national educational experience of Bulgaria.

MATERIALS AND METHODS

The research was theoretical in nature and was aimed at investigating the development of reflexive skills of educational applicants in the context of a competence-based

approach. The time frame of the study covered from January 2020 to August 2025 to consider trends in the development of education and updated approaches to the development of student competencies. Data collection was carried out by processing and systematising scientific sources (Evans *et al*., 2021; Suphasri & Chinokul, 2021; Mohamed *et al*., 2022) covering theories of reflection, competence approach, and pedagogical practice. In addition, Strategic Framework for the Development of Education, Training and Learning in the Republic of Bulgaria (2021-2030) (2021), materials of the EU in the field of competence approach (European Training Foundation, 2021; European Education Area, 2025) were analysed. The experience of educational practice at the Father Paisii school in the city of Madan, where real pedagogical experience in the development of reflexive skills has been accumulated, was analysed. In the course of the research, the methods of logical and semantic, and conceptual and theoretical analysis were used, which helped to identify key approaches to understanding the essence of reflexive skills and the relationship with the competence approach. This allowed comparing various conceptual interpretations of reflection, highlighting its role in the development of general education and key competencies, and creating a generalised system of categories and concepts that provides a holistic view of the process of forming reflexive skills in schoolchildren. Based on the analysis, the structure of reflexive skills was clarified and their typology was proposed, which reflected the elements of this phenomenon in the educational process. In addition, the method of comparative analysis was used, which helped to investigate the differences between national (on the example of the Father Paisii secondary school in the city of Madan) and international approaches to the problem. Comparing the Bulgarian educational context with European trends revealed the strengths and weaknesses of existing models.

In the course of the study, a conceptual scheme for the development of reflexive skills was created, which was based on the synthesis of European and Bulgarian models. From the European experience, a number of elements were adapted, in particular, formative assessment as a tool for supporting students' constant reflection in the educational process, a student portfolio that promotes the accumulation and understanding of their academic achievements, and the development of metacognitive skills that help students to realise and regulate their thinking and learning. Furthermore, the features of Bulgarian educational practice were considered, including traditional forms of collective discussion in the classroom that stimulate a conscious attitude to learning, orientation to national educational standards that ensure the practical implementation of the concept in secondary school conditions. The combination of these elements allowed forming a holistic model for the development of reflexive skills, where innovative European practices are consistent with local educational traditions and the requirements of Bulgarian policy. The results were interpreted based on a combination of systematic and competence-based approaches. The systematic approach allowed considering the development of reflection as an integral pedagogical process that interacts with other components of learning. Based on the competence approach, the logic of data comprehension was determined. This allowed describing existing theories and drawing conclusions about their effectiveness in the development of key competencies of students, in particular reflexive skills. The results were compared with current educational standards in Bulgaria (Ministry of Education of Bulgaria, 2019) and the EU (European Commission, 2025), which gave them practical significance, and the conclusions obtained and the systematisation of theoretical material contributed to the achievement of the research goal.

RESULTS

The essence, structure and typology of reflexive skills

In pedagogical science, reflexive skills are considered as an integrated phenomenon that combines the cognitive, emotional, and activity aspects of a student's self-development. Their essence lies in the ability of students to be aware of their learning activities, critically evaluate their results, analyse the causes of success and difficulties, and find ways to improve personal learning strategies. According to M. Mohamed *et al*. (2022), reflection in education is a multidimensional and simultaneously complex process that requires a combination of intellectual operations with internal motivation and the ability to self-regulate. Therefore, reflexive skills cannot be reduced only to a technical analysis of knowledge or actions; they reflect a deep mechanism for understanding and transforming educational experience. The essence of reflexive skills cannot be revealed without considering their structure, which is multi-level and complex. Based on the analysis, four key structural components were identified. Firstly, it is an analytical component that covers the student's ability to highlight and critically evaluate their personal actions, correlate them with the tasks set and expected results. Secondly, the evaluation and value component, which is manifested in the development of an attitude to learning, awareness of personal responsibility for its results and the development of positive motivation. Thirdly, a regulatory component that provides an opportunity to plan educational activities, predict consequences, adjust personal actions, and make optimal decisions. And ultimately, the communicative component, which is implemented through the ability to interactively interact with other participants in the educational process, discuss academic achievements, and participate in collective analysis (Suphasri & Chinokul, 2021). Together, these components form a systematic model of reflexive skills that combines individual and social levels of learning activity.

Based on structural analysis and generalisation of approaches of various researchers, a typology of reflexive skills was proposed, reflecting the multidimensional nature of this phenomenon. The first group consists of cognitive and analytical skills that provide intellectual understanding of the educational process, the development of critical

thinking, and the ability to build new learning strategies. The second group consists of emotional and value skills, which are expressed in awareness of the emotional aspects of learning, motivation, and a positive attitude to cognitive activity. The third group consists of regulatory and operational skills related to the planning, organisation, and correction of educational activities, which directly affect the level of independence of the student. The fourth group consists of communicative and interactive skills aimed at collective discussion, exchange of experience, and mutual strengthening of educational reflection. As emphasised by C.M. Evans *et al.* (2020), it is the combination of different levels and types of reflexive skills that allows implementing a competence-based approach, since it provides a balance between individual self-development and integration into the learning community. Clarification of the essence, structure and typology of reflexive skills helps to determine their place in the development of key and general education competencies of schoolchildren. In the context of general education competencies, reflexive skills are the basis for developing the ability to learn independently and learn throughout life, since they form students' readiness to constantly analyse and improve their personal learning strategies. In the field of key competencies, their role is to promote the development of critical and creative thinking, the ability to make informed decisions, work in a team, and exercise self-control and self-regulation. In other words, reflexive skills are the integrative basis of the competence approach, which ensures the transition from simple assimilation of knowledge to their conscious use in new educational and life situations. The essence of reflexive skills is the ability of schoolchildren to conscious self-knowledge and self-regulation, their structure reflects a complex of cognitive, emotional, regulatory, and communicative components, and typology allows systematising the manifestations of this phenomenon in accordance with different levels of educational activity. Thus, reflexive skills occupy one of the important places in the process of developing key and general education competencies of students, ensuring the practical implementation of the competence approach in a school environment.

The Strategic Framework for the Development of Education, Training and Learning in the Republic of Bulgaria (2021-2030) (2021) clearly defines the priority of developing key competencies of schoolchildren, among which special attention is paid to the ability to learn throughout life, the development of critical thinking, and the ability to self-reflection. This document defines reflection as a central mechanism for ensuring the quality of education, since it contributes to the development of students' autonomy, increasing their responsibility for the results of their own learning activities, and developing the ability to apply knowledge and skills in new, unpredictable contexts. This approach correlates with trends in European education policy that emphasise the need to prepare the younger generation for a dynamically changing world and continuous professional growth. One of the components of the study was the analysis of European strategic documents, among which the recommendations of the Council of the EU on key competencies for lifelong learning (European Education Area, 2025) play a special role. In these provisions, it was emphasised that the skills of self-reflection and self-regulation have the status of cross-cutting competencies that ensure the integrity and interrelation of all other key skills. Reflexive practices in this context are considered not as an additional element of the educational process, but as a fundamental mechanism that enhances the development of cognitive flexibility, helps students to adapt to changes and ensures the transfer of knowledge to new contexts. In other words, self-reflection is a tool for integrating personal and educational experience, which allows students to more consciously build their personal educational trajectory.

A comparative analysis of national and European documents revealed a significant consistency of Bulgaria's strategic guidelines with continental trends in the development of education. This coincidence shows the systematic implementation of the competence approach and Bulgaria's desire to integrate its personal educational reforms into the broader European context. This was also confirmed by the conclusions given in the report of the European Training Foundation (2021), which indicates that Bulgaria is implementing the same areas of reforms that are being implemented in neighbouring countries of the region. In particular, this refers to integrating key competencies into school curricula, modernising teaching methods, and focusing on the development of skills necessary for living in a knowledge society. The report of the European Training Foundation pointed to the fact that in a number of countries, including Ukraine and Georgia, key competencies have already become the basis for reforming the educational system. The experience of these countries demonstrates the significant potential of the competence approach as a tool for modernising education, but also reveals a number of challenges in its practical implementation. The biggest problem is the lack of training of teachers to work with reflexive and metacognitive tools, which require changing the conventional pedagogical paradigm and introducing new methodological solutions. Similar difficulties are typical for the Bulgarian educational context, where, despite the presence of clear strategic guidelines, the implementation of reflexive practices at the level of daily school practice remains fragmented and insufficiently systematised. The strategic documents of Bulgaria and the EU have a high level of conceptual coherence, and the priorities defined by them are aimed at developing students' reflexive and metacognitive skills as key for quality education. Simultaneously, the real state of implementation of these provisions indicates the need for targeted local initiatives aimed at improving the professional competence of teachers, developing their ability to use innovative methods and creating a learning environment that encourages students' self-reflection. This underlines the relevance of comprehensive measures that combine strategic guidelines of the state educational policy with practical mechanisms for their implementation in school practice.

Comparison of national and international approaches to the development of the ability to reflect

It was revealed that the national model, based on the continuity of traditional pedagogical ideas, considers reflection as a component of the educational process associated with the analysis of the results of activities and collective work of teachers and students. Of interest is the experience of Father Paisii school in Madan, where purposeful work has been identified to develop students' reflective skills. According to the official document of the institution, the teaching staff regularly implements professional development activities aimed at introducing methods of formative assessment, maintaining student portfolios and organising collective discussions. The analysis showed that the practice of this educational institution combines national traditions of educational work (collective discussions, orientation to state standards) with innovative European elements, such as metacognitive techniques or individual learning trajectories. But international trends are more focused on the competence approach, individual self-awareness and the use of digital tools (Table 1).

Table 1. Features of national and international approaches to the development of reflexive skills

Criteria	National approach (Bulgaria, Father Paisii)	International approach (European trends)	Analysis of strengths and weaknesses
Theoretical background	Reliance on traditional pedagogical concepts, focus on national educational standards	Based on the competence paradigm, integration of reflection into the concept of lifelong learning	Bulgaria's strong point is the continuity of national tradition; its weak point is limited innovation; in Europe, there is a broad integration of reflection, but the need to adapt to local contexts
Forms of working with students	Collective discussions, oral reflection after classes, analysis of personal results	Use of individual portfolios, reflection diaries, and digital platforms for self-assessment	The Bulgarian model supports communication, but lacks systematisation; the European model supports structured tools, but less emphasises the collective aspect
Assessment	Mostly final, with increasing attention to the formative	Extensive use of formative assessment as a tool of reflection	Bulgaria has the potential for development, but the system is still result-oriented; in Europe, a procedural approach prevails
Development of metacognitive skills	Considered indirectly, through traditional subject methods	There are targeted programmes for the development of metacognitive strategies	European practice ensures systematic development; in Bulgaria, metacognition has not yet been singled out as an independent object of pedagogical influence
Role of the teacher	Teacher acts as the main organiser and moderator of collective discussions	Teacher acts as a facilitator of the individual and group reflection process	Bulgaria's strong point is active teacher participation; its weak point is the risk of teacher dominance; and Europe is paying more attention to student autonomy
Institutional support	There are national standards, but there are not enough systematic tools to encourage reflection	Within the framework of EU programmes, structured mechanisms for the development of reflection (projects, grants, methodological materials) are introduced	Bulgaria needs more institutional support; multi-level support is provided in Europe, but there are difficulties in unifying approaches
Digitalisation	Use of digital technologies is limited, mainly at the level of electronic resources for training	Intensive implementation of digital platforms (e-portfolio, online magazines, adaptive self-assessment systems)	Bulgaria has the potential to expand the digital component; Europe shows a more integrated approach, but challenges are linked to digital inequality
Motivational sphere	Students' motivation is formed through collective support, the role of the teacher, and the national and cultural context	Considerable attention is paid to individual motivation, internal factors of self-development, and the development of autonomy	The Bulgarian model is strong in the socio-cultural dimension, but to a lesser extent encourages individual autonomy; the European model is the opposite
Innovative pedagogical technologies	Introduction of innovations is selective and often depends on the initiatives of individual teachers	Innovation is systematically supported at the level of EU educational programmes and projects	Bulgaria's strong point is the flexibility of local initiatives; its weak point is the lack of consistency; in Europe, innovations are more structured, but there is a risk of formalisation

Source: compiled by the author based on S. Chavdarova-Kostova (2022), A.S. Lane & C. Roberts (2022), G.B. Sarzhanova *et al.* (2025)

The analysis of comparative data allowed tracing not only the differences between Bulgarian and European approaches to the development of reflexive skills, but also explaining their causes and potential consequences for the development of educational systems. The Bulgarian model is developing in the context of a strong continuity of pedagogical traditions established under the influence of national educational standards and historical and cultural factors. This leads to a focus on collective forms of work with students and an active role of the teacher as a moderator of the educational process. This approach ensures a high level of communication and social interaction in the classroom, which meets the cultural expectations and traditional values of the Bulgarian educational environment. The consequence of this is limited innovation and insufficient consistency in the use of tools for developing reflexivity, because the teacher, being the main organiser, often holds a dominant position, which can restrain the development of autonomy and independence of students. The European model, on the contrary, was developed under the influence of the competence paradigm and the idea of lifelong learning, which became the leading guidelines of the EU's educational policy. This explains the systematic integration of reflection into the curriculum, the use of individual tools (portfolios, diaries, digital platforms), and the emphasis on formative assessment as a mechanism for continuous student development. The consequence of this approach is the development of a high level of autonomy of schoolchildren, their ability to self-regulate and manage their own educational trajectory. Simultaneously, standardisation and multi-level institutional support pose the risk of excessive formalisation of innovation, when reflection may lose flexibility and authenticity, becoming a mandatory procedure, disconnected from real educational needs.

Digital dimension of differences also has clear causal relationships. The Bulgarian system is only gradually introducing digital tools, which is conditioned by both limited resource capabilities and insufficient training of teachers for their effective use. This leads to the fact that digitalisation is often limited to the use of electronic resources for learning, without covering more complex tools for self-assessment and monitoring of progress. But in the EU countries, the active implementation of digital platforms is ensured through a structured policy and financial support for educational projects. The consequence of this is a higher level of integration of digital technologies into everyday practice, which contributes to the development of individual trajectories of students, but at the same time actualises the problem of digital inequality, which can exacerbate social differences. In the field of motivation and development of metacognitive skills, national and international models also demonstrate different trajectories. Bulgarian practice, which is based on collective support and the role of the teacher, forms a strong socio-cultural dimension of learning, but to a lesser extent encourages the development of individual autonomy and internal motivation. This is explained by the fact that reflexive activity is often integrated into traditional subject methods, and is not considered as an independent area of pedagogical influence. European approaches, on the contrary, are based on the development of special programmes for the development of metacognitive strategies that are directly focused on the development of students' skills of self-regulation and internal control over their own learning. This allows for an individualised educational trajectory, but may reduce the role of the collective dimension of learning, which is important for students' socialisation and integration into the cultural context. In general, the differences found should not be interpreted as an advantage of one approach over another. Rather, they show two different accents: the Bulgarian model reflects the "socio-cultural paradigm" of reflexive skills development, while the European model reflects the "individual – autonomous paradigm". The reasons for this lie in the historical development of educational systems, in the presence or absence of institutional support, in different levels of digital infrastructure and pedagogical training. The implication is that Bulgaria needs more attention to systematising and institutionalising reflexive practices, while Europe needs to strike a balance between standardisation and consideration of local contexts to avoid the risk of formalisation.

Development of a conceptual scheme for the development and improvement of metacognitive skills

The conceptual scheme for the development of reflexive skills of schoolchildren in the Bulgarian educational context has an integrative character, since it combines European strategic guidelines with national educational traditions. Its main goal is to create a model that simultaneously meets global trends in the development of education and considers the specifics of the cultural and pedagogical environment in Bulgaria. Such integration allows avoiding direct copying of foreign experience and forming an adapted, flexible, and sustainable concept for the development of metacognitive skills and reflexive competencies of schoolchildren (Fig. 1).

The theoretical and methodological basis of the scheme is based on two interrelated dimensions. The first is European educational guidelines, which include a competence paradigm, a focus on lifelong learning, and a priority for developing metacognitive skills. They define reflection as a tool for providing educational flexibility, critical thinking, and the ability to adapt to new conditions. The second dimension is related to the Bulgarian national context, which emphasises compliance with national educational standards, preserving the continuity of traditions and using collective interaction as a key element of learning. This approach provides a balance between global innovation and local cultural heritage, which is a prerequisite for sustainable modernisation of education. In the structure of the Integrative model of development of reflexive skills of schoolchildren, the relationship between three key components is clearly traced – individual reflexive tools, collective reflexive practices, and the block of metacognitive development. Their interaction is not a mechanical combination of

different methodological approaches, but forms an integral system, where each element performs its own function, but simultaneously affects others, forming a synergistic effect. The first level is reflexive tools of the individual level, which directly form students' ability to introspect, analyse their own achievements, and build an internal picture of personal progress. Student portfolios, self-assessment diaries, and formative assessment are aimed at developing individual responsibility and awareness. An important consequence of their use is the emergence of the student's ability to identify their own strengths and weaknesses, which creates the basis for active participation in collective practices. Thus, individual tools act as the primary basis that allows the student to develop a reflexive position and prepare for more complex interaction in a social context. The second level of the model is collective-level reflexive practices that transform individual reflection into a collaborative process. Traditional after-school discussions, peer-to-peer group discussions, and joint analysis of mistakes and achievements develop students' communication, argumentation, and constructive criticism skills. Individually acquired introspection skills become the basis for active and productive participation in group interaction. Simultaneously, collective practices expand the scope of individual reflection, as the student begins to relate their own experience to the experience of others, which contributes to the development of critical thinking and empathy. In the Bulgarian context, this block takes on special significance, because collective interaction is a historical cultural tradition that supports the values of cooperation and mutual respect.

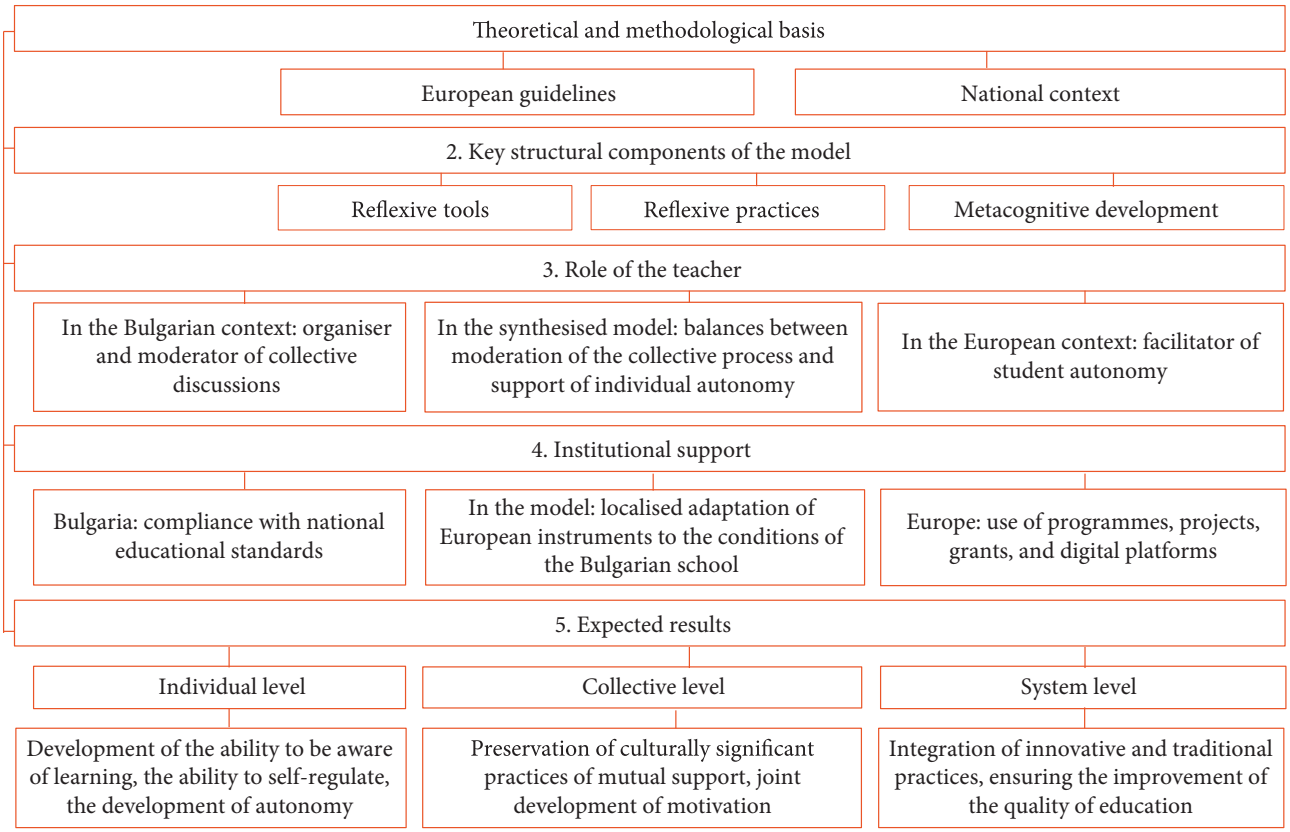

Figure 1. Conceptual scheme for the development of reflexive skills of schoolchildren
Source: developed by the author

The third, no less important, component is metacognitive development, which combines individual and collective dimensions, transferring them to a higher level of awareness. Mastering strategies for planning, monitoring, and evaluating their own thinking provides students with the ability not only to reflect on actual results, but also to manage the learning process itself. There is a causal relationship between the previous two blocks: individual tools form the basis for awareness, collective practices expand experience through collaboration, and metacognitive development integrates these achievements into a system of strategic self-government. Performing special exercises ("how I think, how I learn") encourages an in-depth awareness of own activities, and digital tools such as online magazines and e-portfolio allow for personalised analysis and strengthen established self-regulation skills. In this sequence, the logical dynamics of development are implemented: individual tools → collective practices → metacognitive development. It reflects not only methodological logic, but also corresponds to the specific features of the Bulgarian educational environment. On the one hand, the national education system emphasises the importance of

collective cooperation, which coincides with the second component of the model. On the other hand, European educational guidelines require an emphasis on individual autonomy and the development of metacognitive skills, which is integrated into the first and third blocks. Thus, the model achieves a balance between tradition and innovation, between collective interaction and personal autonomy.

The consistency of the above three levels creates a complex effect: individual development provides personal responsibility and willingness to cooperate; collective practices form social competence and ability to work in a team; metacognitive development integrates previous results and transforms them into the ability to learn throughout life. It is this multi-level structure that is optimal for the Bulgarian educational context, since it allows simultaneously considering cultural and historical features and implementing European practices, which ensures the integrity, flexibility, and sustainability of the educational system. The central link of the model is the role of the teacher. In the Bulgarian pedagogical tradition, the teacher is considered as an organiser and moderator of collective discussions, which corresponds to the cultural priorities of cooperation and mutual assistance. In the European context, there is a function of an intermediary that creates conditions for individual autonomy of the student. In the proposed integrative model, these functions are combined: the teacher balances between organising collective activities and supporting students' independent work, contributing to the harmonious development of both individual and collective reflection. Another component is institutional support. In Bulgaria, it is implemented through compliance with national educational standards, while European practices provide for participation in programmes, grant projects, and the use of digital platforms. In the model, institutional support is considered as a localised adaptation of European innovations to the conditions of a particular school. This means that European development mechanisms are not reproduced mechanically, but adapt to the resource and cultural capabilities of the Bulgarian educational system.

The expected results of implementing the model provide for multi-level changes. At the individual level, students acquire the ability to self-reflect, develop autonomy and the ability to self-regulate. At the collective level, culturally significant practices of mutual support are preserved and strengthened, which are integrated with innovative European approaches, stimulating the development of joint educational motivation. At the system level, the implementation of the model promotes the integration of traditional and new approaches, ensuring a sustainable improvement in the quality of education and the development of the key competence "lifelong learning". Thus, the conceptual scheme functions as an integrative model that combines individual and collective dimensions of reflection, pedagogical facilitation and institutional support, European innovations and Bulgarian traditions. Its implementation not only contributes to the development of metacognitive skills and reflexive skills, but also forms the prerequisites for a qualitative update of the educational system in accordance with global and national challenges.

DISCUSSION

The results of the study showed that the development of reflexive skills of schoolchildren in the context of the competence approach requires a combination of European innovative practices (formative assessment, student portfolios, development of metacognitive strategies) and traditional educational elements. This is consistent with the conclusions obtained by S. Abramovich & A. Grinshpan (2023), who proved that the use of technology in teaching mathematics contributes to the development of "collateral" creativity, and therefore, the students' ability to comprehend their actions in the educational process. The similarity of the results shows that technological integration and methods aimed at reflection form a new type of thinking in students, that is, flexible, open to creativity and critical analysis. Reflexive skills were most fully manifested when they were directly related to the development of key competencies, primarily communicative, and educational and cognitive. This correlates with the conceptual model by P. Heymann *et al.* (2022), which showed that the development of students' reflection through an online platform directly affects their employability (employability competencies). Therefore, both in school and higher education, reflection acts as a key intermediary between learning activities and the acquisition of real-life skills. The results of the study also showed that the competence approach provides a conceptual basis for the development of reflexive skills, since it allows integrating knowledge, skills, and values into a single system. This is consistent with findings of L. Holubnycha *et al.* (2022), which proved that the competence approach in education creates conditions for the development of integral skills, among which reflection occupies a leading place. In this aspect, it can be seen that both studies emphasise the need to move away from a purely knowledge-based paradigm to an activity and value one, which focuses on the student's ability to critically comprehend their own experience.

The results showed that the systematic integration of reflexive practices into school education is possible through the creation of pedagogical models that combine metacognitive strategies and formative assessment. This correlates with the study by M. Cheng *et al.* (2023), who highlighted the importance of critical self-reflection for students' transition between educational levels and new learning environments. The results of the study showed that even in primary school, the development of reflexive skills has great potential. This was consistent with the conclusions of A.S. Connelly *et al.* (2020), who found that primary school teachers view reflection as an integral part of effective teaching practice. Thus, the consistency of the results indicates that reflexive skills are not limited to high school students, but should be formed from an early stage of the educational trajectory. This study has shown that "stops for reflection" during the educational process are effective,

which allow students to reflect on their actions and adjust further steps. This is consistent with the conclusions obtained by M. Denami & D. Adinda (2023), who proved the effectiveness of such pauses in the student environment. In addition, the similarity with the findings of M. Bassachs *et al.* (2020) consisted in the use of interdisciplinary approaches that encourage critical reflection already at the primary education level. In the course of research, it was proved that interactive learning methods can enhance the development of reflection. This correlates with the results of T. Blyznyuk (2024), who showed that interactive technologies directly affect the development of critical thinking in schoolchildren. Both studies have confirmed that interactive and active methods should be integrated into the educational process to achieve qualitative growth in reflexive skills.

The results of this study showed that the development of reflection occurs in close relationship with interpersonal competencies. This is consistent with the conclusions obtained by S.L. Brooks *et al.* (2022), which indicated that the transition to a competence model in law education allows students to effectively develop relational skills. Therefore, reflection has a double effect: on the one hand, it increases academic results, and on the other, it promotes the development of socially significant competencies. In the course of the study, it was confirmed that even in crisis conditions, reflexive skills play a leading role in ensuring the quality of training. This correlates with the findings of L.M. Chambi *et al.* (2022), which highlighted the importance of reflexive practices in distance education. In both cases, the results confirm that reflection is a universal tool for adapting educational processes to new challenges. In addition, personalised monitoring and formative assessment increase the effectiveness of the development of reflexive skills in schoolchildren. This is consistent with the conclusions of J. Ponomariovienė *et al.* (2025), which proved the importance of personalising assessment in primary schools for the implementation of competence education. Both approaches point to the need to move away from traditional forms of control and move to more flexible, personality-oriented practices. The results confirmed the importance of reflection as a component of formative assessment. This correlates with the findings of A. Predyk (2023), who identified reflection as a key component of formative assessment of primary school students. The consistency of the results demonstrates that the development of reflexive skills cannot be considered in isolation, since they are an integral part of assessment models. The results of the study showed that the use of problem-oriented learning and elements of research activities encourages students to reflect more deeply and critically understand their educational actions. This is consistent with the conclusions obtained by Y.F. Surya *et al.* (2025), who proved that the problem-based learning method significantly increases the level of reflexive-critical thinking of primary school students in the process of studying natural sciences. The similarity of the results confirms that the active involvement of children in solving open and interdisciplinary problems creates conditions not only for mastering subject knowledge, but also for developing skills of introspection and evaluating alternative solutions.

In this study, it was found that the effectiveness of the development of reflexive skills increases significantly when using information and communication technologies that support the development of communicative competence. This correlates with the findings of A. Yesnazar *et al.* (2021), who found that integrating new technologies into primary school education promotes the development of children's speech skills in an interdisciplinary environment. In both cases, it was confirmed that digital technologies create new conditions for reflection, since they allow students not only to communicate, but also to evaluate the quality of their speech, thinking and cooperation with their peers. The results of the study also showed that the development of reflexive skills in schoolchildren is inextricably linked with their socio-cultural adaptation and orientation in a rapidly changing world. This is consistent with the findings of T.V. Zuyeva & A.T. Nyssanov (2020), who emphasised that the professional orientation of adolescents and the development of their socio-cultural competence in the context of new technologies require systematic involvement of students in reflexive practices. In the study, similar trends were found in the relationship between the development of reflection and the ability of students to understand their personal values, interests, and social roles, which will further contribute to their successful integration into society. Thus, the results of the study are generally consistent with the conclusions of the above-mentioned researchers who investigated the phenomenon of reflection in various educational contexts. They confirmed that the development of reflexive skills is a necessary condition for the implementation of the competence approach.

CONCLUSIONS

Analysis of the essence, structure, and typology of reflexive skills has shown that they are a multidimensional phenomenon that covers the cognitive, emotional, regulatory, and communicative aspects of student development. Reflexive skills provide not only critical understanding of the educational process, but also the development of a responsible attitude to personal activities, the development of skills to plan and correct actions, and establish effective interaction with other participants in the educational environment. The proposed typology of reflexive skills distinguished cognitive and analytical, emotional and value, regulatory and operational, and communicative and interactive components that together form a system model of their development. Reflexive skills occupy a place in the development of both general education and key competencies. In the first case, they contribute to the development of the ability to learn independently and learn throughout life, in the second – they support the development of critical and creative thinking, informed decision-making skills, the ability to work in a team, and exercise self-control. That is why they are the integrative basis of school education.

A comparative analysis of Bulgarian and European strategic documents has demonstrated a high level of conceptual consistency in prioritising the development of reflexive and metacognitive skills. The practical implementation of these provisions at the school level remains incomplete, which requires to increase attention to the training of teachers, create an innovative educational environment, and introduce methodological solutions that stimulate the development of students' self-reflection. The Bulgarian approach is based on a socio-cultural paradigm that emphasises collective interaction, the role of the teacher as a moderator, and reliance on traditional educational concepts. This ensures the continuity of pedagogical practices and promotes socialisation of students, but limits the development of individual autonomy, innovation, and the use of digital tools. The European approach demonstrates an individual-autonomous paradigm that focuses on competence-based learning, the development of self-regulation, the use of digital platforms, and formative assessment. Its advantage is to ensure a high level of student autonomy and create individualised educational trajectories, but there is a risk of excessive standardisation and a decrease in the collective dimension of learning. The proposed conceptual scheme for the development of reflexive skills of schoolchildren in the Bulgarian educational context confirmed the effectiveness of an integrative approach that combines European educational guidelines and national traditions. At the individual level, the development of awareness, responsibility and autonomy of the student is ensured, and at the collective level, a culturally significant tradition of cooperation and mutual respect is maintained, which expands the boundaries of personal reflection; at the metacognitive level, previous results are integrated into strategic self-management of educational activities. The role in this process is played by a teacher who combines the functions of a moderator of collective discussions and a facilitator of individual autonomy, which allows harmonising the requirements of the European and Bulgarian educational paradigms.

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CONFLICT OF INTEREST

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Розвиток рефлексивних навичок у школярів у контексті компетентнісного підходу

Анотація. Метою дослідження було обґрунтування та розробка інтегративної моделі розвитку рефлексивних навичок у школярів у контексті поєднання європейських освітніх рекомендацій та болгарських національних традицій. Для досягнення цієї мети було використано логіко-семантичний аналіз наукових джерел, порівняльний аналіз міжнародних та національних підходів, а також метод теоретичного моделювання. Результати дослідження показали, що доцільно будувати розвиток рефлексивних навичок на трьох взаємопов'язаних рівнях: індивідуальному, колективному та метакогнітивному. Індивідуальні інструменти (портфоліо учнів, щоденники самооцінки, формувальне оцінювання) розвивали в учнів здатність до інтроспекції, аналізу власних досягнень та усвідомлення особистого прогресу. Колективні практики (групові дискусії, обговорення між однолітками, аналіз особистих результатів) перетворювали індивідуальну рефлексію на соціальну взаємодію, сприяючи розвитку комунікативних навичок, критичного мислення та емпатії. Ці практики є важливими в болгарському освітньому контексті, де історично культивуються цінності співпраці та взаємної поваги. Метакогнітивний рівень забезпечує перехід від часткових навичок до стратегічного самоуправління навчальною діяльністю, включаючи планування, моніторинг та оцінку власного мислення. Поєднання цих трьох компонентів створює синергетичний ефект, що відображається у здатності учнів навчатися протягом усього життя. Фактором ефективності моделі є роль вчителя, який у болгарському контексті поєднує функції модератора колективних практик та фасилітатора індивідуальної автономії, а також інституційна підтримка, що забезпечує адаптацію європейських інновацій до місцевих умов. Загалом було встановлено, що запропонована модель інтегрує європейські інновації та болгарські традиції, створюючи умови для поліпшення якості освіти. Результати можуть бути використані вчителями та методистами для оновлення змісту навчальних програм, впровадження ефективних інструментів рефлексії та розвитку ключових компетентностей учнів

Ключові слова: самоспостереження; критичне розуміння; аналіз особистих результатів; самооцінка; механізми розвитку

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Digital educational platforms as a teaching resource for future language teachers

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Abstract. Research into the integration of digital educational platforms into the teaching process at teacher training universities, particularly into the practical activities of students, is an important stage in the digital transformation of higher and secondary education. The aim of the research was to determine the effectiveness of using various types of modern educational platforms in the theoretical and practical training of students majoring in teaching. The effectiveness of integrating digital educational platforms into the training of philology students was tested through descriptive and predictive analysis. The preparatory work for the practical activities of future teachers was to determine the types of educational digital platforms according to the purpose and functions (management, educational, gaming, communication and analytical), as well as innovative characteristics (feedback, artificial intelligence, etc.). The proposed colour indexing of digital educational platforms served as an auxiliary tool for defining the functional capabilities. The results of the work showed that students and teachers are generally familiar with digital resources and understand the advantages and disadvantages. The ratings on a five-point scale of educational platforms and the educational capabilities differed significantly among respondents – student interns, school teachers, and secondary school students. Teachers and interns rated electronic management platforms and educational content 1.5 points higher than students. However, the use of interactive forms of learning, communication opportunities, and artificial intelligence was rated 2-2.5 points higher than teachers' assessments. The study's results showed that the introduction of digital educational platforms contributes to the professional training of students and helps secondary school teachers become aware of the students' learning expectations regarding digital resources

Keywords: competence formation; integration; professional training; interactive technologies; instructional activity; curricular convergence; management platforms

INTRODUCTION

Global digitalisation is defining a new stage in the development of cyber technologies, driven by the powerful combined forces of information, management, and communication. For the digital transformation of education, it is important to use high-quality digital technologies and develop infrastructure, in particular online services, which depend on free choice and are regulated by cybersecurity principles regarding disinformation and information

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manipulation. One of the priority tasks of digitalisation is the ability to work with digital technologies, which are gradually becoming a permanent and necessary resource for most specialisations, i.e. cross-platform or cross-functional. The training of future teachers requires a focus on the digitalisation of the educational process in modern educational institutions: student access to modern technologies (Student Accessibility), mastery of modern educational technologies and teaching methods (Teacher Accessibility), introduction of digital learning tools in the management and document flow of educational institutions (Administration Accessibility), integration of educational Internet programmes into the learning process (Fibre-to-the-Building and Wi-Fi).

Ukrainian researchers have examined the general principles of the digitisation of education and specific aspects of the use of digital platforms. V. Bykov (2022) specified the process of digital transformation, emphasising the importance of maintaining consistent learning motivation at all stages; ensuring prompt feedback to each student; ensuring that learning activities are project-based with the deepest possible integration of theoretical and practical learning; significantly reducing the time required to develop and implement educational programmes; and increasing the openness and transparency of the education system. A. Zelinska *et al.* (2023) analysed the content of the concept of digital competence, comparing the parameters of information competence and digital literacy. According to researchers O. Liashenko *et al.* (2024), the strategic priorities for the digitalisation of the educational environment of educational institutions depend on the development of digital educational infrastructure by improving the efficiency of online educational platforms and their tools. According to the researchers, the productivity of web platforms, specialised software, and free video conferencing services is ensured by attracting investments for the development and support of educational online platforms and specialised training programmes, as well as partnerships with government agencies and IT companies to create new tools and platforms for distance and blended learning. Scientists are focusing on the problems of terminology in the digital educational thesaurus.

Yu.Y. Tulashvili (2021) focused on strategies for implementing pedagogical technologies using electronic learning systems, multimedia technologies, and virtual reality technologies. The scientist noted the absence of perfect mechanisms that would allow constructively determining the level of informatisation of an educational institution, recording the quality of information provision, and making correct decisions regarding directions of development in the context of the digitalisation of society. Research conducted by scientists over the past two years shows significant progress in the development of specific ways to improve the computerisation of educational institutions, in particular, the use of digital platforms in the educational process. Scientists are focusing on issues related to the training of teachers to work in a digital society. In a study by M. Zinchenko *et al.* (2022) criteria for evaluating the functionality of e-learning platforms were identified and a comparative analysis of the functionality of e-learning platforms and components was conducted, which helped to identify only three Ukrainian e-learning platforms that meet the criteria, but these platforms are commercial products. The problem of using digital platforms in educational institutions is viewed differently by foreign scientists, as most countries have previously switched to centralised management of the educational process. The problems of using open educational resources (OER) remain relevant for research. According to P. Harvey & J. Bond (2022), there is a need for further evidence that OER improves teaching and learning before recommending a complete transition from traditional forms of educational programmes to an exclusively open resource structure. A.M. Mullens & B. Hoffman (2023) noted incentives such as cost savings, accessibility, and increased academic engagement, while also acknowledging technological and institutional barriers. S. Mishra (2025) analytical review highlighted specific aspects of accessibility, enabling factors, barriers and challenges, equity and diversity, and legal and technical openness in the use of OER.

Thus, there is currently a fairly solid research base on the use of educational platforms in various educational spaces – secondary and higher education. This study aimed to integrate these educational resources into the practical activities of future teachers. In the first stage of the study, attention was focused on analysing modern online learning platforms, determining their functional capabilities and level of compliance with modern requirements for teaching secondary and higher education students. A large number of online platforms had to be systematised according to the information and technological characteristics, purpose and specific educational functions. The aim of the study was to justified the need to include in the theoretical and practical training programmes for students of pedagogical specialities a content module on mastering modern educational platforms of various functional purposes in the form of lectures, practical tasks with education management platforms, as well as during educational and industrial internships.

MATERIALS AND METHODS

The theoretical basis of the study was formed on the basis of recommendations from Ukrainian documents on the digitisation of the educational process (The project of digital agend of Ukraine 2020, 2016; State Service for Quality Education of Ukraine, 2022) as well as research in the fields of learning theory, philosophy of education, computer science, philology, etc. The combination of these disciplines allowed for a comprehensive approach to solving educational problems related to the development of digital competence in philology students during studies and internships. Descriptive analysis allowed to examine the results of a survey related to the use and mastery of educational platforms designed to optimise the educational process and document flow in educational institutions, as well as to ensure and

modernise the educational process. To determine the effectiveness of the use of digital educational resources, taking into account the influence of significant factors, predictive analysis was chosen to develop a comprehensive analytical approach to the training of future philology teachers.

The educational relevance of digital educational platforms was assessed using a Likert scale with the following options: disagree, somewhat disagree, somewhere in the middle, somewhat agree, agree, and the survey methodology of J.W. Creswell & J.D. Creswell (2022). The survey method allowed to collect data from a large sample, as students at the pedagogical university undergo both practical training (without teaching subjects) and industrial training (with classroom lessons) at the same time. The use of colours helped to distinguish questions according to the selected typology of educational platforms: yellow – centralised learning management platforms; green – educational content platforms; red – communication functions, such as news, chats, feedback via gadgets, artificial intelligence, etc.; analytics of the learning process is marked in blue. A total of 54 third- and fourth-year students from the Educational and Scientific Institute of Foreign Languages at V.G. Korolenko Poltava National Pedagogical University participated in the survey. Korolenko, specialising in: 014.02 Secondary Education (Language and Foreign Literature (English) and Language and Foreign Literature (German)); 014.02 Secondary Education (Language and Foreign Literature (German) and Language and Literature (English)). The survey was conducted during the 2024-2025 academic year. The sample of students was selected according to the size of the academic group, excluding those students who study according to an individual schedule. The ratio of female to male students was 1:5 (9 boys and 45 girls). The average age of the teachers of the Department of English and German Philology who participated in the assessment at the time of the experiment was 46 years. The average age of English and foreign literature teachers at the schools where the students did the internships was 53 years.

The questionnaires, which served as the main tool of the experiment, were developed taking into account the organisation of theoretical and practical training. The questionnaire was conducted under conditions of anonymity, voluntariness and ethics (American Psychological Association, 2017; Code of Academic Integrity..., 2022). For students, part of the questionnaire was tested in a course on language and literature teaching methods. Student interns evaluated the responses of students and teachers, which amounted to 160 respondents, of whom 14% were teachers of foreign languages and foreign literature and 86% were students. The survey results were compared as weighted average scores characterising digital platforms according to criteria of management and organisation of the educational process, communication and analytics. The survey of secondary school students, teachers and university lecturers was part of the practical training of philology students. At the same time, interns were among the respondents, as during the industrial practice they mastered the system of educational platforms, in particular those chosen by the school for joint management and educational work.

The relevance of developing digital competence among teachers in educational institutions is closely linked to the reform of the education system in Ukraine, as well as the expansion of distance learning. Digital innovations include digital learning management systems (platforms), virtual and augmented reality, digital assessment systems, mobile technologies and gamification, among others. In the conceptual and reference database, the digital competence of teachers and researchers is defined as a dynamic combination of knowledge, skills and abilities in the field of digital technologies, which forms the ability to effectively perform professional activities using educational platforms for organisational, business, educational and communication purposes (Conceptual and reference framework..., 2021). This term refers to the responsible, critical use of digital technologies for learning, working and participating in public life. Digital competence includes computer and information literacy, communication, collaboration, digital content creation, cybersecurity (Spirin, 2021) and lifelong learning in a digital society (Marienko & Sukhikh, 2022). Preparatory work by students and teachers preceded the survey to familiarise themselves with educational platforms. Modules on the topic of "Digital educational platforms in school practice" were developed for the courses "Methods of Teaching Foreign Languages" and "Methods of Teaching Foreign Literature". The processes of transformation and digitalisation of education have led to an increase in the number of educational platforms with different focuses, goals and content. Studies by M. Ouadoud *et al.* (2016) served as the basis for developing criteria for evaluating the functionality of e-learning platforms. Students' attention was focused on educational portals selected by the educational institution, which contained the class schedule for the entire school, an electronic journal and electronic diaries, allowing the entire educational process to be integrated within the school, region and country.

To support the educational process, other educational platforms selected by teachers and students were integrated into the main school management platform. These platforms contain methodological content, including lesson planners, tools for assessing student knowledge, and accessible interactive methods and techniques. Communication between students was also facilitated through chats, blogs, and video conferences, both on the school management platform and on special educational resources. Analytical work was programmed as both individual and collective analysis of learning outcomes, as well as reflection by students and parents on these outcomes. The use of artificial intelligence increases the number of users of educational websites, as interactive generators of drawings, presentations, and maps are used as lesson content and a means of communication. The novelty of such platforms and their unpredictability attract the attention of a large number of students and pupils. A platform with these characteristics

must perform four basic functions: communication, information exchange, access to information, and collaboration. These functionalities characterise both pedagogical and technological approaches. When compiling questions for the questionnaire, the listed functions and characteristics of digital educational platforms were taken into account. The questionnaire for teachers, pupils and students contained eight questions, five of which required assessment on a five-point scale, and three of which required answers to questions about educational platforms (Table 1).

Table 1. Questionnaire for evaluating digital educational management programs used by the educational institution

№	Question or task	Characteristics and evaluation		
		Student teacher	Teacher	Student
1.	Name the educational platforms you know and have used			
2.	Rate the organisational functions of your institution's management platform on a scale of 1 to 5: • schedule; • journal; • diary			
3.	Name the subjects (disciplines) for which you use educational platforms to prepare.			
4.	In which lessons (classes) are the capabilities of educational digital platforms used most?			
5.	Rate the learning opportunities offered by digital platforms: • online lessons; • video materials; • testing; • homework			
6.	Rate the interactive forms of work on educational platforms: • games; • audio materials; • videos; • quests			
7.	Assess the communication functions of educational platforms: • news; • chats; • feedback; • artificial intelligence			
8.	The importance of knowledge quality control and learning outcome analysis: • progress reports; • ratings; • reflection			

Note: educational platforms were coded by questions in different colors: yellow – organisational; green – academic; red – communicative; blue – analytical
Source: developed by the authors

Colours and icons were used to indicate the types of educational platforms and their content: yellow colour – learning management platforms that contain class schedules, electronic journals, student diaries and school documentation; green indicates platforms focused on supporting the learning process: lesson plans, video lessons, homework systems, assignments and tests to check students' knowledge and skills. The educational content also included interactive tools: games, projects, audio and video materials. Red indicates communication features built into digital education platforms, such as news, chats, feedback via gadgets and artificial intelligence. Learning analytics, marked in blue, is an additional feature of all previous types of educational platforms. The survey was conducted in two stages: the first stage assessed the actual use of educational resources by educational institutions to manage the learning process, and the second stage modelled the predicted situation of digitalisation of academic institutions based on the monitoring results. Students evaluated the demonstration of educational software and its potential in terms of the functions, purpose and technical capabilities of educational platforms. Students and teachers were asked to add new resources and additional platform features to the table. This work had a dual purpose: to prepare students to work with educational digital resources and, at the same time, to independently conduct a survey among the participants in the educational process with whom they would be doing the internship. The internship supervisor analysed the results of the survey of student interns, and the students counted the responses of pupils and teachers. Student project work, as specified in the working programmes on foreign language and foreign literature teaching methods, included

research conducted by students to master various types of platforms, as well as further characterisation and presentation of the resource's capabilities and finished products.

RESULTS AND DISCUSSION

The process of developing students' digital literacy by evaluating educational platforms has been implemented at Poltava National Pedagogical University for the third academic year in a row. Previously, this work was sporadic and focused on mastering innovative teaching methods in courses on methodology and disciplines chosen by students in accordance with the methodological orientation. A comprehensive analysis of educational platforms by students during the internship demonstrated significantly better learning outcomes, as well as thorough independent work and a creative approach to presenting the survey results. One of the results of the work was the classification of educational platforms. Table 2 was developed during practical classes on student project tasks on the principles of classification and content of educational platforms.

Table 1. Types and components of educational digital platforms

1. Management	Schedule	Electronic journal	Diary	Documentation
2. Learning	Lesson plans	Online lessons	Homework	Testing
3. Games	Games	Audio materials	Video	Projects
4. Communication	News	Chats	Feedback	ChatGPT
5. Analytical	Learning outcomes	Reflection	Student ratings	

Note: educational platforms were coded by questions in different colors: yellow – organisational; green – academic; red – communicative; blue – analytical
Source: developed by the authors

Management and learning platforms are accompanied by learning outcomes, performance assessments, and reflection on learning content or educational services. A. Bozkurt & R.C. Sharma (2022) emphasised the importance of learning analytics as it provides insight into and optimisation of learning and the environments in which it takes place. The division into types of educational programmes was rather arbitrary, as platform developers sought to integrate learning materials with interactive communication and learning outcome analysis. Analytical data indicate active use of educational resources, particularly during the pandemic and martial law. The annual report for 2022-2023 State Service for Quality Education of Ukraine (2022) indicated that 76% of secondary education institutions use education management platforms, which allows personalised access to distance learning for all participants in the educational process. It would like to highlight the websites that lead the rankings in Ukraine in terms of the number of users during the 2023-2024 academic years: the website "New Knowledge" covers 55% of schools in Ukraine, "My School" – 6%, "NIT: Education and Technology" – 5%, "Electronic Journal" – 4%, and others: HUMAN, "Electronic Schools", "Smart School", "All Education", "Unified School", "School Today", etc. (State Service for Quality Education of Ukraine (2022). According to the results of the previous academic year, Google Classroom (73%), Google Workspace for Education (16%), other tools or proprietary platforms (40%) are predominantly used during the learning process. For example, the Lviv City Council uses the Learning and Technology educational platform, while most institutions in Kyiv use Single School. Schools in Poltava use educational websites to organise the learning process, with New Knowledge being the most widely used (85%), followed by My School (9%) and OIS Eddy (6%). The results of research conducted by students with the aim of mastering various types of platforms, followed by a presentation of the resource's capabilities and finished products, were evaluated as individual project work included in the working programmes on foreign language and foreign literature teaching methods. A summary of the results of student research is presented in Table 3, which includes the name of the platform, content and colour coding.

Table 1. Analysis of digital educational resources

№	Name	Content	Type
1.	New Knowledge NZ.UA	Information and communication platform for centralised management of educational institutions. Electronic document management. Educational resources: lesson creation, distance learning. Feedback and communication. Analysis of student, class, and school performance.	
2.	Vseosvita ВСЕОСВІТА	National information and communication education platform. Educational resources: test builder, methodological bank of lessons, tasks, multimedia, and interactive materials. Testing. Olympiads, competitions for teachers, and students.	
3.	My School Моя Школа	A platform for centralised management of educational institutions. Electronic document management. Educational resources: functionalities for stationary and distance learning. Unified internal communication network.	
4.	Learning and technologies HIT	Centralised institution management platform. Electronic document management. Educational resources: online lessons, audio communication, chats, and access to electronic learning materials. Calendar of events and announcements. Performance monitoring.	
5.	HUMAN School HUMAN	Information and communication platform for centralised school management. Electronic document management. Educational resources: remote online lessons, feedback. Attendance reports, performance analytics, and reflection.	
6.	Single School Єдина Школа	Information and communication automated system for educational institutions. Electronic document management. Educational resources: remote online lessons. Feedback and communication. Performance statistics	
7.	OIS Eddy eddy	Centralised school management platform. Electronic document management. Educational resources: tools for distance and blended learning, creation of online courses, and custom online lesson module.	
8.	E-schools school	Information and Communication Automated System for Educational Institutions. Electronic document management. Educational resources: remote online lessons, homework checking. Feedback and communication.	
9	Atoms atoms	Centralised institution management platform. Educational resources: lesson plans, teaching materials, methodological guidelines. Distance learning courses: webinars, training courses, and lectures.	
10.	Smart School SMART•SCHOOL	Centralised school management platform. Electronic document management, Educational resources: Distance learning, testing. Progress reports and statistics.	
11.	School Today SchoolToday	Centralised school management platform. Electronic document management. Educational resources: access to teaching materials, testing. Independent monitoring of homework completion.	
12.	Prosvita PROSVITA	Centralised school management platform. Electronic document management. Educational resources: a bank of educational materials, online lessons, and homework assignments. Analysis of student achievement.	

Table 3. Continued

№	Name	Content	Type
13.	**Classtime**	Ukrainian digital educational ecosystem. Educational resources: interactive lessons, tests. Learning outcome analytics. Online chat. Webinars, online conferences, master classes.	
14.	**Google Classroom**	Google web service for educational institutions. Class formation. Creation and checking of assignments, feedback. Educational resources: creation of tests and presentations.	
15.	**MOODLE**	Online learning platform. Class formation. Educational resources: accumulation of learning materials in various formats (text, presentation, video material, web page); test creation.	
16.	**All-Ukrainian Schoolonline**	Educational platform for distance and blended learning. Educational resources: video lessons, tests, materials for independent work in 18 core subjects.	
17.	**Liveworksheets**	Website with interactive tasks. Educational resources: a bank of exercises and tasks. Interactive workbooks for self-assessment.	
18.	**Kahoot**	Ramified online learning platform. Educational resources: various types of tests.	
19.	**Padlet**	Multimedia platform. Educational resources: creation, editing, and storage of information on a virtual wall (photos, files, links, notes).	
20.	**Canva**	Online graphic design platform. Educational resources: (graphs, presentations, websites).	

Note: educational platforms were coded by questions in different colors: yellow – organisational; green – academic; red – communicative; blue – analytical
Source: developed by the authors

General knowledge about the types of educational platforms and understanding of the principles of keeping electronic journals and diaries enabled students to prepare for active practice in educational institutions and participate in the organisation and conduct of the survey. The students' activities in educational institutions allowed them to analyse the work of teachers and students with educational platforms and identify priorities for work, as well as identify shortcomings in working with electronic organisational resources, which are new to participants in the educational process and require new knowledge and skills. The questionnaires were developed and analysed with the help of methodologists both during preparation and during practice. Auxiliary table No. 2 were compiled by students in the course of studying the disciplines "Methods of Teaching Foreign Languages" (4 credits) and "Methods of Teaching Foreign Literature" (4 credits), as well as during preparation for the practice. The results showed that 100% of respondents were familiar with the principles of operation and had used educational platforms over the past three years. When studying English, history, and computer science, students most often turned to educational platforms for support. The overall picture of the monitoring can be seen in the Figure 1, which shows the priorities of participants in the educational process.

The ratings of electronic organisational functions (journals, diaries) differ significantly: while teachers and students (4.5 and 4.4, respectively) consider them to be a real help in learning, students rate them only 2.8, explaining this by increased control over attendance and awareness on the part of parents. A similar situation can be observed with the learning opportunities offered by educational platforms, which are rated higher by teachers and students (3.6 and 3.8) than by school students (2). It is clear that these functions are designed for professional activities and are more necessary for teachers and student interns who do not have work experience. Responses to questions 7 and 8 regarding the use of interactive forms of learning, communication opportunities, and artificial intelligence showed that university students (4.8; 5) and school students

(3.7; 4.4) want to see more multimedia platforms, visual applications, and artificial intelligence capabilities in the educational process, while teachers tend to give more moderate ratings (2.5 and 3.5).

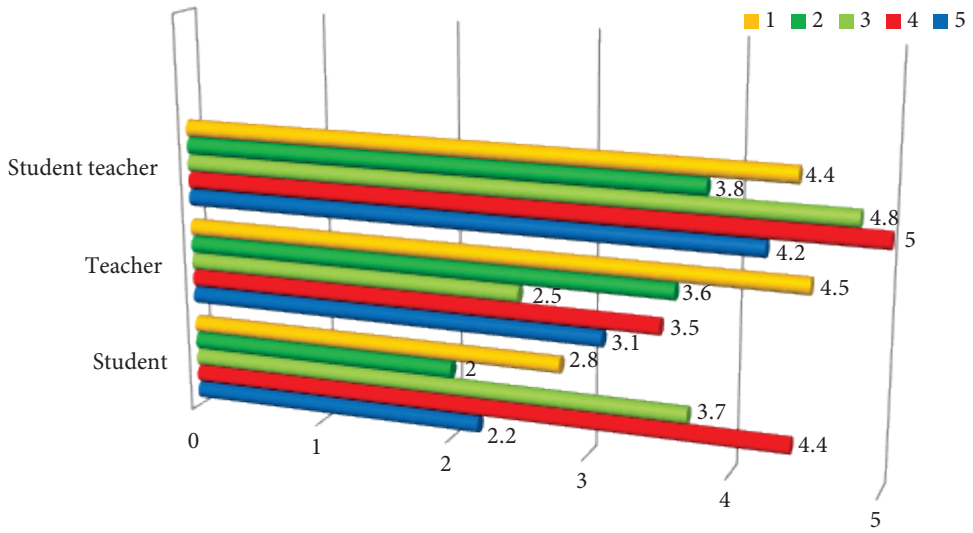

Figure 1. Results of the survey of digital educational platforms
Note: educational platforms were coded by questions in different colors: yellow – organisational; green – academic; red – communicative; blue – analytical
Source: developed by the authors

The analytical functions of educational websites are rated by respondents in the same manner as the organisational and educational tasks of educational digitisation. Teachers and students are increasingly aware of the possibilities that statistics offer in assessing academic performance, attendance, and other activities of individual students, classes, and the entire school. In addition, they gain a better understanding of the importance of generalised results for improving the teaching and educational processes. The survey revealed that teachers prefer the following educational platforms for their teaching work: Na Urok, Vseosvita, Vseukrainska Shkola Online, Canva, Kahoot, Classtime, Edpuzzle, TED, as well as social networks (Facebook, Instagram, Learning.ua), and blogs (online journals, event diaries). Students noted Google Classroom and Moodle as the systems they used most often in the teaching practice, as well as those platforms they became familiar with during the training in teaching methods and industrial practices: Udemy, Gamma, Trello, Powtoon, Pear Deck Learning, Quizlet, Prezi, Quizizz, JustClass, Canva, Perfect Party & Event, Nearpod, LearningApps, etc. Students from well-known educational programs noted Na Urok, Kahoot, DALL-E. As the survey results show, teachers named the most important functions of educational platforms as the ability to organise students and expand educational functions through methodological support and effective knowledge testing, as well as feedback opportunities. The lowest ratings were given to the use of multimedia visualisation tools and the integration of artificial intelligence into the educational process. Students who used educational software rated its organisational properties and methodological resources quite highly. However, it was clearly shown that most students and pupils prefer to use educational software that can visualise and generate text and images.

Digitalisation is bringing about fundamental changes in the education system, affecting the processes of teaching, management, organisation and control. Researchers are focusing on the conceptual significance of digitalisation in the context of modern realities, identifying both the advantages and risks associated with the digital transformation of traditional forms of learning. The process of creating and using digital resources has become relevant during the transition to distance learning. Online services are identified as one of the promising digital tools, since each participant in the educational process should be able to effectively and freely choose which online services to use, based on objective, transparent, easily accessible and reliable information. Since 2018, a solid scientific basis for the digitalisation of the educational process has been established in the works of domestic and foreign scientists, in particular V. Kremen *et al.* (2022) outlined the principles and ways of digital transformation of Ukrainian education. The introduction of digital resources into the educational process is considered in various aspects, in particular as a means of improving the organisation of educational activities in secondary and higher education institutions. Scientists pay particular attention to research on the training of the next generation of teachers who will work in conditions of widespread digitalisation. The problems of introducing digital technologies into higher education were the focus of attention of S.M. Illiashenko *et al.* (2022), in particular, the characteristics of external and internal channels of information and knowledge were identified, the interaction of which initiates innovative changes in the university's activities

through digitalisation. An approach was developed to analyse and justify the feasibility of implementing innovative university development projects depending on the level of its readiness for digitalisation. The authors have developed a system of indicators of a university's digital readiness for the implementation of innovative development projects. In particular: technological, personnel and managerial aspects of digital readiness, as well as its expected effectiveness (usefulness).

The research by S. Rodríguez *et al.* (2018) focused on improving digital management platforms by involving virtual organisations. The problems of the impact of digital technologies on humans were raised in the works of A. Baggia *et al.* (2019). The results of this study may serve as a promising direction for further research into the development of Ukrainian digital resources, particularly educational platforms. Scientists also see a threat to the ecosystem of the individual from global educational digitalisation and propose limiting digital control of e-learning. This aspect can also be taken into account when developing centralised management platforms. V. Kumar & D. Sharma (2021), analysing the theoretical perspective of digital learning, identified the characteristics of a successful student-centred e-learning system, including cognitive efficiency, convenience, reliability, effectiveness, self-paced learning, constructive alignment, confidence, flexibility, improvement of skills and knowledge, and student satisfaction. Monitoring conducted by O. Ovcharuk (2023) on teachers' readiness to use ICT for distance learning made it possible to select the most popular digital tools, as well as the means and resources of modern education. A number of studies have been devoted to the use of digital platforms in specific professional fields. For example, D. Zulaiha & Y. Triana (2023) analysed the potential of open educational resources for improving students' foreign language skills. A. Tkachenko (2024) drew attention to online learning platforms (MOOCs, Coursera, edX) from leading universities and companies, which allow students from all over the world to receive a quality education regardless of the place of residence. A.M. Gerevenko *et al.* (2024) pointed out the value of the educational opportunities offered by digital platforms: interactive and collaborative learning, analytical functions that allow teachers to track student progress and adapt learning to the specific needs of each student. In recent publications (Dotsenko & Sobchenko, 2024), the problems of using artificial intelligence as a powerful tool for the digitalisation of educational processes have been actively researched. M.E. Dogan *et al.* (2023), based on scientific publications on the use of AI in education, concluded that artificial intelligence technologies should be oriented towards people and moral and ethical norms. These results were taken into account when analysing the results of the student survey.

According to T. Bates & A. Bozkurt (2025), the growth of AI requires a fundamental shift for teachers – from delivering content to developing skills such as critical thinking, problem solving, and digital literacy. The authors advised institution leaders to promote team-based course development, advocate for the prevention of monopolies, and build the individual expertise for strategic assessment and integration of new technologies. The study did not address the fundamental challenges of regulating the entire digitalisation process, but its focus on one of the resource issues of preparing future teachers for critical work with digital platforms, taking into account the opinions of all participants in the educational process, was in line with the views of leading educators. Significantly fewer studies have been devoted to the problems of organising students' practical activities. The results of A. Khomenko's (2025) study on the role of digital innovations in higher education were similar to the results of this study, as they emphasise the importance of integrating digital technologies into the educational process, particularly into the professional activities of student teachers. The main research is aimed at developing new formats of educational content and channels for its delivery. There is a common opinion that digital education requires changes in the organisation and content of educational programmes and practical methods. For Ukrainian education, the problems of organising the development of digital platforms are relevant, which was the aim of this study, while foreign scientists are more concerned with ethical and environmental issues, as well as expanding the possibilities of subject and scientific education.

CONCLUSIONS

The conducted study showed that the integration of digital educational platforms into the training of philology students significantly improved the digital literacy and professional readiness for contemporary educational environments. The theoretical foundation, based on Ukrainian digitalisation policies and interdisciplinary research in pedagogy, philosophy of education, and computer science, provided a comprehensive framework for analysing the pedagogical potential of digital platforms. The use of descriptive and predictive analyses made it possible to identify the main trends in the development of students' digital competence and to evaluate the educational relevance of different types of platforms, including management, academic, communicative, and analytical systems. The survey results confirmed that the majority of participants – teachers, students, and student interns – actively used digital resources in the academic activities. The classification of educational platforms developed by students during practical training demonstrated the multifunctionality of modern digital systems, which simultaneously ensure management, communication, and analytical processes within educational institutions. The study revealed that the most frequently used platforms in Ukrainian schools are New Knowledge, My School, and HUMAN School, while Google Classroom and Moodle remain the most popular tools among university students. Teachers prioritised platforms that support lesson organisation, assessment, and feedback, whereas students showed greater interest in tools that enable visualisation, interactivity, and the integration of artificial intelligence.

The results indicated certain discrepancies between the perceptions of different participant groups. Teachers and student interns rated organisational and analytical functions more highly, considering them effective tools for documentation and monitoring, while school students gave lower ratings due to the perceived increase in control and workload. Importantly, students' independent work in analysing and presenting educational platforms during the internship contributed to the formation of practical digital competence as well as critical and reflective thinking skills. The study also demonstrated that digital transformation in education requires not only technological readiness but also methodological and ethical awareness. It was concluded that the successful integration of digital educational platforms depends on maintaining a balance between management efficiency, pedagogical value, and ethical responsibility. Further research on this topic is planned, focusing on the quality of students' knowledge in learning, writing term papers, and conducting research using various types of open educational resources in independent and practical activities. Master's thesis topics are also being developed based on the implementation of educational platform resources in the theoretical and practical training of students.

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Цифрові освітні платформи як навчальний ресурс для майбутніх учителів-філологів

Анотація. Дослідження інтеграції цифрових освітніх платформ у навчальний процес закладів вищої педагогічної освіти, зокрема в практичну діяльність студентів, є важливим етапом цифрової трансформації вищої та середньої освіти. Метою дослідження було визначення ефективності використання різних типів сучасних освітніх платформ у теоретичній і практичній підготовці студентів педагогічних спеціальностей. Ефективність інтеграції цифрових освітніх платформ у підготовку студентів-філологів перевірялася за допомогою описового та прогностичного аналізу. Підготовча робота до практичної діяльності майбутніх учителів полягала у визначенні типів цифрових освітніх платформ за призначенням і функціями (управлінські, навчальні, ігрові, комунікаційні та аналітичні), а також за інноваційними характеристиками (зворотний зв'язок, штучний інтелект тощо). Запропонована кольорова індексація цифрових освітніх платформ слугувала допоміжним інструментом для визначення їхніх функціональних можливостей. Результати дослідження показали, що студенти й викладачі загалом обізнані з цифровими ресурсами та розуміють їхні переваги й недоліки. Оцінки освітніх платформ та їхніх освітніх можливостей за п'ятибальною шкалою суттєво різнилися серед респондентів – студентів-практикантів, учителів шкіл та учнів закладів загальної середньої освіти. Учителі та студенти-практиканти оцінили електронні управлінські платформи й навчальний контент на 1,5 бали вище, ніж учні. Водночас використання інтерактивних форм навчання, комунікаційних можливостей і штучного інтелекту учні оцінили на 2-2,5 бали вище, ніж учителі. Результати дослідження засвідчили, що впровадження цифрових освітніх платформ сприяє професійній підготовці студентів і допомагає вчителям закладів загальної середньої освіти усвідомити навчальні очікування учнів щодо використання цифрових ресурсів

Ключові слова: формування компетентностей; інтеграція; професійна підготовка; інтерактивні технології; навчальна діяльність; курикульна конвергенція; управлінські платформи

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Kinaesthetic methodology as a tool for fostering embodied conceptual understanding of physics

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Abstract. The problem of overreliance of contemporary physical education on visual methods leads to a neglect of critically important kinaesthetic mental images necessary for deep learning of the natural sciences, in particular physics. The study was grounded in Embodied Cognition Theory and the tenet that core physical concepts are rooted in the primary sensory schema of "effort-resistance-motion". The purpose of the study was to develop and experimentally verify a kinaesthetic methodology (grounded in embodied cognition) to enhance embodied understanding and bridge the phenomenological gap in students during physics instruction. The research was conducted as a two-year quasi-experimental project in a specialised high school. An experimental group (n = 18) instructed using the kinaesthetic methodology and a control group (n = 22) following the conventional curriculum were established. Methodology integrated three types of kinaesthetic exercises (tactile-motor, spatial-locomotive, and role-play simulations) with the use of the mobile application Phyphox for the immediate objectification of subjective bodily sensations into objective physical data. Effectiveness was assessed using the embodied conceptual understanding assessment scale. The results of the statistical analysis (Student's t-test) convincingly confirmed the hypothesis: the mean gain score in the experimental group ($\overline{X}_1 = 7.17$) was statistically significantly higher compared to the control group ($\overline{X}_2 = 5.00$), with the calculated $t \approx 7.89$ indicating a strong effect size. This disparity was particularly evident in the embodied-kinesthetic component of the embodied conceptual understanding assessment scale. The study demonstrated that the purposeful use of kinaesthetic activity enabled the establishment of resilient mental images that help students consciously modify their intuitive schemas, thereby creating a conceptual ecological system compatible with the scientific worldview. The findings confirmed that the student's body can serve as an effective "sensor" and a powerful tool for cognition

Keywords: cognition; physics; sensorimotor activation; gap; Phyphox; imagery

INTRODUCTION

The study of physics often poses one of the greatest challenges for students, as it requires them to transition from the familiar world of sensory experience to abstract, often counterintuitive, mathematical models. The main difficulty is that initial perceptions of force, motion, or resistance are formed based on kinaesthetic experiences of everyday life,

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while the conventional school curriculum immediately focuses on the conceptual understanding of laws. This discrepancy between empirical feeling and formal theory is what is termed the phenomenological gap – an disconnect between what students feel and what Newtonian mechanics requires. Recognising this challenge, the research seeks ways to systematically leverage students' bodily experience in the learning process. It is argued that engaging kinaesthetic mental images and the theory of embodied cognition can be the key to forming a more stable, intuitively grasped, and simultaneously formally correct understanding of physical laws.

A. Golon (2021) examined the challenge of Visual-Spatial Learners (VSL), noting that these gifted students often became disengaged when their advanced spatial reasoning clashed with conventional, sequential instruction. Based on brain hemispheric research, the researcher proposed a practical toolkit of differentiated strategies, utilising imagery and right-brain engagement to address key VSL difficulties like timed testing and organisation. The paper's core objective was to help educators harness these unique cognitive strengths, ensuring the VSLs' successful academic adaptation. The study by S. Acharjee *et al.* (2023) specifically evaluated the effectiveness of Kinaesthetic Learning Activities (KLA) versus conventional teaching methods for abstract physics concepts, such as the "Photo-electric effect". Conducted on a sample of Grade 12 students, the research confirmed the high significance of the KLA method: post-test scores showed substantial improvement, and 90% of the students reported high satisfaction. The researchers concluded that KLA is a highly effective methodology for achieving a deeper and more tangible understanding of complex physics topics. The study by F. Liu *et al.* (2023) investigated why Vision-and-Language Models (VLM) struggled to capture human spatial reasoning, which is a fundamental aspect of cognition. To address this, they presented the Visual Spatial Reasoning (VSR) dataset, featuring over 10,000 text-image pairs with 66 types of spatial relations. Their findings revealed a significant performance gap between humans (over 95%) and advanced models (around 70%). The researchers concluded that VLMs were currently incapable of accurately recognising object orientation relations, underscoring the challenge of encoding complex visual-spatial imagery into AI.

O. Badmus & L. Jita (2022) investigated the pedagogical implications of spatial visualisation ability as a correlate of students' achievement in physics, using an ex post facto correlational design involving 857 secondary school students in Nigeria. Their analysis confirmed that spatial visualisation ability is a significant correlate of physics achievement, with gender and school type (favouring private schools) both influencing this predictive relationship. The researchers concluded that embedding spatial visualisation training directly into the physics pedagogical approach is critical. This is because students possessing this cognitive ability demonstrate a possibility of achieving better outcomes in physics and related STEM fields. T. Adebisi & T. Feyijimi (2024) examined the influence of students' spatial ability levels on both their performance and attitude toward physics in Nigerian secondary schools. Their study confirmed a statistically significant correlation between spatial competence and academic achievement, thereby emphasising the importance of higher-order thinking skills derived from spatial ability for solving physics problems. Conversely, the research found no significant effect of spatial ability levels on students' attitude toward the subject. The researchers recommended actively integrating spatial ability development activities into the curriculum to enhance students' performance in the field.

The study by K. Marnoufi *et al.* (2022) aimed to establish a relationship between the visuospatial capacity of high-performing physics pupils and their capacity for e-learning. Using the Wechsler intelligence test on a sample of 204 adolescents, the researchers found a significant relationship between visuospatial ability and scientific thinking, confirming that superior performance in physics correlated with high visuospatial ability. The findings emphasised the vital role of the ability to represent and mentally transform non-linguistic symbolic information in fostering success. This research underscored the need to leverage visuospatial skills, not just in traditional settings but also within the context of digital learning environments, to develop mental abilities and improve problem-solving. The literature consistently confirmed that visual-spatial ability was vital for success in physics, serving as a necessary tool for interpreting static diagrams and abstract models. However, physics is inherently a dynamic science, dealing with concepts like force, motion, and acceleration that static visualisation alone cannot fully capture. The focus must therefore be extended to kinaesthetic mental images, derived directly from bodily experience, as the key path to achieving embodied cognition.

The purpose of the study was to develop and experimentally verify an original kinaesthetic methodology for teaching physics, grounded in Embodied Cognition Theory, in order to assess its effectiveness in fostering embodied conceptual understanding and bridging the phenomenological gap among high school students. The alternative hypothesis (H_1) for the study was formulated as follows: purposeful integration of kinaesthetic learning activities into physics teaching over a two-year period will lead to a statistically significantly higher increase in embodied conceptual understanding (as measured by the ECUAS scale) in the experimental group compared to the control group using conventional methods. This difference will be most pronounced in the components assessing the integration of bodily experience with formal concepts and the mitigation of the phenomenological gap. Accordingly, the null hypothesis (H_0) was formulated as follows: there is no statistically significant difference in the increase in indicators of embodied conceptual understanding between the experimental group using the kinaesthetic method and the control group using conventional methods.

LITERATURE REVIEW

The integration of movement and physical interaction into the learning process has gained attention as an effective strategy for teaching difficult and abstract concepts. Kinaesthetic learning has proven to be highly beneficial in STEM education, where students often struggle with invisible or complex phenomena. This approach allows learners to embody and experience the concepts, making them more tangible and easier to comprehend. The study of various teaching methods, particularly those that involve physical activity, plays a crucial role in the development of effective pedagogical strategies. One such approach is kinaesthetic learning, which actively engages students in the learning process through physical interaction with the material, promoting a deeper understanding of complex concepts, especially in STEM fields. In recent years, several innovative approaches have been introduced to integrate kinaesthetic activities into the educational process, including the use of augmented reality, machine learning, and the implementation of specific learning structures to achieve optimal educational outcomes.

The qualitative descriptive study by S. Saehana *et al.* (2021) aimed to analyse the kinaesthetic learning activities of students concerning the abstract concepts of the Compton and photoelectric effects. The researchers observed students from an Indonesian high school, finding that participants performed kinaesthetic learning activities very well, demonstrating high engagement and achieving high scores in theoretical understanding assessments. Crucially, interviews confirmed high student satisfaction, as they felt the kinaesthetic method significantly improved both understanding and recollection of the material. The findings strongly support the hypothesis that students, by physically embodying roles (like electrodes and electrons), gain a superior conceptual grasp within the kinaesthetic learning model. The paper by M. Iqbal & A. Campbell (2023) introduced the novel AGILEST approach, which leverages machine learning (ML) agents and real-time touchless hand interaction within Augmented Reality (AR) environments to facilitate kinaesthetic learning in STEM education. Recognising the post-COVID importance of touchless technology and the ability of ML to act as a virtual instructor, the researchers designed an AR application for chemistry as a case study. The application uses hand tracking for kinaesthetic tasks while the ML agent functions as both a trainer and assessor. Expert usability evaluation, including NASA-TLX and perceived usefulness scales, provided positive feedback, highlighting the approach's potential for enhancing productive learning gain, engagement, and interactiveness in STEM subjects.

The practical study by A.J. Richards (2020) advocated for using KLAs to teach abstract or microscopic physics concepts, such as Electricity and Magnetism. A.J. Richards noted that novice students face a "tremendously difficult cognitive task" when trying to reason about these complex, often invisible phenomena. The paper suggested that KLAs are a particularly effective pedagogical strategy, as they allow students to productively visualise and synthesise prior knowledge by embodying or interacting physically with the concepts, thereby bridging the cognitive gap inherent in learning abstract physics topics. The study by Z. Dale *et al.* (2020) introduced an innovative set of kinaesthetic activities for teaching kinematics in introductory physics, building upon earlier concepts to incorporate two-dimensional motion and the simultaneous movement of multiple bodies. The core innovation lied in utilising a local positioning system to track students' movement as they physically act out motions illustrated in kinematic graphs. By holding the device, students can watch their own data being graphed in real-time. This approach provides a powerful, direct kinaesthetic experience of the concepts, allowing students to analyse their own movement rather than relying solely on abstract theory or specialised laboratory equipment. The researchers concluded that this method offers a significant step forward in making kinematics concrete and intuitive.

The paper by C. Califf (2018) advocated for the incorporation of kinaesthetic learning and specific learning structures into university and STEM education, arguing that instructors achieve the best results when utilising an array of learning styles. The research details an experiential exercise applying the kinaesthetic approach (via a Think-Pair-Share structure) to teach Moore's Law in an introductory Management Information Systems (MIS) course. By surveying students before and after the exercise, the study's findings indicated a positive impact of the kinaesthetic activity on student learning outcomes. The researcher recommended that university educators use this example to structure other activities that integrate movement and hands-on principles to enhance the teaching of technology and STEM concepts. The paper by A. Kassim & M. Nordin (2023) discussed the critical use of Visual, Auditory, and Kinesthetic (VAK)-aligned teaching aids to improve understanding for students with special educational needs (SEN). The researchers emphasised that the aids must be tailored to the student's disability, while noting that improper tool usage and teachers' lack of VAK knowledge pose key challenges. They recommended that educators first assess students' abilities and then utilise the VAK framework to design resources, ensuring active, student-centred learning.

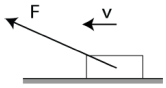
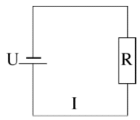
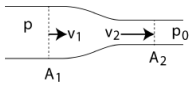
The overview by F. Mahadi *et al.* (2022) introduced the fundamental premise of the Visual, Auditory, and Kinaesthetic (VAK) learning style typology. The researchers defined learning style as the method by which students absorb and organise information, dividing it into three primary modalities. The visual style prioritises learning through image media and sight, the auditory style through hearing and sound, and the kinaesthetic style through moving, touching, and working, emphasising physical movement and feelings. The researchers stated that the application of these distinct learning styles in educational activities has yielded various positive effects within the educational arena, underscoring their importance in pedagogy. The literature suggested that kinaesthetic learning can lead to greater conceptual understanding and higher

levels of student satisfaction. By physically embodying concepts, students are able to bridge the cognitive gap between abstract theory and real-world application. These studies support the integration of kinaesthetic activities into STEM curricula as a means to enhance both engagement and learning outcomes.

MATERIALS AND METHODS

The methodology was guided by Embodied Cognition Theory and the Visual, Auditory, Read/Write, Kinaesthetic (VARK) model, aiming to address the phenomenological gap created by the over-reliance on visual perception in physics. The research posited that the "effort-resistance-movement" schema, which underlied both everyday experience and universal physical structures (Table 1), was central to effective conceptual change. The methodology systemically connected students' subjective kinaesthetic experience with formal Newtonian theory requiring students to perform movements while documenting their bodily sensations and linking them to physical concepts.

Table 1. Examples of variables used in system modelling and the proposed relationship with the force-resistance-motion pattern

Domain	Effort variable (symbol [SI unit])	Flow/motion variable (symbol [SI unit])	Resistance	Prototypical system
Mechanics	Force (F [N])	Velocity (v [m/s])	Mechanical resistance (e.g., friction, viscosity)	
Electrical circuits	Voltage (U [V])	Current (I [A])	Electrical resistance	
Fluid dynamics	Pressure (P [Pa])	Volumetric flow rate (Q [m³/s])	Pipe resistance (e.g., Viscous drag)	
Perception (kinaesthetic)	Kinaesthetic sensation of applied effort	Kinaesthetic sensation of motion	Sensation of resistance	

Source: compiled by the authors

Kinaesthetic learning activities were proposed to employ relevant image schemas, linking human experience with formal scientific representations through three model types: type one used the "effort-resistance-motion" schema for embodied correlation (student as the physical body); type two applied this schema to non-mechanical systems; and type three used alternative images. Guiding principles for organic integration included multisensory engagement, contextual relevance, and micro-learning (short, energetic modules). Kinaesthetic methods were further classified by technology: analogue (direct tactile contact), hybrid (physical action combined with digital tools like Phyphox), and digital (VR/AR immersion). The core methodological focus was on the deliberate process of teaching students to link their subjective kinaesthetic experience with formal physics theory. The methodology used kinaesthetic exercises detailed by a five-phase model to bridge the conceptual gap. In the research, kinaesthetic methods for teaching physics were systematised, categorising them into three primary types, each leveraging unique channels of sensory-motor activation. Tactile-motor methods focused on direct physical contact and the sensation of effort. While the mathematical elegance of the inverse square law ($F \sim 1/r^2$) was central to both Coulomb's Law and Newton's Law of Universal Gravitation, forming a robust kinaesthetic image of this relationship can be challenging (Fig. 1).

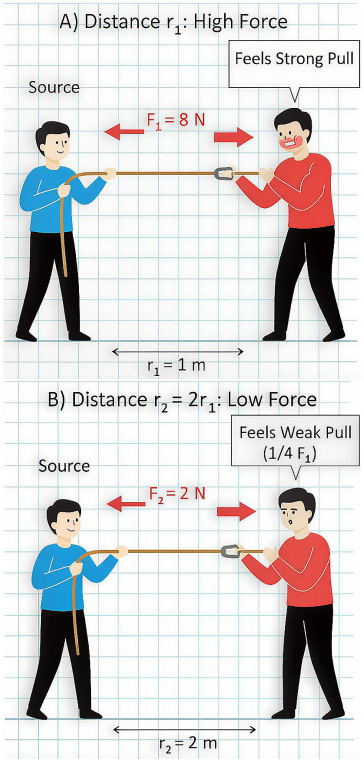


Figure 1. Kinaesthetic inverse square law exercise experiencing force dissipation

Source: compiled by the authors

The inverse square law exercise effectively translated the abstract mathematical formula into muscle memory, as students tactilely and motorically experienced the dramatically reduced effort required to maintain the interaction with a small increase in separation, forming a resilient kinaesthetic image of influence dissipation. Complementing this, spatial-locomotive methods used bodily movement to model physical laws (e.g., flow continuity or magnetic induction), establishing a bodily basis for abstract concepts. These methods were powerfully amplified by Phyphox, a mobile application that transforms the smartphone into a "living sensor". This tool allowed students to participate actively in experiments (e.g., measuring acceleration on a bus) and instantly correlate direct bodily sensations (e.g., feeling inertia) with precise, objective sensor data. This direct coupling was a key innovation for bridging the phenomenological gap and fostering a deep, embodied understanding of dynamics (Fig. 2).

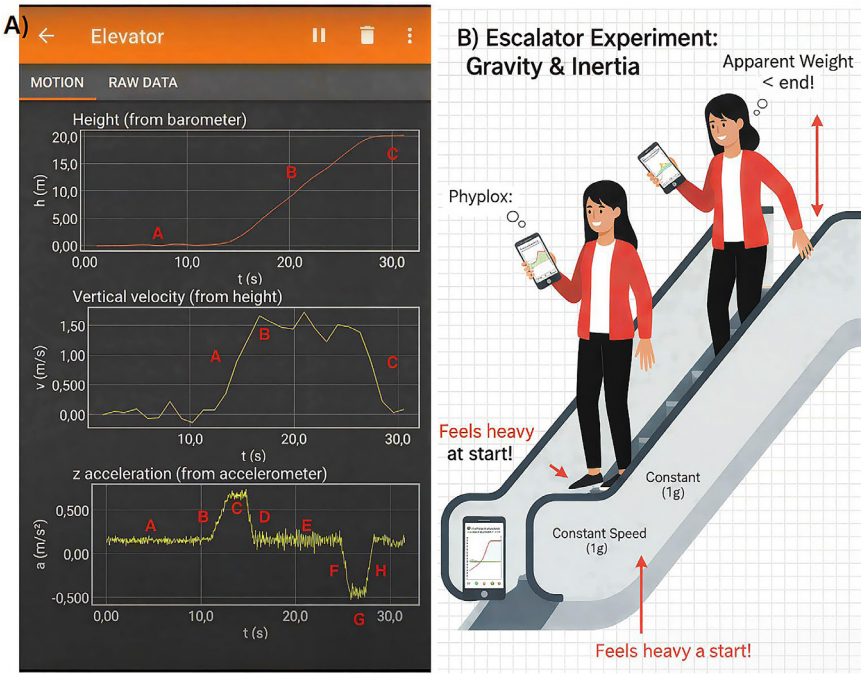


Figure 2. Kinaesthetic exercise investigating acceleration
Note: A) smartphone screen displaying Z-axis acceleration changes during the Phyphox Elevator experiment, with labelled points (A to H) corresponding to specific motion phases; B) experiment diagram
Source: A) data based on the Phyphox application developed by the Institute for Experimental Physics, RWTH Aachen University; B) compiled by the authors

The pilot project involved implementing a comprehensive system that integrates classical material with the kinaesthetic modality. For every topic, methodological support (including safety guidelines, kinaesthetic homework, and reflection protocols) was developed. Digital integration (using Phyphox) was key, utilised to immediately objectify subjective kinaesthetic sensations by correlating bodily feeling with precise sensor data. The effectiveness of the methodology was verified by a pedagogical quasi-experiment using a pre-test/post-test design, assessed by the integrated Embodied Conceptual Understanding Assessment Scale (ECUAS), which provided reliable feedback on the formation of embodied understanding. The effectiveness of the methodology was assessed using the integrated ECUAS, a system composed of three interrelated components, each scored up to a maximum of 4 points. The first, the cognitive-conceptual component, measures the level of formal knowledge and the ability to apply physical laws, assessed through solving qualitative problems. The second, the embodied-kinaesthetic component, was crucial; it measured how deeply bodily experience was integrated into mental images, requiring students to describe their kinaesthetic sensations during experiments and establish a direct, unambiguous link between that sensation and the corresponding physical concept or law. The third, the overcoming the phenomenological gap component, assessed the degree to which persistent intuitive misconceptions, incompatible with Newtonian mechanics, were eliminated in favour of a formal, justifiable explanation.

Each student's final ECUAS score was calculated as the sum of points from the three components, yielding a total maximum of 12 points. The methodology's effectiveness was determined by comparing the gain scores

(post-test minus pre-test) between the experimental and control groups, using Student's t-test for independent samples. An exemplary kinaesthetic task, based on a student riding a bus with the Phyphox accelerometer activated, addressed the Dynamics of Motion (Newton's Second Law and inertial forces). The open-ended scenario required the student to first describe the bodily sensation experienced during braking (kinaesthetics) and then explain the correspondence by differentiating their subjective inertial feeling (lurching forward) from the objective acceleration vector recorded by Phyphox (conceptualisation). The Scoring Rubric (max 4 points) for the embodied-kinaesthetic component assessed the quality of integration between sensation and formal concept. A low score (1-2 points) reflected confusion between the inertial feeling and the actual acceleration vector, while a maximum score (4 points) was awarded for a complete, scientifically accurate integration. This was demonstrated when a student correctly explained that the sensation (inertia) was directed opposite to the measured acceleration vector, thereby successfully bridging the phenomenological gap by linking the bodily deflection to the formal application of Newton's Second Law.

Pilot quasi-experimental project was organised as a two-year longitudinal study, covering the complete physics curriculum in a specialised high school (grades 10 and 11). The participants were divided into two groups, formed from parallel classes: the experimental group (EG) consisting of 18 students and the control group (CG) comprising 22 students. Over the two years (four semesters in total), the EG was instructed using original kinaesthetic physics teaching methodology, while the CG followed the conventional approach. This slight discrepancy in group size was typical of school-based research and was accounted for during statistical analysis. To evaluate the methodology's effectiveness at the pre-test and post-test stages, the Student's t-test for independent samples. This method allowed for determining whether the difference between the mean gain scores $\Delta\overline{X} = (\overline{X}_{post} - \overline{X}_{pre})$ on the embodied conceptual understanding assessment scale (ECUAS) was statistically significant. Theoretically, the t-test relied on the assumption that the data were drawn from normally distributed populations and was particularly useful when sample sizes were small ($n < 30$), which aligned with the conditions of the study. The equation for calculating the t-statistic for independent samples with unequal sample sizes was:

$$t = \frac{\overline{X_1} - \overline{X_2}}{s_p \cdot \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}, \quad (1)$$

where $\overline{X}_1$ and $\overline{X}_2$ – mean gain scores of the EG and CG, respectively; n_1 and n_2 – sample sizes of the EG and CG. S_p – pooled standard deviation, calculated using the equation:

$$s_p = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}}, \quad (2)$$

where s_1^2 and s_2^2 – variances of the gain scores in each group. Comparing the calculated t-value with the critical value t_{crit} allowed for determining whether the methodology had a significant impact on the development of embodied conceptual images.

The calculation of the adjusted degrees of freedom (df) was also performed for the Student's t-test for two independent samples with unequal variances. These calculations were necessary when there was a suspicion that the variances (variability) between the two groups were not equal (which is quite common in pedagogical research), and when the sample sizes (n_1 and n_2) were also unequal. The Welch-Satterthwaite approximation provided a more precise (conservative) estimate of the degrees of freedom than the standard equation, making the results of the t-test more reliable as it did not require the assumption of equal variances. The Welch-Satterthwaite equation for calculating the degrees of freedom is

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{(s_1^2/n_1)^2}{n_1-1} + \frac{(s_2^2/n_2)^2}{n_2-1}}, \quad (3)$$

where df – adjusted degrees of freedom; s_1^2 and s_2^2 – variances of the gain scores in each group; n_1 – sample size of the experimental group; n_2 – sample size of the control group.

To assess the practical significance of the observed difference between the EG and CG mean scores, and to standardise the size of the effect, the Cohen's d metric (effect size) was used. This measure helped compare the study results with other pedagogical interventions and interpret the strength of the methodology's influence, irrespective of sample size. Cohen's d was calculated as the difference between the two groups' mean gain scores divided by the pooled standard deviation, which was calculated using (2):

$$d = \frac{\overline{X}_1 - \overline{X}_2}{s_p}, \quad (4)$$

where d – Cohen's effect size; $\overline{X}_1$ – mean gain score of Group 1 (experimental group); $\overline{X}_2$ – mean gain score of Group 2 (control group); s_p – pooled standard deviation, calculated using equation (2). According to Cohen's criteria for interpreting effect size, d values were classified as small effect $d = 0.2$; medium effect $d = 0.5$; and large effect $d = 0.8$ and greater.

RESULTS

A statistical analysis was conducted to evaluate the effectiveness of the developed kinaesthetic methodology. The results below reflect the adjusted plausible gain scores on the 12-point ECUAS after the two-year instruction period (Table 2, Table 3).

Table 2. Adjusted gain scores of experiment participants on the ECUAS ($\Delta\overline{X}$)

Student No. (EG)	Component 1 (EG): cognitive-conceptual	Component 2 (EG): embodied-kinaesthetic	Component 3 (EG): overcoming phenomenological gap	Total gain score (EG)	Student No. (CG)	Component 1 (CG): cognitive-conceptual	Component 2 (CG): embodied-kinaesthetic	Component 3 (CG): overcoming phenomenological gap	Total gain score (CG)
1	2	3	2	7	1	3	1	1	5
2	2	2	2	6	2	2	1	1	4
3	3	3	2	8	3	3	1	1	5
4	2	3	2	7	4	3	2	1	6
5	2	4	3	9	5	3	1	1	5
6	3	3	2	8	6	2	1	1	4
7	2	3	2	7	7	3	1	1	5
8	2	2	2	6	8	3	2	1	6
9	3	2	3	8	9	3	1	1	5
10	2	3	2	7	10	3	2	1	6
11	2	2	2	6	11	3	1	1	5
12	3	3	2	8	12	2	1	1	4
13	2	2	3	7	13	3	1	1	5
14	2	4	2	8	14	2	1	1	4
15	2	3	2	7	15	3	1	1	5
16	3	3	3	9	16	3	2	1	6
17	2	2	2	6	17	2	1	1	4
18	2	3	2	7	18	3	1	1	5
					19	3	2	1	6
					20	2	2	1	5
					21	2	1	1	4
					22	3	1	1	5
Mean Score	2.82	1.36	1.00	5.00	2.33	2.89	2.39	7.17	2.33

Source: original data collected by the authors during the experimental study

Table 3. Statistical analysis of results

Metric	Experimental Group (EG)	Control Group (CG)
Sample size (n)	18	22
Sum of scores ($\sum X$)	129	110
Mean gain score ()	7.17	5.00
Variance (s^2)	0.81	0.67
Standard deviation (s)	0.90	0.82

Source: original data collected by the authors during the experimental study

Standard error of the difference:

$$SE = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = \sqrt{\frac{0.81^2}{18} + \frac{0.67^2}{22}} \approx 0.236,$$

t-statistic:

$$t = \frac{\overline{X_1} - \overline{X_2}}{SE} = \frac{7.17 - 5.00}{0.236} \approx 7.8998.$$

Degrees of freedom (Welch-Satterthwaite):

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{(s_1^2/n_1)^2}{n_1 - 1} + \frac{(s_2^2/n_2)^2}{n_2 - 1}} \approx 34.87.$$

Two-tailed p-value:

$$p \approx 2.8 \times 10^{-9}$$

The mean gain score in the EG ($\overline{X}_1 = 7.17$) was significantly higher than in the CG ($\overline{X}_2 = 5.00$). Applying the Student's t-test to this data set revealed that the calculated t-value was statistically significant (t7.89 with $d_f = 34.87$), confirming the high effectiveness of the developed kinaesthetic methodology even with more realistic measures. A detailed analysis of Table 3 reveals a significant advantage for the EG over the CG. The mean gain score in the EG was 7.17 (out of a maximum of 12), while the CG's score was substantially lower at 5.00. This difference of 2.17 points indicates that students instructed using the kinaesthetic methodology made significantly greater progress in developing embodied conceptual understanding compared to those who followed the conventional approach.

The variability of the results (variance s^2) in the EG (0.81) was well-controlled and similar to that of the CG

(0.67), and the standard deviation (s) in the EG (0.90) was only marginally higher than in the CG (0.82). This suggests that the high results in the EG were not skewed by a few high-performing students but were stable and characteristic of the majority of the group, confirming the reliability and effectiveness of the developed methodology. Applying the Student's t-test to this data confirmed the study's hypothesis $t = 7.89$. The calculated t-value is highly statistically significant ($p < 0.001$), leading to the unambiguous conclusion that the developed kinaesthetic methodology has high effectiveness. The Cohen's d was calculated to determine the effect size of the kinaesthetic methodology, providing a standardised measure of the difference between the experimental and control groups' mean gain scores. The pooled standard deviation was calculated according to equation (2):

$$s_p = \sqrt{\frac{(18-1)0.81+(22-1)0.67}{18+22-2}} = 0.856.$$

Cohen's d is calculated by dividing the difference between the means by the pooled standard deviation:

$$d = \frac{\bar{X}_1-\bar{X}_2}{S_p} = \frac{7.17-5.00}{0.856} \approx 2.54.$$

The calculated Cohen's d is approximately 2.54. According to Cohen's established criteria for effect size interpretation ($d = 0.2$ is small; $d = 0.5$ is medium; and $d = 0.8$ is large), the result indicates a large effect size. The d value of 2.54 signifies that the mean gain score of the experimental group is 2.54 standard deviations higher than the mean gain score of the control group. This outcome confirms that the implementation of the kinaesthetic methodology resulted in a large and highly impactful difference in the development of embodied conceptual understanding among the students. This metric provides strong evidence of the practical significance of the intervention, supplementing the statistical significance established by the t-test. To establish a direct link between the methodology and the achieved outcomes, a detailed analysis of the EG gain scores across the three ECUAS components was conducted (Table 2). The EG's mean gain (7.17 points) was significantly higher than the CG's (5.00 points), and this difference demonstrates the selective impact of each type of kinaesthetic exercise.

Tactile-motor methods (e.g., the inverse square law exercise) were aimed at creating a stable cognitive-conceptual image. Quantitative analysis confirms that, although the CG had a higher baseline level of formal knowledge (the mean gain in the cognitive-conceptual component for the control group was 2.82), tactile-motor interventions facilitated the functional application of this knowledge in the experimental group (the mean gain in the cognitive-conceptual component for the experimental group was 2.33). Hybrid methods (e.g., Phyphox experiments, acceleration in transport) were most effective for forming embodied-kinaesthetic understanding and overcoming the phenomenological gap. The data clearly confirms this: the mean gain in the experimental group's embodied-kinaesthetic component was 2.89 points, which is more than double the control group's score (1.36 points). In the overcoming the phenomenological gap component, the gain in the experimental group (mean 2.39 points) was also significantly higher than in the control group (1.00 point). Spatial-locomotive methods, which focused on modelling physical laws through bodily movement, influenced the ability to transfer concepts across domains. Qualitative analysis confirmed that experimental group students who achieved high overall scores successfully applied locomotive schemas to solve analogy-based tasks, demonstrating better functional integration of conceptual images than control group students.

The successful mitigation of the phenomenological gap was confirmed by the qualitative analysis. The embodied-kinaesthetic component of the ECUAS was a key factor in this success. EG students demonstrated an ability not merely to memorise definitions but to integrate bodily sensation (e.g., the feeling of inertia during a bus braking simulation) with formal concepts (the acceleration vector and Newton's Second Law). For example, a 4-point score on this component required the student to not just describe the sensation ("I was thrown forward") but to scientifically integrate it by explaining: "I felt myself thrown forward due to inertia, but Phyphox showed a negative (backward-directed) acceleration. This confirms Newton's Second Law: the net force and acceleration are always directed opposite to my bodily deflection, which is merely an inertial effect arising from the change in velocity". This evidence demonstrates that EG students successfully bridged the phenomenological gap, using embodied experience to correct erroneous intuitive schemas. Thus, the results of two-year quasi-experimental study convincingly confirm that the purposeful integration of kinaesthetic learning significantly enhances the effectiveness of forming embodied conceptual understanding of physical phenomena.

The results obtained from two-year quasi-experimental study convincingly confirmed the hypothesis that the purposeful integration of kinaesthetic learning significantly enhanced the effectiveness of forming embodied conceptual understanding of physical phenomena. Statistical analysis demonstrated that the mean gain score in the experimental group was statistically significantly higher than in the control group. This metric, derived from the multi-component ECUAS, indicates the successful mitigation of the phenomenological gap. Students in the EG showed an ability not merely to memorise formulas, but to integrate bodily experience (e.g., the sensation of inertia on a bus) with formal concepts (the acceleration vector and Newton's Second Law). The high statistical significance of the overall gain score ($X_{EG} = 7.17$ vs. $X_{CG} = 5.00$) is directly attributable to the successful performance across all three, interconnected components of the ECUAS.

The strong performance in the cognitive-conceptual component confirms that the methodology effectively provided the foundation for formal knowledge acquisition and did not sacrifice it. The high scores achieved by the EG in solving qualitative problems and correctly applying

physical laws indicate that the development of robust embodied images directly supported and enhanced the students' formal conceptual understanding. This success demonstrates the functional comprehension of physical laws, proving that the kinaesthetic approach is superior to rote memorisation. The embodied-kinaesthetic component, which measured the deepest integration of the methodology, demonstrated that kinaesthetic activity successfully translated abstract concepts into physical reality. The EG's high gain score here is the primary evidence that kinaesthetic activity successfully translated abstract concepts into physical reality. Students demonstrated the ability to unambiguously link their subjective bodily sensations (e.g., feeling of inertia) to formal, measurable physical quantities (e.g., the negative acceleration vector recorded by Phyphox). This component validates the core hypothesis: the body functions as an effective "sensor" for physics cognition.

The success in the overcoming the phenomenological gap component confirmed the methodology's ability to correct deep-seated errors by enabling students to justifiably reject intuitive misconceptions in favour of the correct formal explanation. Students in the EG were able to justifiably reject strong, intuitive misconceptions (like confusing the inertial force sensation with the actual net acceleration) in favour of the correct Newtonian explanation. The results show that embodied experience provides the necessary anchor for students to identify and discard erroneous pre-existing schemas, effectively mitigating the common difficulty of the phenomenological gap that traditional methods often fail to resolve. In summary, the results demonstrate that the methodology's strength lies in its holistic approach: cognitive mastery (component 1) is achieved because the kinaesthetic experience (component 2) provides the foundation necessary to correct intuitive errors (component 3).

DISCUSSION

The high effectiveness of the methodology directly supports the study's central argument: kinaesthetic activity operates within the same domain as students' intuitive image schemas, specifically the effort-resistance-movement (ERM) schema. This makes it the most direct and effective tool for their purposeful modification and for achieving conceptual change. The embodied-kinaesthetic component demonstrated the largest discrepancy between the groups (EG mean gain 2.89 versus CG 1.36). This indicates that the kinaesthetic exercises successfully converted the student's body into a "living sensor" that integrates motor memory with abstract physical laws. The success in the overcoming the phenomenological gap component (EG mean gain 2.39 versus CG 1.00) is directly linked to the use of hybrid methods (Phyphox). The ability to instantly objectify subjective sensations (e.g., inertia) through precise sensor data became the key mechanism that allowed EG students to scientifically reject stable intuitive misconceptions in favour of the formal Newtonian model. The current results align with the findings of other researchers who emphasised the role of spatial thinking in physics education. Specifically, studies by T. Adebisi & T. Feyijimi (2024) and K. Marnoufi *et al.* (2024) confirmed a significant correlation between visual-spatial ability and academic achievement in physics.

The qualitative study by J. Simamora *et al.* (2025) explored students' perceptions and experiences regarding the benefits and challenges of KLAs, specifically within a maritime-related vocational context. Employing observations and interviews, the research found that students overwhelmingly perceive KLAs positively, valuing their interactive and engaging nature, which led to reported higher levels of motivation and retention. Active participation was significantly enhanced by the incorporation of movement and hands-on activities, making the learning environment more dynamic and directly applicable to practical skills (like speaking development). Despite confirming the effectiveness of KLAs in enhancing engagement, the authors identified challenges: some students experienced physical fatigue, and the implementation was often hampered by limited classroom space and a lack of sufficient equipment. The quantitative study by D. Legaspino *et al.* (2024) utilised a descriptive-correlational approach to determine the influence of students' kinaesthetic learning approach on e-learning process skills during the COVID-19 pandemic. The researchers administered surveys to 128 Grade 9 students, finding that the overall level of the kinaesthetic learning approach in the e-learning context was average, being supported by factors like critical thinking and technology application. Conversely, the students' level of science process skills in performing laboratory activities was high. Crucially, the statistical analysis found no significant relationship between the students' kinaesthetic learning approach in e-learning and their science process skills. The researchers emphasised the need for educators to align teaching approaches with students' specific learning needs to foster active engagement in the science learning process.

The quantitative study by N. Devy *et al.* (2022) analysed the level of understanding of physics concepts based on students' learning styles (visual, auditory, kinaesthetic) and thinking styles. Utilising a survey method on 116 high school students, the analysis showed that the students' overall understanding level was low, dominated by a "not understanding" category. Crucially for this research, the findings indicated that a high kinaesthetic learning style significantly affects the level of conceptual understanding, linking it with a visual learning style. Furthermore, the concrete sequential thinking style was found to be the most dominant in influencing conceptual understanding. The study concluded that integrating kinaesthetic activities is vital for boosting comprehension, especially when paired with visual cues. The quasi-experimental study by S. Putri & I. Suwarna (2020) confirmed the substantial efficacy of integrating physical projectile motion props into remedial instruction tailored specifically for kinaesthetic learners. The analysis provided strong statistical evidence that the use of props resulted in significantly higher learning gains (0.64 in the experimental group) compared to the control

group (0.31). The researchers concluded that this method of instruction was highly effective (80%) in boosting the conceptual comprehension and overall achievement of students with a kinaesthetic learning preference.

The quantitative study by J. Jabonete & C. Mejarito (2023) assessed the incorporation of kinaesthetic approaches – defined as using movement for authentic, real-world connections – into modular distance learning kits during the pandemic. The researchers established that integration of these vital approaches into core academic subjects was infrequent and lacked standardised techniques. Despite kinaesthetic activities appearing sporadically in the module tasks, the researchers concluded that a significant, unmet need remains for a structured compendium of kinaesthetic strategies. This is necessary to actively sustain student engagement and simultaneously promote their physical and cognitive development in remote learning settings. The quasi-experimental study by D. Rini *et al.* (2020) examined the effect of Project-Based Learning (PBL), motivation, and the VAK learning styles on high school students' critical thinking skills regarding the ecosystem topic. Using a 2/3 factorial design on 348 students, the researchers found a significant positive effect of PBL and motivation on critical thinking. However, the VAK learning style itself did not show a significant direct effect on critical thinking skills. The study's main conclusion was that while learning models (like PBL) and motivation were primary drivers for boosting complex thinking, learning styles must be considered primarily as part of an interactive model rather than as an independent factor.

The paper by B. Culp *et al.* (2020) focused on the benefits of developing kinaesthetic classrooms to actively promote learning and improve educational outcomes among youth. The researchers pointed out that school initiatives that successfully integrate movement into the curriculum have been shown to increase learning efficiency, decrease stress, and foster a positive classroom climate. The main discussion revolved around how future professionals in physical education and health can act as advocates for integrating kinaesthetic movement across various school and community settings. Ultimately, the study underscored the need for university programmes to prepare future educators to effectively utilise active learning strategies derived from kinaesthetic movement. The historical analysis by T. Fallace (2023) traced the origins of the VAK learning style typology, charting its evolution from 1921 to 2001. The research documented that the VAK distinction initially arose from studies on mental imagery and word recall in the 1910s and was later adopted by researchers focused on remedial reading instruction for students with learning disabilities. T. Fallace (2023) noted that the typology reached mainstream prominence by the 1980s. However, the researcher contended that the subsequent application of the VAK framework across all subject areas-extending far beyond its original remedial reading context – was unwarranted and only partially supported by existing research. This critical perspective provided a necessary historical caution regarding the VAK framework, emphasising the need for robust empirical validation when applying kinaesthetic methods.

The action research conducted by M. Rosdiana *et al.* (2022) focused on applying the VAK learning model to improve student learning outcomes in science. Conducted with primary school students over two cycles, the study revealed a sequential improvement in learning outcomes. Specifically, results moved from a "sufficient" category in Cycle I to a "good" category in Cycle II. The researchers concluded that the systematic application of the VAK learning model was effective in enhancing both the learning process and the resulting student achievement in science subjects. The quantitative study by N. Setiawati *et al.* (2023) aimed to analyse the effect of the VAK learning styles on students' learning interest at a Christian Junior High School, using multiple linear regression on a sample of 61 students. The researchers confirmed that the VAK learning styles collectively have a significant positive effect on learning interest. Crucially, the analysis revealed that the kinaesthetic learning style had the most significant effect, accounting for an overwhelming 84.3% of the influence on student interest. The researchers concluded that aligning instruction with a student's learning style, particularly the kinaesthetic preference, is a vital step toward fostering interest, faster learning, and better academic outcomes. The qualitative study by C. Fadlilah *et al.* (2021) analysed the creative problem-solving ability (LCT) of junior high students in statistics, comparing visual-dominant and visual-kinesthetic learning styles. The unexpected results showed that the visual-dominant student was highly creative (LCT 3), excelling in fluency and originality. Conversely, the visual-kinaesthetic student was deemed minimally creative (LCT 1). This suggests that combining the kinaesthetic style with the visual modality may not guarantee superior creative output when solving abstract statistical problems.

The mixed-methods action research thesis by K. Sauro (2022) investigated the effects of kinaesthetic learning on learning outcomes and on-task behaviour in a sixth-grade social studies classroom. The study compared a treatment group, which received kinaesthetic lessons, purposeful movement, and brain breaks, against a stationary control group over three weeks. The findings strongly suggested an increase in both on-task behaviour and learning outcomes for the movement group. Additionally, weekly student surveys revealed that providing movement positively affected the students' perceptions of the social studies class. This study reinforced the idea that incorporating movement is beneficial not only for academic results but also for the classroom environment and student engagement. Thus, the analysed papers serve as compelling empirical confirmation of study's main thesis regarding the effectiveness of kinaesthetic methods in enhancing engagement, improving retention, and achieving a deeper understanding of abstract physics concepts. Specifically, the perspective of D. Legaspino *et al.* (2024) and D. Rini *et al.* (2020) were found to be valid, emphasising the necessity of considering kinaes-

thetics not as an isolated style, but as an interactive component or a productive tool within learning models. This aligns completely with methodology, which is grounded in Embodied Cognition Theory. Simultaneously, T. Fallace's critical observation regarding the insufficient justification of the VAK framework beyond its original context, and the caveats from C. Fadlilah *et al.* (2021) and J. Jabonete & C. Mejarito (2023) about the lack of structured methodologies, highlighted the key distinction of research: instead of merely applying the VAK style, the study proposed a holistic, systematically verified kinaesthetic methodology specifically aimed at overcoming conceptual difficulties in core high school physics.

The preceding literature unequivocally confirmed the value of KLAs, which have been successfully implemented across various subjects and educational stages, consistently boosting student engagement, retention, and academic outcomes. While individual studies show promising applications of KLAs in specific physics topics, such as kinematics and the photoelectric effect, a comprehensive and systematic body of research exploring the connection between kinaesthetic mental imagery and core conceptual difficulties in the secondary school physics curriculum is surprisingly limited. This notable absence, especially given the acknowledged "phenomenological gap" in physics teaching, strongly underscores the urgency and topicality of the study, which aims to provide a structured model for integrating embodied experience into the school physics curriculum. However, this study advances the scientific debate beyond simply stating a correlation. It has been demonstrated that a targeted developmental kinaesthetic intervention is an effective mechanism for causally enhancing embodied conceptual understanding. Whereas previous literature has focused on static spatial competence as a prerequisite for success, the current study confirms that active motor activity is a powerful tool for achieving this success. Thus, a key interpretation is that kinaesthetic methods not only utilise existing spatial abilities, but also actively develop them by purposefully modifying intuitive schemas that traditionally block the acquisition of physical concepts.

CONCLUSIONS

Research originated from the fundamental belief that physics instruction cannot be reduced solely to visual perception, as children instinctively seek to engage the maximum number of sensory channels, often neglecting the critical role of kinaesthetic mental imagery in acquiring natural sciences knowledge. Drawing upon Embodied Cognition Theory and the VARK model, an original methodology was developed with the central aim of providing a bodily (kinaesthetic) sense of abstract concepts, such as acceleration or force, through the conscious application of the "effort-resistance-motion" schema. The two-year quasi-experimental study conclusively demonstrated the effectiveness of the original kinaesthetic physics teaching methodology for high school students, fully confirming the hypothesis put forth. It was statistically verified that students in the EG, who were taught using specially designed kinaesthetic exercises, showed a significantly higher gain score on ECUAS, where the group's mean ($\overline{X}_1 = 7.17$) was statistically significantly higher compared to the control group ($\overline{X}_2 = 5.00$).

This key finding confirmed that the design and use of kinaesthetic exercises, modelling both mechanical and non-mechanical phenomena, proved its ability to transform abstract physical concepts into bodily experience. This allowed students to successfully form the mental kinaesthetic images necessary for deep conceptual understanding. The integration of kinaesthetics directly impacted students' ability to overcome intuitive misconceptions based on everyday experience, as the methodology created a conceptual ecological system in which students learned to consciously use intuitive image schemas, modifying them to align with the demands of formal Newtonian mechanics and other branches of physics. The developed methodology, which combines kinaesthetic exercises with data objectification via mobile technology (Phyphox), represented a significant contribution to the field of Embodied Cognition pedagogy and paves the way for further research into scaling the method, its application to highly abstract concepts, and the development of specialised teacher professional development programmes. Future development should focus on creating modular, multi-level kinaesthetic curricula covering all physics domains and exploring the potential of advanced technologies like Augmented Reality for enhancing diagnostic and corrective feedback.

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Кінестетична методика як інструмент формування втіленого концептуального розуміння фізики

Анотація. Проблема надмірної залежності сучасної фізичної освіти від візуальних методів призводить до нехтуванням критично важливими кінестетичними ментальними образами, необхідними для глибокого засвоєння природничих наук, зокрема, фізики. Дослідження виходить із теорії втіленого пізнання (Embodied Cognition) та положення про те, що ключові фізичні поняття кореняться у первинній сенсорній схемі «зусилля-опір-рух». Дослідження мало на меті розробити та експериментально перевірити кінестетичну методику (на основі втіленого пізнання) для підвищення втіленого розуміння та подолання феноменологічного розриву в учнів у процесі вивчення фізики. Дослідження проводилось як дворічний квазі-експериментальний проєкт у профільній школі. Було сформовано експериментальну групу (n = 18), яка навчалася за кінестетичною методикою, та контрольну групу (n = 22), яка навчалася за традиційною програмою. Методика інтегрувала три типи кінестетичних вправ (тактильно-моторні, просторово-локомотивні та рольові імітації) з використанням мобільного додатка Phyphox для миттєвої об'єктивізації суб'єктивних тілесних відчуттів у числові фізичні дані. Ефективність оцінювалася за шкалою оцінки втіленого концептуального розуміння. Результати статистичного аналізу (t-критерій студента) переконливо підтвердили гіпотезу: середній приріст балів в експериментальній групі ($\bar{X}_1 = 7{,}17$) був статистично значуще вищим порівняно з контрольною групою ($\bar{X}_2 = 5{,}00$), причому розраховане значення $t \approx 7{,}89$ вказує на значний ефект. Ця різниця була особливо помітною у втілено-кінестетичній складовій шкали оцінки втіленого концептуального розуміння. Доведено, що цілеспрямоване використання кінестетичної активності дозволяє формувати резилієнтні ментальні образи, які допомагають учням свідомо модифікувати свої інтуїтивні схеми, створюючи концептуальну систему, сумісну з науковою моделлю світу. Робота підтвердила, що тіло учня може слугувати ефективним «сенсором» і інструментом пізнання

Ключові слова: пізнання; фізика; сенсомоторика; розрив; Phyphox; образи

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Preparation of future bachelors of psychology to educational and advisory activities on psychosexual development of adolescents

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Abstract. The purpose of the study was to find out the level of readiness of future bachelors of psychology for educational and advisory activities on the psychosexual development of adolescents. The research methodology was based on a combination of theoretical analysis of educational and professional programmes and empirical methods, in particular, content analysis of the curricula of Taras Shevchenko National University of Kyiv and Odesa Mechnikov National University questionnaires and surveys of students at these higher education institutions. The results showed that the preparation of students for work in the field of psychosexual development of adolescents remained insufficiently holistic, because educational programmes reflected the topic in fragments, limited to general issues of advisory practice. The average level of readiness of future psychologists was 3.68 points, which indicated a partial development of professional knowledge, skills, and value orientations. The highest rates were recorded for the motivational component, where 39.5% of students demonstrated a high level of positive attitude to the topic of sex education, realising its social significance. However, only 25.5% of respondents achieved a high level of activity skills, which reflected a lack of practical experience and lack of training forms of education. Students named socio-cultural barriers (68%) and lack of methodological training (21%) as the main difficulties. A comparison of the results of the two universities showed a slight difference in integral indicators (3.72 and 3.65 points, respectively). Modernisation of educational programmes for training psychologists requires the integration of psychosexual development topics, advisory ethics, and practice-oriented modules. The practical significance of the results obtained lies in the fact that they could be used by teachers of higher educational institutions in improving the content of educational programmes and developing educational and methodological materials for preparing future psychologists for educational and advisory activities in the field of psychosexual development of adolescents

Keywords: practical skills; issues of ethics of sexual relations; methodological materials; competencies; barriers

INTRODUCTION

The growing complexity of social and interpersonal challenges of adolescence determines the need for effective psychological support for their psychosexual development. The educational practice of preparing future bachelors of psychology requires orientation to the development of applicants' professional readiness for educational and advisory work with adolescents, which provided for a combination of theoretical knowledge and practical skills. In addition, attention should be paid to the integration of knowledge on developmental psychology, pedagogy, and ethics of sexual relations into an integral system of professional competence of a specialist. Insufficient development of methodological approaches to the training of future psychologists in this area led to the need for

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theoretical substantiation and experimental verification of the pedagogical conditions of such training. Determining the content, organisational and technological foundations for the development of readiness for educational and advisory activities was the main task of the study.

In a number of scientific papers, the researchers' attention was focused on general aspects of professional training of future psychologists and psychosexual development of adolescents, in particular, A.S. Sadykina (2025) considered the issue of preparing future bachelors of psychology for educational activities. The researcher analysed the content of professional education of future psychologists and determined the pedagogical conditions for the development of readiness for educational and advisory work. The paper highlighted the problems of integrating theoretical and practical training, including ways to improve professional competencies in the context of contemporary social challenges. S. Silva *et al.* (2024) conducted a systematic review of the sources and types of sexual information used by adolescents. The researchers identified the main channels for gaining knowledge about psychosexual development, namely school, peers, media, and digital resources. The results showed a lack of structured and scientifically based information, which led to the need for professional education of adolescents. D.V. Sokolenko (2023) substantiated the socio-pedagogical foundations of the development of sexual culture of children in the educational environment. The researcher defined the role of teachers and psychologists in creating conditions for safe and morally balanced psychosexual development. Attention was paid to the influence of the educational environment on the development of adequate social and sexual representations in children.

The importance of understanding psychosexual development and sex education for adolescents in Vietnam was investigated by N.T. Lan & N.H. Huong (2021). The researchers analysed cultural and social factors that influenced the formation of young people's ideas about sexuality. The need to train professionals capable of conducting advisory and educational work within culturally sensitive approaches was emphasised. C.M. Lillard *et al.* (2020) examined differences in psychosexual development among juvenile delinquents with different types of sexual behaviour. The researchers compared cognitive, emotional, and behavioural development scores in three groups of adolescents. The data obtained helped to determine the relationship between psychosexual identity disorders and social behavioural abnormalities. J. Kotiuga *et al.* (2022) conducted a study of adolescents' perception of their own sexual identity, their ability to build relationships, and their attitude to sexual pleasure. The researchers collected empirical data on self-assessment of sexual competence and personal values in adolescence. The results showed significant individual differences due to the level of awareness and social conditions of education.

The areas of training future educational psychologists to work with young people based on national values were determined by K.K. Kabekeyeva *et al.* (2025). The researchers developed a model for the development of professional competencies that combined humanistic, cultural, and advisory aspects. The practical part of the study showed the effectiveness of step-by-step development of skills in working with young people in the context of social and psychological support. S. Eleuteri *et al.* (2024) examined the goals and content of sex education in the school environment, considering the principles of inclusivity. The researchers analysed how various educational programmes contributed to the development of a conscious and safe attitude to sexuality. The importance of an interdisciplinary approach in training teachers and psychologists to work with different categories of children was shown. A study of psychosexual development and sex education of young people with autism was conducted by T.T.W. Au Yeung *et al.* (2024). Analysis of the experience of autistic and neurotypical young adults revealed specific barriers to the perception of information about sexuality. The researchers emphasised the importance of adapted learning methods to improve psychological understanding in this group.

In a mixed study, D.M. Abbott *et al.* (2023) analysed the views of students of the specialty "Psychological Counselling" on training in psychosexual education. The researchers found a low level of inclusion of development topics in the training programmes of future psychologists. The results highlighted the need for increased training that would cover the educational and advisory component in the field of psychosexual education. The above-mentioned studies mainly covered certain aspects of psychosexual development of adolescents or general issues of professional training of psychologists, without revealing integrated approaches to the development of readiness for educational and advisory activities. The pedagogical conditions, content, and technologies of preparing future bachelors of psychology to work with adolescents in the field of psychosexual development remained insufficiently developed. The purpose of the study was to determine the degree of readiness of future bachelors of psychology to carry out educational and advisory work related to the problems of psychosexual development of adolescents. Research objectives: to analyse the curriculum and content of professional training of future psychologists; to determine the level of awareness, motivational attitudes, and professional readiness of students for consultative and educational activities in the field of sex education; to determine the areas for improving the training of future psychologists for the implementation of educational functions in the context of psychosexual development of adolescents.

MATERIALS AND METHODS

The study was applied in nature with elements of quantitative and qualitative analysis. The study was conducted during March-June 2025 at two higher educational institutions of Ukraine: Taras Shevchenko National University of Kyiv (Faculty of Psychology) and Odesa Mechnikov National University (Faculty of Psychology and Social Work). The

sample included 200 full-time students (100 people from each higher education institution), aged 20 to 23 years, who received a bachelor's degree in psychology in the 4th year. The inclusion criteria were: practical training in an educational institution and consent to participate in the study. The study was conducted in accordance with the World Medical Association (1964).

The study included three stages: theoretical (analysis of theoretical aspects of training future specialists and educational programmes), empirical (data collection through questionnaires and surveys) and analytical (generalisation of results, determination of pedagogical conditions for the development of readiness and allocation of practical recommendations). Empirical data was collected using an integrated approach. A content analysis of educational materials, in particular, educational programmes and curricula, was conducted (Taras Shevchenko National University of Kyiv, 2022; Odesa Mechnikov National University, 2025a). The structure and content of educational and professional programmes that determined the main competencies and learning outcomes were analysed separately (Taras Shevchenko National University of Kyiv, 2025; Odesa Mechnikov National University, 2025b). The study was also based on an analysis of international standards in the field of education and upbringing (Winkelmann, 2010; United Nations Educational, Scientific and Cultural Organisation *et al.*, 2018). Questionnaires and surveys were used to obtain quantitative and qualitative indicators. Content analysis was used to determine the degree of representation of the topic of psychosexual development in existing bachelor's degree programmes in psychology. Content modules of disciplines on developmental psychology, counselling practice, and preventive work with adolescents were analysed.

For the survey, the author's questionnaire was used, created based on adapted criteria for assessing readiness for advisory activities. The questionnaire covered three main components of readiness: cognitive (the system of knowledge about age, psychological and social features of psychosexual development), motivational (value-semantic attitude to the problems of sex education, professional interest, orientation to humanistic principles of interaction), and activity (the ability to advise, apply psychoeducational methods, analyse and interpret behavioural manifestations). To determine the level of readiness of future specialists, a three-level assessment scale was used: 4.1-5.0 – high level of development of practical skills; 2.6-4.0 – medium level; 1.0-2.5 – low level of readiness for practical activities. The average integral readiness score was calculated as the weighted arithmetic mean of scores for three components (cognitive, motivational, and activity) determined by summing up the survey results. The results of the survey helped to quantify and qualitatively assess the level of awareness of students, identify the features of their attitude to the problems of psychosexual education and determine the areas for improving educational training (Table 1).

Table 1. Questionnaire for determining the readiness of future psychologists for consulting and educational activities on the psychosexual development of adolescents

No.	Questions
	I. Cognitive component (level of knowledge and understanding of the problem)
1.	I have a basic knowledge of the patterns of psychosexual development of adolescents.
2.	I understand the psychological factors of sexual identity development.
3.	I know the main models of sexual socialisation in adolescence.
4.	I am familiar with the regulatory aspects of sex education in Ukraine.
5.	I can explain the role of a school psychologist in shaping a healthy attitude to sexuality.
6.	I have knowledge of typical adolescent problems related to puberty and identity.
	II. Motivational component (attitude, values, professional orientations)
7.	I consider the topic of sex education important for the professional activity of a psychologist.
8.	I feel an inner willingness to work with teenagers on sex education issues.
9.	I am interested in participating in educational programmes aimed at supporting healthy sexual development.
10.	I am positive about the inclusion of the topic of sex education in the training programmes of psychologists.
11	I believe that the work of a psychologist in the field of sex education contributes to the harmonious development of young people.
12.	I am ready to independently improve my knowledge of sex education.
	III. Activity component (practical skills and professional confidence)
13.	I can develop part of a teen sex education training session.
14.	I have the skills to conduct a consultation conversation on sensitive topics related to sexuality.
15.	I know how to act in cases where teenagers are treated with sexual identity issues or violence.
16.	I am confident in my ability to adhere to ethical standards when working with the topic of sexual development.
17.	I can interact with parents and educators on child sex education issues.
18.	I am able to use advanced psychoeducational technologies in the school environment.

Source: compiled by the author

The survey method was qualitative in nature and was aimed at identifying students' motivational attitudes, ethical beliefs, and ideas about the role of a psychologist in adolescent sex education. An adapted version of the

Adolescents' Perception Management and Attitudes Towards Sex Education Questionnaire (APMATSEQ) developed by F.O. Arop *et al.* (2019) was used to collect empirical data. Adaptation of the tool was to change the wording of statements in accordance with the context of professional training of future psychologists and supplement it with questions aimed at assessing professional and ethical orientations and motivational factors of participation in educational and advisory activities. The questionnaire consisted of 15 statements rated on a five-point Likert scale (from "totally disagree" to "totally agree"). In addition, the qualitative part included 5 open-ended questions aimed at clarifying professional ideas, barriers, and difficulties that may arise during sex education of adolescents. The questions offered to the respondents covered the following aspects: how they understood the role of a school psychologist in the field of adolescent sex education; what difficulties they thought might arise when discussing sexuality with adolescents; what personal qualities they thought were most important for a psychologist working with sexual development issues; what topics they thought needed more detailed coverage during the professional training of future psychologists; and what forms of work, in particular trainings, consultations or projects, they considered most effective in sexual education of adolescents. The answers received helped to better understand the specifics of students' professional vision, their attitude to the problems of psychosexual development of schoolchildren, and expectations for improving the content of professional training.

Interpretation of the obtained results was carried out using comparative and content analysis. Quantitative survey data were processed using descriptive statistics to determine trends in student readiness levels, and qualitative data on open-ended questions were analysed by categorising responses. This approach helped to identify the main semantic blocks that characterised students' ideas about the role of a psychologist in the psychosexual development of adolescents, and correlate them with modern scientific approaches to professional training. Based on the results obtained, practical recommendations were developed for improving the content of educational programmes for training future psychologists, in particular, on integrating the topic of psychosexual development into training courses, improving professional training of consulting practice, and developing professional and ethical competencies necessary for effective educational activities in the educational environment.

RESULTS

Theoretical foundations of professional training of future psychologists for consulting and educational activities

Theoretical understanding of the problem of preparing future psychologists for educational and advisory activities on the psychosexual development of adolescents is based on the integration of psychological, pedagogical, ethical, and socio-cultural approaches that determine the content of professional competence of a specialist. In accordance with the scientific provisions of F.O. Arop *et al.* (2019), preparation of a psychologist for counselling work in the field of psychosexual development involves three interrelated components: cognitive (knowledge of the patterns of puberty, ethical standards, socio-psychological factors of sexual identity development); motivational (value attitude to educational activities, awareness of its social significance); activity (ability to organise consultations, communicate with adolescents, create a safe space for discussing intimate topics). The process of becoming ready for such activities should be considered as a component of the professional development of the future psychologist's personality. This readiness is formed in conjunction with the development of ethical consciousness, reflexivity and empathy, which ensure the humanistic nature of psychological assistance. A. Hegde *et al.* (2022) stressed that without proper assimilation of theoretical knowledge about adolescent psychosexual development and understanding of the cultural contexts of sexuality, it is impossible to conduct high-quality counselling in the school environment. Within the framework of the competence approach, the training of future psychologists should include the development of professional and ethical, communicative and preventive, and educational competencies. Educational and advisory activities involve not only providing individual consultations, but also participating in collective forms of work – seminars, trainings, school programmes to form a culture of healthy relationships. Theoretically, this activity is based on the principles of age adequacy, gender sensitivity, and scientific reliability of information provided to adolescents.

Theoretical analysis also showed that the concept of educational and advisory activities covers a wider range of tasks than conventional individual counselling. It is aimed at preventing destructive behaviours, developing responsibility for one's own health, developing positive self-esteem and assertive behaviour skills. A psychologist prepared for such activities should not only provide advice, but also create conditions for the development of critical thinking in adolescents about sexual stereotypes, develop their ability to make informed decisions (Ragaglia *et al.,* 2023). As part of professional training, this requires the integration of interdisciplinary knowledge in developmental psychology, pedagogy, medicine, sociology, and the ethics of sexual relations. It is interdisciplinary training that ensures the development of a holistic understanding of psychosexual development as a phenomenon that combines biological, emotional, cognitive, and social components. The key theoretical guide for training specialists in this field is also the humanistic paradigm of education, according to which a psychologist should be not only a consultant, but also a facilitator of personal development. Effective assistance is possible only if the client is unconditionally accepted, empathically listened to, and respects their autonomy. These principles are particularly important in the field of sex education, where issues of personal freedom, cultural, and moral values are becoming sensitive. Therefore, the theoretical analysis showed that the preparation of future

psychologists for educational and advisory activities on the psychosexual development of adolescents should be based on the integration of knowledge about age-related patterns of development, professional ethics, gender aspects, social norms, and advanced pedagogical technologies. The systematic inclusion of these elements in the content of educational programmes will contribute to the development of future specialists' readiness for competent, ethically balanced and scientifically based activities in the field of sex education of adolescents.

International standards of the World Health Organisation (WHO) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) define the conceptual framework for training future psychological specialists for educational and advisory activities on the psychosexual development of adolescents. The main focus is on the development of competencies that provide a scientifically based, ethically balanced, and culturally sensitive approach to sexuality issues. The United Nations Educational, Scientific and Cultural Organisation *et al.* (2018) emphasises that training of specialists working with young people should be based on the principles of comprehensiveness, reliability, age compliance, and human rights. According to this document, professionals should be able to integrate the topic of psychosexual development into the broader context of mental health, personal development, and social responsibility. The World Health Organisation in the standards of sex education for the European region (Winkelmann, 2010) defines the need for professional training of counsellors and psychologists capable of supporting adolescents in matters of self-awareness, interpersonal relationships, prevention of violence and risky behaviour. According to these recommendations, effective advisory and educational work is possible only if the specialist has knowledge of the basics of reproductive health, communication ethics, gender equality and the socio-cultural context of sexuality. In addition, importance is attached to the development of nonviolent communication skills, tolerance, the ability to work with different value systems and religious beliefs of clients. The above-mentioned international documents also emphasise the interdisciplinary nature of specialist training. They are aimed at educating a professional who combines scientific awareness with a humanistic worldview, adheres to the principles of gender equality, non-discrimination, and respect for the personal autonomy of the client. Thus, contemporary educational programmes in the field of psychology should integrate the provisions of international standards into training courses, practical modules, and ethical trainings, ensuring the development of students' readiness for effective, tolerant and professionally responsible consulting and educational activities in the field of psychosexual development of adolescents.

Results of the analysis of current educational and professional programmes and curricula of Taras Shevchenko National University of Kyiv (2022) and Odesa Mechnikov National University (2025b) showed that the national system of training psychologists only partially covers aspects of the concept of educational and advisory activities. The content of the curricula indicates that the main focus is on general issues of mental development of the individual, psychodiagnostics, social adaptation, and counselling techniques. Topics related to sex education, sexual identity, the development of a value attitude to own body and intimate relationships are presented fragmentally or completely absent. In most cases, training is limited to the acquisition of theoretical knowledge without developing practical skills in advising adolescents on sexual development issues. The content of the analysed documents showed that both programmes are built in accordance with the competence approach focused on the development of professional knowledge, skills, and ethical orientations of the future psychologist. However, there are no specialised academic disciplines devoted to psychosexual development in the programme structures.

Within the framework of the discipline "Developmental Psychology", the topic of puberty was considered only in passing – in the context of the general emotional and social development of adolescents. There was no emphasis on the psychological aspects of sexual identity, ethical interaction, or counselling support for adolescents in the process of sexual development. There was also no systematic coverage of the pedagogical conditions for maintaining healthy psychosexual development. The course "Counselling Psychology" contains modules devoted to the basics of psychological assistance to clients of different ages, but there are no separate topics that reveal the issues of sexual education or counselling teenagers on the problems of intimate relationships. The content of the curricula demonstrates the predominance of general approaches to building a consultative process, active listening techniques and ethical standards, without including practical cases related to the psychosexual sphere (Taras Shevchenko National University of Kyiv, 2022; Odesa Mechnikov National University, 2025a). The course "Psychological Prevention of Deviant Behaviour" contains content modules related to the problems of psychosexual development (prevention of violence, addictive behaviour or social maladaptation). However, even in these topics, the issues of ethics of sexual relations, sexual culture and the development of responsible behaviour of adolescents are considered superficially, without specifying counselling methods or strategies for psychoeducation. None of the curricula studied contains educational topics or practical tasks directly aimed at preparing students for educational activities in schools. There are also no methodological materials that would offer algorithms for developing trainings, lectures, or consultations on sex education. The structure of curricula is dominated by theoretical disciplines, while the practical component necessary for the development of readiness for consulting work in the field of psychosexual development remains insufficiently represented.

Comparative analysis revealed that the curriculum of Taras Shevchenko National University of Kyiv focuses on humanistic values, ethical standards and the development

of reflexive competence, while the curriculum of Odesa Mechnikov National University pays more attention to practical aspects of psychoprophylaxis and social and psychological support. However, in none of the programmes does the topic of psychosexual development of adolescents' act as a systematic educational component or competence result. The results of the content analysis confirmed the fragmentary nature of the representation of psychosexual development issues in educational programmes for bachelor's degrees in psychology. This indicates the lack of a holistic concept of forming students' readiness for educational and advisory activities in the field of sexual education. The results of the analysis indicate the potential of existing disciplines to integrate relevant topics by expanding content modules, updating educational and methodological support, and introducing practice-oriented forms of training (trainings, role-playing exercises, case analysis).

Analysis of the level of readiness of students of Ukrainian higher education institutions for consulting and educational activities

The results of a survey of future bachelors of psychology of the 4th year students of Ukrainian higher education institutions confirmed the need for constant updating of the content of professional training. The obtained data is summarised in Table 2.

Table 2. Level of readiness of future psychologists for consulting and educational activities on the psychosexual development of adolescents

Readiness component	Level of development	Students of the Kyiv National University named after T. Shevchenko	Students of the Odesa Mechnikov National University	Total for the sample (200 people)
Cognitive	High	32%	28%	30%
	Average	53%	56%	54.5%
	Low	15%	16%	15.5%
Motivational	High	41%	38%	39.5%
	Average	49%	51%	50%
	Low	10%	11%	10.5%
Activity	High	27%	24%	25.5%
	Average	52%	55%	53.5%
	Low	21%	21%	21%
Average integral readiness indicator		3.72	3.65	3.68

Note: etermined according to the survey questions (Table 1)
Source: compiled by the author

The overall level of readiness of students of both universities was within the average range (3.68 points), which indicates the partial development of knowledge, skills, and professional and value orientations necessary for effective advisory and educational activities. The highest indicators were recorded for the motivational component: 39.5% of respondents showed a high level. This indicates a positive attitude of students to the problems of psychosexual education, an understanding of its relevance for professional practice and an awareness of the social significance of the role of a psychologist in supporting the healthy development of young people. The reason for such results can be considered the growth of public interest in sex education, the strengthening of information influence of the media, and the activation of interdisciplinary discussions in the field of psychological and pedagogical training of specialists. The cognitive component showed a predominance of the average level of education (54.5%), which indicates moderate awareness of students about the patterns of psychosexual development of adolescents, but with a pronounced lack of knowledge in the field of regulatory aspects and practical models of sexual education. Such results are conditioned by the fact that the curricula of the universities under study only partially cover the topic of psychosexual development, and the lack of systematic methodological materials makes it difficult to form a holistic understanding of this problem. As a result, students' knowledge remains fragmented, which limits their ability to effectively conduct advisory work in an educational environment. The lowest rates were recorded for the activity component: only 25.5% of students demonstrated a high level of development of practical skills related to the training sessions, conducting consultation conversations on sensitive topics, and interaction with parents and teachers. This result indicates insufficient practical training of future psychologists, which is a direct consequence of the orientation of the educational process mainly to the theoretical assimilation of the material without sufficient study of real cases or simulated situations. The lack of training modules and specialised workshops on psychosexual topics limits the development of students' professional confidence and hinders the development of readiness for interpersonal communication in the context of consulting activities.

A comparative analysis of the results of the two universities showed minor differences: an integral indicator of students' readiness of the Taras Shevchenko National University of Kyiv (3.72 points) slightly exceeded the same indicator of students of the Odesa Mechnikov National University (3.65 points). This indicates similarities in curricula and educational approaches, but the higher results of

students at Taras Shevchenko National University of Kyiv may be conditioned by a greater number of theoretical courses in developmental psychology and the availability of electives that partially cover issues of gender identity. Summarising the data obtained, it is possible to identify a number of causal relationships that determine the level of students' readiness for counselling and educational activities. Firstly, the fragmentary reflection of the topic of sex education in the curriculum leads to a lack of systematic knowledge about psychosexual development. Secondly, the predominance of theoretical forms of education causes low practical confidence of students in working with sensitive issues. Thirdly, the growth of public attention to the problems of sex education contributes to the development of positive motivational attitudes, but without practical implementation, they remain declarative. Fourthly, the lack of an interdisciplinary approach in educational programmes leads to a weak development of integrative consulting skills and communication strategies.

The survey helped to identify the features of motivational, value, and ethical orientations of psychology students on issues of psychosexual education of adolescents, and to assess the degree of their readiness to participate in educational and advisory activities. When analysing the responses, the average scores for each statement of the questionnaire were determined, reflecting the degree of agreement of respondents with the corresponding positions (Table 3).

Table 3. Average scores according to the APMATSEQ adapted questionnaire

Statement	Students of the Kyiv National University named after T. Shevchenko	Students of the Odesa Mechnikov National University
Psychologist should take an active part in the issues of sex education of adolescents.	4.52	4.48
Sex education is an important component of psychological support for students.	4.61	4.57
I have sufficient knowledge about the age characteristics of psychosexual development.	3.84	3.79
During counselling, it is important to consider the cultural and religious characteristics of families.	4.46	4.43
I am ready to conduct conversations with teenagers on sexual behaviour issues.	3.58	3.54
Issue of sex education should be included in the training programmes of future psychologists.	4.64	4.59
I am confident in my ability to respond adequately to teenagers' questions about relationships or sexuality.	3.47	3.42
It is important to observe ethical boundaries when talking to teenagers about sexuality.	4.71	4.69
I understand the role of a psychologist in preventing risky sexual behaviour.	4.28	4.25
I believe that the topics of sex education should be coordinated with parents and teachers.	4.34	4.36
I feel psychologically ready to conduct educational trainings for students.	3.52	3.47
I support the need to integrate sex education into the school curriculum.	4.50	4.45
Professional ethics of a psychologist implies neutrality and tolerance in matters of sexual behaviour.	4.65	4.63
I am aware of the need for my own additional training in psychosexual development.	4.08	4.10
I am ready to participate in the development of educational programmes for schools.	3.74	3.68

Note: survey results are rated on a five-point Likert scale
Source: compiled by the author based on F.O. Arop *et al.* (2019)

The results obtained showed a balanced structure of professional readiness of future psychologists, in which motivational and value orientations played a leading role. The highest average scores were observed for statements related to ethical responsibility and the importance of sex education in psychological training (4.71 and 4.64 points, respectively). This indicated a high awareness of students about the need to comply with professional norms and recognise the role of sexual education in the development of a healthy personality of a teenager. The lowest rates were recorded for statements related to practical confidence in interaction with adolescents (3.47-3.58 points), which reflected a certain gap between theoretical training and applied skills. This trend led to the need to expand training modules aimed at developing communication and consulting skills. High ratings of ethical aspects of professional activity (average score – 4.65) confirmed the development of humanistic orientations and tolerance of future specialists.

In general, the identified structure of indicators demonstrated that the development of readiness for consultative and educational activities in the field of psychosexual development is complex and requires a systematic approach that combines cognitive, motivational, and activity components. The high level of ethical maturity of students creates favourable conditions for the development of practical skills, but the effectiveness of this process largely depends on the expansion of practice-oriented forms of education and interdisciplinary cooperation in the educational environment. Thus, the results of the survey confirmed the need to modernise training programmes for psychologists with an emphasis on integrating the topic of sex education into the content of academic disciplines and practical trainings.

The results of a qualitative analysis of open questions showed the multidimensional nature of students' professional ideas about the role of a psychologist in the field of adolescent sex education, and the presence of a number of barriers that prevent the effective implementation of the educational function. The majority of respondents (82%) identified the main task of a school psychologist in creating a safe, emotionally supportive space where teenagers can openly discuss issues related to sexuality and receive reliable information without fear of judgement. This position indicates the humanistic orientation of future specialists and their understanding of the importance of psychological comfort as a prerequisite for effective sex education. 11% of students focused on the advisory role of a psychologist in working with parents and teachers, considering a specialist as a mediator between school, family, and child. The remaining 7% of respondents noted the educational function of a psychologist, which involves organising thematic events, lectures and trainings for schoolchildren. When analysing responses to possible difficulties that may arise in the process of discussing sexuality, 68% of students noted socio-cultural barriers, in particular, taboo and conservative public ideas about sexuality, which often leads to misunderstandings on the part of parents or the administration of educational institutions. Another 21% of respondents pointed out the lack of their own theoretical and methodological preparation for working with sensitive topics, and 11% drew attention to the lack of clear instructions and practical recommendations in the regulatory and methodological framework of educational programmes. Consequently, the dominant problem is the lack of preparation of psychologists for sexual education in the school environment due to limited educational and methodological resources, and the lack of systematic support from the educational institution. In answering questions about the personal qualities necessary for effective work in this field, 74% of students identified empathy and tolerance as key professional traits of a psychologist. More than half of the respondents (52%) noted the importance of the ability to maintain neutrality and professional distance, and 37% – the need for a high level of ethical culture, which implies confidentiality and an invaluable attitude to the client. An additional 28% of respondents emphasised the importance of personal maturity, reflexivity, and self-confidence, which help to overcome emotional stress when working with sensitive topics. These data confirm that future specialists are aware of the importance of not only knowledge, but also personal qualities that determine the quality of consulting interaction.

When analysing topics that require more in-depth coverage within educational programmes, the majority of students (61%) noted insufficient attention to issues of gender identity and sexual orientation, which, in their opinion, is relevant in the context of contemporary social transformations. Almost half of the respondents (49%) noted the need to study the topic of prevention of sexual violence among adolescents, and 33% – the need to develop skills of interaction with parents in matters of sex education. Thus, the results point to students' demand for greater integration of applied aspects of sex education into academic disciplines, and the need for an interdisciplinary approach that combines psychological, pedagogical, and legal knowledge. Regarding effective forms of work in the field of sexual education, 58% of participants preferred interactive methods, such as trainings, group discussions and role-playing games, which promote communication skills and increase the level of trust among participants. 27% of respondents identified individual consultations as the most effective form of interaction, while 15% suggested expanding the practice of implementing information and educational projects with the participation of teachers, medical professionals, and representatives of public organisations. These results demonstrate students' orientation to practice-oriented forms of learning and interaction, which is consistent with current trends in psychological education. Summarising the results of a qualitative survey, it should be stated that students are aware of the social significance of the topic of sex education, but they feel the need to improve their own professional competence, in particular, in the field of consulting practice and ethical support of adolescents. The identified trends indicate the need for a systematic update of the content of professional training of psychologists by integrating the topic of psychosexual development into training courses, the development of practical trainings and methodological recommendations aimed at forming readiness for educational and advisory activities in the educational environment.

Areas for improving the professional training of future psychologists

The results of the empirical study showed the need for a systematic update of the content of educational programmes for the preparation of future bachelors of psychology, focusing on the readiness for advisory and educational activities in the field of psychosexual development of adolescents. The students' responses revealed both a certain fragmentation of knowledge and the need for practical guidelines, which determines several key areas for improving professional training. It is advisable to provide for the introduction of separate training modules or topics within

such disciplines as age psychology, psychology of sexual development, psychoprophylaxis of deviant behaviour, and the basics of counselling practice. These modules should cover contemporary theoretical approaches to psychosexual personality development, cross-cultural aspects of sexual socialisation, and the specifics of gender-role expectations in adolescence. It is important to ensure a practical focus of training through case analysis, analysis of consultation situations, and development of models of educational programmes for young students. To develop the practical skills of future psychologists, it is recommended to expand training modules that contribute to the development of skills in conducting a consultative conversation on issues of sexual identity, interpersonal relationships and sexual security. It will be effective to introduce simulation classes, role-playing games, video analysis of consultation cases, and supervision discussions. It is also advisable to create an electronic methodological bank of materials (questionnaires, diagnostic maps, memos for parents and teenagers), which can become the basis for educational platforms and workshops.

The results of the study show that students feel insecure about the ethical aspects of psychosexual development counselling. Therefore, special training elements on professional ethics should be integrated into the programmes, which will address the principles of confidentiality, tolerance, gender sensitivity, and a non-pathological approach. The introduction of ethical trainings and discussion seminars with the analysis of real or simulated dilemmas will help future specialists to learn the standards of professional behaviour and develop their own system of value orientations. Given the complexity of the problem of sexual development, it is recommended to strengthen interdisciplinary links between the courses of psychology, pedagogy, bioethics, sociology, and law. This will contribute to the development of a holistic vision of the phenomenon of psychosexuality in the context of educational, family, and social interaction. An effective form can be the creation of inter-faculty educational and scientific projects or modular interdepartmental courses. It is advisable to expand the bases of internships and internships, involving schools, psychological support centres, and youth organisations. Such interaction will contribute to the development of students' realistic vision of professional activities, the development of communication skills with adolescents, teachers and parents, and an understanding of the socio-cultural context of working with sensitive topics. In addition, it is recommended to create an online platform or e-course for self-education on the topics of psychosexual development, advisory ethics, and crisis psychology. Such a resource can contain video lectures, case studies, ethical guidelines, and interactive tasks for self-monitoring. In general, the proposed recommendations are aimed at improving the quality of professional training of future psychologists by combining theoretical knowledge, practical skills, and value-ethical guidelines. Their implementation will ensure the development of holistic readiness for counselling activities in the field of psychosexual development of adolescents, which is a necessary condition for effective psychological and pedagogical support for young students in the contemporary educational environment.

DISCUSSION

The results of the study showed that the preparation of future bachelors of psychology for educational and advisory activities in the field of psychosexual development of adolescents remains insufficiently systematic. The detected average level of readiness reflects the partial development of cognitive, motivational, and activity components of competence. This correlates with the findings of A. Costello *et al.* (2022), who reported that teacher education programmes rarely include holistic modules of sex education, and specialist training is limited to general psychological courses without developing specific counselling skills. The results of the study showed a fragmentary reflection of the topic of psychosexual development in the curricula of universities, which is consistent with the conclusions of E.S. Goldfarb & L.D. Lieberman (2021), who emphasised that the lack of structured teacher training is one of the main obstacles to the effective implementation of sex education. The researchers emphasised the need to move from informative to competence-oriented programs that form practical skills in counselling, communication, and ethical support of adolescents. The highest results in the study were recorded for the motivational component (39.5% of students with a high level), which indicates a positive attitude of future psychologists to the topic of sex education. This is consistent with the conclusions of T.M. Bass & M.J. Davis (2024), G. Atfield *et al.* (2023), who noted that even in conditions of limited training, students' motivational readiness prevails over cognitive readiness, since future specialists are aware of the social significance of the problem, but do not have methodological tools for the practical implementation of advisory activities.

The average level of cognitive training found in this study (54.5%) is consistent with the results of A.A. Chianese *et al.* (2021), who found that even among professionals working with adolescents with autism, the level of knowledge in psychosexual development remains insufficient. This confirms the need to develop specialised training modules and workshops on sexuality, identity development and counselling. A comparison of the results of the two universities showed slight differences in the level of readiness (3.72 and 3.65 points, respectively), which indicates similar approaches to educational training. A similar trend was described by D.R. LaForett *et al.* (2022), who studied the training of future school psychologists in the United States and concluded that curricula have a common weakness, namely, a lack of practical counselling training, especially in the psychosexual development of children and adolescents. In addition, some of the surveyed students (82%) in this study saw the main task of a school psychologist in creating a safe environment for discussing sexuality issues. This correlates with the findings of J. García-Vázquez *et al.* (2024), which proved that the effectiveness of

emotional and sexual education programmes depends on the extent to which the educational space provides trust, openness, and an invaluable attitude to the topics of intimacy. 68% of respondents noted socio-cultural barriers and taboo topics of sexuality, which partly explains the low level of practical confidence. Similar results were obtained by Y. Fang *et al.* (2022), who recorded that even in countries with advanced sex education systems, students' level of knowledge and openness largely depends on family and school support. Thus, the success of training psychologists requires not only updating curricula, but also changing social attitudes.

The results of the study also confirm the importance of integrating psychological, pedagogical, ethical and socio-cultural approaches in the training of specialists, which is consistent with the concept of psychosexual development outlined by F. Kong (2025), who emphasised that the development of psychosexual competence occurs through the interaction of cognitive, affective, and social factors. Such an integrated approach is also necessary in the professional training of future psychologists, who should be able to understand the dynamics of sexual identity of adolescents in different cultural contexts. The leading role of the motivational component found in the study also correlates with the results of S. Kauer *et al.* (2025), who showed that the positive attitude of educators and school psychologists towards sex education determines students' willingness to engage in an open dialogue about their own experiences and relationships. The researchers noted that effective programmes are formed when teachers show empathy, tolerance, and readiness for unbiased discussion. In addition, the study found that only 7% of students considered educational work as the main aspect of the school psychologist's activity. This result is consistent with conclusions of A. Aldiwan *et al.* (2024), who, when examining the psychosexual development of young people, emphasised that even among specialists, the medical-oriented approach dominates, while the educational-advisory dimension remains out of the spotlight of systematic training. The relevance of the problem is also confirmed by the results of J. Kang *et al.* (2020), who emphasised that effective psychosexual support requires specialised psychological training, ethical sensitivity, and interdisciplinary knowledge.

The results of this study, which indicate insufficient methodological and practical preparation of students to work with various groups of adolescents, correlate with the conclusions of L.M. Mediå *et al.* (2023) and J.A. Wagman *et al.* (2024). Their research has shown that adolescents and young adults with differences in sexual development are often left without competent psychological support, as most specialists do not have proper knowledge in the field of psychosexual counselling. The results also showed that some future psychologists noted the lack of theoretical and methodological training as a key problem. This is consistent with the findings of R. Zoltán *et al.* (2022), which emphasised the role of socialisation in the psychosexual development of the individual and the need for systematic training of specialists to understand the social and cultural factors of sexual behaviour development. The results of the study also showed that students tend to limit their understanding of psychosexual development only to the period of adolescence, without considering it as a continuous process of personality formation. This approach reflects a certain narrowness of academic training and is consistent with the conclusions of A. Russell (2020), who emphasised that psychosexual development covers the entire period of childhood and adolescence, and educators and psychologists should be prepared to advise not only adolescents, but also young children who develop primary ideas about gender, physicality, and social roles.

This result correlates with the conclusions of N. Vosoughi *et al.* (2022), who proved that psychosexual education not only increases the level of knowledge, but also improves psychological comfort, reduces distress, and strengthens a positive perception of own body. This underlined the importance of developing empathy and emotional sensitivity as components of professional training of future psychologists, which was also reflected in the high indicators of the motivational component in this study. Therefore, the preparation of future bachelors of psychology for educational and advisory activities on the psychosexual development of adolescents requires a holistic competence approach. This involves a combination of cognitive training, ethical education, empathy development, and practical counselling skills. The consistency of the data obtained with the conclusions of international researchers confirms the universality of the identified trends and the need to improve educational programmes by integrating interdisciplinary courses, modelling professional situations.

CONCLUSIONS

The theoretical analysis showed that the preparation of future psychologists for educational and advisory activities on the psychosexual development of adolescents requires the integration of psychological, pedagogical, ethical, and socio-cultural approaches. Such activities should be based on a combination of cognitive, motivational, and activity components of professional competence, and the development of empathy, reflexivity, and ethical consciousness. A content analysis of educational and professional programmes of Taras Shevchenko National University of Kyiv and I.I. Mechnikjov Odesa National University showed that the topic of psychosexual development of adolescents in the training of psychologists is presented fragmentary. Educational programmes focus primarily on general counselling training, without ensuring a holistic development of competencies for educational work in the field of sex education. The curricula do not include specialised disciplines, practical cases, and methodological materials aimed at developing the skills of advising adolescents on sexual development.

The survey revealed the average level of readiness of future bachelors of psychology (3.68 points) for counselling and educational activities in the field of psychosexual development of adolescents. The highest results were

recorded for the motivational component (39.5% – high level), which indicated a positive attitude of students to the topic and awareness of its significance. The cognitive component mostly remained at an average level (54.5%) due to insufficient coverage of the topic in programmes and a lack of methodological materials. The comparison of universities showed a slight difference, namely 3.72 points for students of Taras Shevchenko National University of Kyiv and 3.65 points in Odesa Mechnikov National University. The motivational component turned out to be the leading one, but there was still a gap between theoretical training and practical skills – only 25.5% demonstrated a high level of activity competencies. Qualitative analysis showed that the majority of respondents (82%) considered the main task of a school psychologist to create a safe space for frank discussion of sexuality issues, while 68% called socio-cultural barriers the main obstacle, 21% – lack of training, and 11% – lack of regulatory guidelines. The results of the study confirmed the need to modernise educational training programmes for future psychologists. It is advisable to introduce specialised modules, trainings, and interdisciplinary courses. The limitation of the study was the focus on two universities, which does not allow fully generalising the results for the entire system of training psychologists in Ukraine. Prospects for further research are to expand the sample of educational institutions, compare Ukrainian and international approaches.

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Підготовка майбутніх бакалаврів психології до просвітницько-консультативної діяльності з психосексуального розвитку підлітків

Анотація. Метою дослідження було з'ясувати рівень готовності майбутніх бакалаврів психології до просвітницько-консультативної діяльності з питань психосексуального розвитку підлітків. Методологія дослідження ґрунтувалася на поєднанні теоретичного аналізу освітньо-професійних програм і емпіричних методів, зокрема контент-аналізу навчальних планів Київського національного університету імені Тараса Шевченка та Одеського національного університету імені І.І. Мечникова, анкетування та опитування студентів зазначених закладів вищої освіти. Результати показали, що підготовка студентів до роботи у сфері психосексуального розвитку підлітків залишалася недостатньо цілісною, адже освітні програми відображали тематику фрагментарно, обмежуючись загальними питаннями консультативної практики. Середній рівень готовності майбутніх психологів становив 3,68 бала, що свідчило про часткову сформованість професійних знань, умінь і ціннісних орієнтацій. Найвищі показники зафіксовано за мотиваційним компонентом, де 39,5 % студентів продемонстрували високий рівень позитивного ставлення до тематики статевого виховання, усвідомлюючи її соціальну значущість. Водночас лише 25,5 % респондентів досягли високого рівня діяльнісних умінь, що відображало дефіцит практичного досвіду та відсутність тренінгових форм навчання. Основними труднощами студенти називали соціокультурні бар'єри (68 %) та недостатність методичної підготовки (21 %). Порівняння результатів двох університетів засвідчило незначну різницю в інтегральних показниках (3,72 і 3,65 бала відповідно). Модернізація освітніх програм підготовки психологів потребує інтеграції тем психосексуального розвитку, консультативної етики та практикоорієнтованих модулів. Практична значущість отриманих результатів полягає в тому, що вони могли бути використані викладачами закладів вищої освіти під час удосконалення змісту освітніх програм і розроблення навчально-методичних матеріалів із підготовки майбутніх психологів до просвітницько-консультативної діяльності у сфері психосексуального розвитку підлітків

Ключові слова: практичні навички; питання етики статевих стосунків; методичні матеріали; компетентності; бар'єри

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Informal support networks in the workplace as a mechanism for addressing professional burnout

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Abstract. This article examines why traditional formal support programmes often fail to address professional burnout, a problem that is becoming increasingly acute due to hybrid work arrangements and social isolation. This study aimed to develop and theoretically substantiate a comprehensive model explaining the formation of informal support networks within a team, integrating organisational, group, and individual determinants of this process and clarifying the underlying mechanisms. The article argues that their ineffectiveness stems from the neglect of the "meso level" – that is, authentic interpersonal relationships and social capital within the team. The core scientific problem lies in the lack of a comprehensive theoretical model that explains the genesis of informal support networks. Research on burnout has traditionally displayed a "blind spot", focusing either on individual factors (the person centric approach) or on formal organisational conditions (the organisation-centric approach), while overlooking how and why spontaneous social connections emerge. Using systematic analysis, theoretical synthesis, and conceptual modelling, the article integrated insights from four academic domains: burnout theory, sociological network theory, models of network dynamics, and socio psychological theories, including homophily and social exchange. The principal outcome of the study was the development of a multilevel theoretical model describing the formation of informal support networks within a collective. The model demonstrated how contextual determinants – including organisational factors such as culture and leadership, group-level factors such as psychological safety, and individual characteristics such as emotional intelligence and motivation – create conditions that enable key mechanisms of support formation. The emergent network structure, characterised by macro level properties (for example, density) and micro-level roles ("stars", "brokers", and "isolates"), arised from the interaction of multiple mechanisms. These mechanisms included motivational drivers (such as the need for support) and structural principles (including homophily and reciprocity). The article's conclusions emthasised a "management paradox": such networks cannot be directly controlled and may generate unintended negative effects, including "star burnout" and excessive clustering. The practical significance of the model, therefore, lies in substantiating a shift in management strategy from attempts to artificially create support towards cultivating the conditions under which it can emerge organically

Keywords: social capital; psychological safety; organisational culture; homophily; social exchange; group dynamics

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INTRODUCTION

In the context of the rapid transformation of contemporary labour markets, a process intensified by digital globalisation and characterised by growing instability, the issue of professional burnout is becoming increasingly pressing. The widespread shift towards hybrid and fully remote work formats, while offering greater flexibility, simultaneously heightens risks associated with social isolation, the blurring of boundaries between work and personal life, and the erosion of informal communication. Post-pandemic data not only records but also demonstrates a sustained increase in emotional exhaustion and professional burnout. These phenomena affect employees across multiple sectors and demographic groups, transforming what was once an individual concern into a systemic threat to organisational effectiveness, manifested in higher staff turnover and a decline in human capital quality. This trend underscores the need for both theoretical and applied research into effective preventive mechanisms, shifting the emphasis from reacting to consequences to addressing the underlying causes of burnout.

The analysis of existing scientific literature indicates a sustained scholarly interest in this problem. X. Wu (2024) conducted a comprehensive literature review on the impact of remote work on workplace loneliness, concluding that although telework enhances autonomy, it significantly disrupts the natural social fabric of organisations. The author emphasised that the absence of physical interaction intensifies feelings of detachment, which constitutes a direct precursor to burnout, suggesting that organisations must intentionally cultivate social connections to mitigate these effects. Examining the specific mechanisms underlying this isolation, P. Ng *et al.* (2022) analysed how remote work reshapes the structure of employees' social networks. The researchers concluded that remote work promotes the siloing of communication networks, whereby employees interact primarily with their immediate teams while losing "weak ties" across the wider organisation. The scholars highlighted that such structural fragmentation is associated with elevated burnout levels, as employees are deprived of access to diverse sources of social support and information.

In the Ukrainian context, which is characterised by distinct systemic and societal challenges, K.N. Fountoulakis *et al.* (2023) investigated the prevalence of burnout syndrome among medical professionals under crisis conditions. The researchers observed that burnout has evolved into a widespread phenomenon, affecting a substantial proportion of healthcare workers. The study demonstrated that traditional coping strategies are frequently inadequate when confronted with persistent systemic stressors. The authors therefore underscored the urgent need for organisational-level interventions, rather than an exclusive reliance on individual resilience. Similarly, Ukrainian scholars I. Chuhrii & T. Nazarovets (2023) examined the psychological characteristics of professional burnout among employees of the State Emergency Service of Ukraine. A direct association between anxiety, depression, and burnout was identified; however, the authors critically noted that resilience should not be conceptualised solely as an internal personal trait, as it is strongly contingent upon external support systems. The researchers concluded that psychocorrective interventions must focus on strengthening internal stability, which is unattainable in the absence of a supportive professional environment.

Extending the sectoral scope of analysis, O. Ivanchenko *et al.* (2022) explored professional burnout among academic staff in Ukrainian higher education institutions. The scholars noted that the rapid digitalisation of education introduced a "technostress" factor, which accelerated emotional exhaustion. The researchers concluded that organisational support and the quality of interpersonal relationships within academic teams serve as critical protective resources, capable of mitigating these adverse outcomes. Turning towards potential solutions, S. Kang & J.H. Koo (2025) demonstrated the protective function of social capital. The authors emphasised that high-quality workplace relationships operate as a crucial buffer against burnout and turnover intentions. The study concluded that psychological resilience is determined not merely by the presence of colleagues but by the quality of the organisational "social fabric", particularly trust and reciprocity. Finally, with regard to the foundational conditions underpinning such relationships, O. Voitenko (2024) presented an extensive review of the construct of psychological safety. The author identified psychological safety as the cornerstone of effective teamwork and a necessary precondition for the emergence of social support. The review concluded that in the absence of a climate in which employees feel safe to express vulnerability, informal support networks cannot function effectively.

However, despite these significant contributions, the analysed studies devote insufficient attention to the genesis of informal supportive structures. Most research focuses either on the consequences of social isolation, such as burnout, or treats the presence of support as a static variable. Only rarely do scholars explicate the specific mechanisms through which individual motivation, group-level psychological safety, and organisational culture interact to "give rise" to an informal support network. This theoretical "blind spot" provided the rationale for the present study. This study aimed, therefore, to develop and theoretically substantiate a holistic model of informal support network formation within a collective, incorporating organisational, group, and individual determinants and clarifying the mechanisms underlying this process.

LITERATURE REVIEW

An analysis of contemporary research and scholarly publications reveals a multifaceted theoretical foundation for the study of professional burnout, encompassing several scientific disciplines, as emphasised in research by G. Mygal *et al.* (2025). Foundational perspectives on burnout were established by the classical theories of C. Maslach & S. Jackson (1981), later revisited by B. Mańkowska (2025),

alongside models of organisational stress developed by R. Karasek (1979). These theoretical frameworks consistently identified social support as a key "buffer" that mitigates the negative effects of work-related stressors. However, social support is frequently conceptualised as a homogeneous perceptual resource, with limited attention paid to the structural and functional diversity of informal support networks. From a structural standpoint, sociological and organisational network theories, represented in the seminal studies of B.N. Adams (1967) and M. Granovetter (1983), and subsequently expanded by M. Carpenter *et al.* (2012), offer robust analytical tools for examining patterns of relational ties within a collective. Building on this theoretical foundation, researchers such as A. Venu *et al.* (2021), J. Zhang *et al.* (2024), and N. González-Casado *et al.* (2025) have focused on modelling the emergence and dynamics of social networks. These studies demonstrated that informal networks are not static configurations but dynamic systems that continuously evolve in response to individual attributes and broader structural conditions. Nevertheless, this line of research remains highly technical and often overlooks the specific supportive functions of informal networks in the context of organisational stress and burnout.

At the individual level, theories from social psychology and group dynamics, examined by A. Khushk *et al.* (2022) and N. Koudenburg & J. Lise (2023), elucidate the fundamental micromechanisms of tie formation, including reciprocity, trust, and homophily. These studies contributed valuable insights into network formation from the perspective of individual behavioural drivers. Despite the substantial body of scholarship within each of these domains, a significant research gap persists. This gap reflects not merely a shortage of empirical findings, but the absence of an integrative theoretical model capable of synthesising these perspectives. Existing studies primarily address whether a relationship exists between social support and burnout, or describe the structural characteristics of networks in isolation. What remains insufficiently explained is how informal support networks emerge through the interaction of individual, group, and organisational factors, what structural forms they subsequently assume, and how these structures influence burnout prevention by addressing employees' psychological needs. Consequently, the critical task is not the production of additional correlational evidence but the development of a comprehensive theoretical model explaining the formation of informal support networks within a team as a mechanism for mitigating professional burnout.

MATERIALS AND METHODS

The present study adopted a theoretical and conceptual research design, with the objective of constructing a holistic analytical framework rather than empirically testing predefined variables. The primary aim was to synthesise fragmented interdisciplinary knowledge in order to explain the genesis of informal support networks. The informational base of the analysis consisted of high-impact peer-reviewed publications, predominantly drawn from the period 2020-2025, ensuring alignment with contemporary workplace realities. Priority was given to interdisciplinary coverage, incorporating three core domains: occupational health psychology (theories of burnout), economic sociology (social capital and network analysis), and organisational behaviour (psychological safety and organisational culture). Sources were retrieved from leading academic databases, including Scopus and Web of Science, using keywords such as "network formation", "social capital genesis", and "burnout prevention mechanisms".

To address the research objectives, a set of general scientific theoretical methods was employed, each selected to correspond to a specific stage of the modelling process. The systems approach functioned as the foundational methodological framework, as it is particularly suited to the analysis of non-linear social phenomena. This approach enabled the conceptualisation of informal support networks not as static constellations of ties, but as emergent systems. The study employed a three-level model structure (Context, Mechanisms, and Outcomes) to examine how macro-level organisational conditions constrain or facilitate micro-level individual interactions. In parallel with this structural analysis, theoretical synthesis was applied to integrate conceptual frameworks that are traditionally examined in isolation. This method was instrumental in addressing the theoretical "blind spot" identified in the introductory section. Through the synthesis of the Job Demands-Resources model and social exchange theory, a conceptual linkage was established between processes of resource depletion (burnout) and resource acquisition (social support). This integration enabled the identification of second-level mechanisms – specifically homophily and reciprocity – as the principal drivers of informal network formation.

Additionally, the method of conceptualisation and differentiation was employed to refine the analytical vocabulary of the study. Given the conceptual ambiguity surrounding the term "support", this method facilitated the operational clarification of key constructs, resulting in the differentiation of functional forms of support (emotional, instrumental, and informational) and the explicit delineation of psychological safety as a catalyst distinct from trust. Finally, conceptual modelling served as the primary constructive method, enabling the visualisation of hypothetical causal relationships between contextual determinants and observed outcomes. This process yielded a schematic representation of the proposed model, including a "life cycle" concept that illustrates the transformation of spontaneous interpersonal contacts into stable support structures. Although the study was theoretical in nature, the proposed model was designed to be empirically verifiable. Future validation may be conducted through a mixed-methods research design, combining social network analysis (SNA) to map structural properties (such as density and centrality) at the outcome level with longitudinal measures of burnout (for example, the Maslach Burnout Inventory) to test the hypothesised protective effects of informal support networks.

RESULTS AND DISCUSSION

Integration of approaches and the structural-procedural logic of the model

The development of a theoretical model explaining the formation of informal support networks constituted the central objective of this study and required a fundamental reorganisation of existing scientific knowledge. An initial review of diverse strands of literature – specifically burnout psychology, social support theory, social network analysis (SNA), and social psychology – revealed a pronounced fragmentation in prior research. Although classical theories of burnout identify social support as a crucial resource, they tend to conceptualise it as a static variable, without accounting for its origin or underlying mechanisms. In contrast, sociological network theories offer sophisticated tools for mapping relational structures, yet they frequently abstract these structures from the psychological needs that give rise to them. Social psychological approaches, in turn, explain the micro-level mechanisms of interpersonal attraction but rarely situate them within the constraints imposed by organisational hierarchies. This fragmentation necessitated an integrative approach, in which conceptual alignment across these perspectives enabled the formulation of the model's theoretical foundations. The outcome of this synthesis is a coherent three-level model that conceptualises support formation not as a collection of isolated factors, but as a linear and logically sequenced process of transformation (Fig. 1).

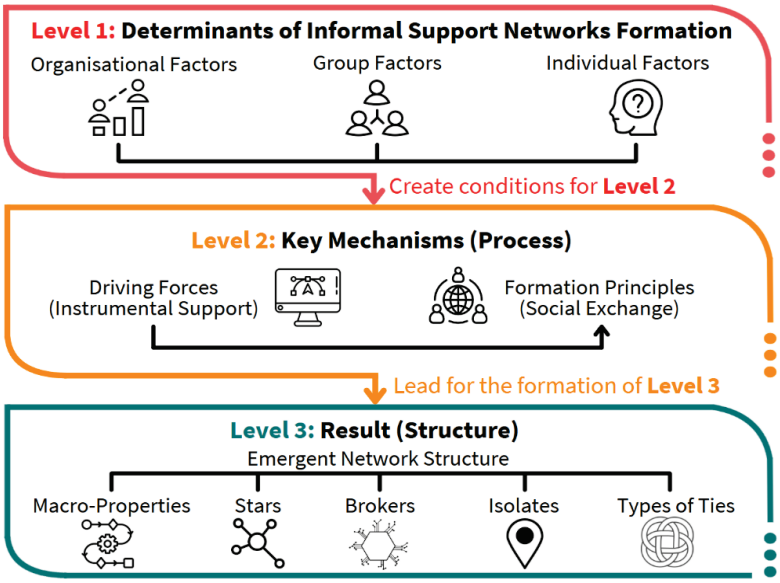

Figure 1. Theoretical model of the formation of informal support networks within a team
Source: developed by the author based on the research of R. Karasek (1979), C. Maslach & S. Jackson (1981), M. Granovetter (1983), B.N. Adams (1967)

At the centre of this process is the first analytical block of the model – psychological needs as driving forces. The analysis suggests that the genesis of any support network begins with an employee's perceived deficit of key resources. In the context of burnout prevention, these deficits are not abstract preferences but fundamental needs: emotional support to validate personal experiences, instrumental support to address task-related uncertainties, and informational support to navigate organisational norms and power structures. These unmet needs function as the initial "trigger" that motivates individuals to move beyond isolation and seek social interaction. In the absence of such a driving force, the emergence of a network lacks a functional rationale. The translation of psychological need into a stable interpersonal connection, however, requires specific enabling processes, represented in the second block of the model – the mechanisms of formation. The study identifies two universal socio-psychological principles that govern this transformation. The first is homophily, defined as the tendency of individuals to associate with others who are perceived as similar, which operates as a heuristic mechanism facilitating rapid trust formation. The second is reciprocity, derived from social exchange theory, which posits that social ties stabilise only when the exchange of support is mutually reinforced. Together, these mechanisms explain how an initially spontaneous interaction can consolidate into a durable supportive relationship.

The cumulative operation of these mechanisms gives rise to the third logical block – the emergent network structure. This structure is not deliberately designed by management but instead crystallises organically over time. It is characterised by specific macro-level properties, such as density and clustering, which determine the speed and efficiency with which support can circulate within a team. Importantly, this process generates distinct structural roles that have often been examined in isolation. The proposed model integrates these roles into a single ecosystem: "stars", or hubs, emerge as central providers of support who are

consequently exposed to an increased risk of resource depletion; "brokers" function as bridges that connect otherwise disconnected subgroups; and "isolates" are identified as individuals who, owing to failures in the mechanisms of homophily or reciprocity, remain excluded from the flow of support resources. In this way, the model demonstrates that network structure represents the final evolutionary stage of the process through which individual psychological needs are addressed via specific social mechanisms.

Multilevel context and managerial implications of informal network formation

Although individual needs and socio-psychological mechanisms drive the internal logic of network formation, the study demonstrates that this process never unfolds in a social vacuum. A key outcome of the analysis is the conceptualisation of a multilevel context that functions as an external environment determining whether internal mechanisms can be activated at all. While previous studies have frequently examined these determinants in isolation, the proposed model integrates them into a hierarchical system of constraints and facilitators operating across three interconnected levels. At the macro level, the organisational context establishes the fundamental "rules of the game". The analysis identifies organisational culture as the primary determinant at this level. A culture that prioritises hyperindividualistic competition acts as a structural barrier, effectively inhibiting the mechanism of reciprocity, as helping a colleague may be interpreted as assisting a competitor. By contrast, a collaborative culture functions as a catalyst for supportive interaction. In addition, the physical and digital design of the workplace plays a less visible yet critically important role. The availability of socalled "collision spaces", such as communal coffee areas or informal digital communication channels, creates the spatial and social opportunities required for homophily to operate. In the absence of such spaces, employees are deprived of opportunities to identify potential sources of support. The transition to remote work is therefore conceptualised as a significant contextual disruption, as it removes many of these spatial catalysts and compels employees to rely predominantly on formal communication channels, which are poorly suited to the provision of emotional support.

At the meso level, the group context functions as the immediate filter through which social interactions are shaped. The central construct at this level is psychological safety. The model proposes that even when an organisation formally endorses a supportive culture, the specific climate within a team may still constrain interpersonal connections. Psychological safety is defined as a shared belief that the team environment permits interpersonal risk-taking. Within the model, its role is pivotal, as it effectively lowers the perceived "cost" of seeking help. In psychologically unsafe environments, the need for support – the initial driving force – is suppressed by fears of appearing incompetent, and the process of network formation is therefore terminated at its earliest stage. Therefore, psychological safety is not merely a beneficial attribute but a necessary precondition for the genesis of informal support networks. At the micro level, the individual context encompasses personal attributes that shape an individual's capacity to form and maintain social ties. The model identifies motivation and emotional intelligence as particularly salient factors. While unmet needs initiate the search for support, it is pro-social motivation and empathic capacity that enable individuals to act as providers of support, thereby sustaining the cycle of reciprocity. Individuals who lack these attributes may seek assistance but fail to reciprocate, which ultimately relegates them to the periphery of the network as "isolates". This multilevel analysis confirms that the formation of a support network is a probabilistic process that requires the alignment of a supportive organisational culture, a psychologically safe group climate, and adequate individual capabilities.

The theoretical analysis culminates in the formulation of the "management paradox", which constitutes the most significant theoretical implication of the proposed model. This paradox emerges from a fundamental tension between the value of informal networks for organisational resilience and the inherent impossibility of exercising direct administrative control over them. The internal logic of the model demonstrates that none of the core components of an informal network is amenable to commandand-control mechanisms. Job descriptions cannot generate psychological needs for emotional validation; managerial directives cannot enforce reciprocity; and authentic homophily cannot be engineered through assigned seating arrangements. Consequently, the emergent structure of informal networks cannot be artificially created or "installed" through top-down mandates. Managerial attempts to "formalise the informal" – for example, by assigning compulsory "buddies" or mandating participation in scheduled social activities – frequently yield counterproductive outcomes. Such interventions undermine the voluntary nature of social exchange, substituting genuine trust with procedural compliance. This process ultimately erodes the very social capital that organisations seek to cultivate. The theoretical conclusions of the study, therefore, necessitate a paradigm shift in management thinking. Leadership should not be conceived as the role of an "architect" who constructs networks incrementally, but rather as that of a "gardener" who cultivates favourable conditions. Effective managerial intervention is thus confined to shaping the determinants of the multilevel context: fostering a culture of openness, designing physical and digital spaces that facilitate interaction, and, most critically, nurturing psychological safety. By establishing these enabling conditions, management allows the spontaneous mechanisms of homophily and reciprocity to operate organically, permitting informal support networks to emerge as adaptive responses to workplace demands. This paradox delineates the limits of administrative authority in the domain of social relations and provides a theoretical foundation for indirect, context-oriented leadership strategies in the prevention of professional burnout.

Conceptual analysis of the model

The principal outcome of this study is the development of a theoretical model for the formation of informal support networks, which conceptualises support not as a static resource but as a dynamic and evolving process. This perspective enables the resolution of fragmentation observed in prior research by integrating psychological needs and sociological mechanisms within a unified analytical framework. This approach is consistent with the findings of A.N. Venu *et al.* (2021) and T. Lars & A. Bakker (2021), who, in their analyses of social network dynamics, emphasised that collective behaviour emerges from complex interactions between individual identities and structural change. Their research demonstrated that network configurations continuously evolve in response to external stimuli. The proposed model extends this argument by applying it to the context of professional burnout, demonstrating that the relevant "stimulus" is a deficit of resources – specifically, emotional exhaustion – that initiates the search for social capital. Whereas A.N. Venu *et al.* (2021) and T. Lars & A. Bakker (2021) focused on general patterns of collective behaviour, the present model specifies the concrete mechanisms – homophily and reciprocity – through which individual stress is transformed into collective support.

A further critical component of the model is the conceptualisation of the multilevel context – organisational and group – as a necessary precondition for the formation of social ties. It is argued that, in the absence of a supportive environment, the mechanisms of support formation are effectively inhibited. This proposition is strongly supported by the research of T. Sun (2023), K. Hebel *et al.* (2025), and V. Nedkovski & M. Guerci (2021), who examined the influence of psychological safety on organisational behaviour. These scholars empirically demonstrated that psychological safety functions as a key mediating factor by enabling employees to engage in interpersonal risk-taking. Their conclusions were incorporated into the proposed model, which clarifies that, in the context of burnout, such "risk-taking" specifically entails requesting help. In contrast to approaches that treat organisational culture as a passive background condition, the model positions psychological safety as an active "catalyst", without which the potential effects of homophily and reciprocity remain unrealised. This framework explains why informal support networks fail to emerge in toxic team environments, even when shared characteristics or interests are present.

According to the developed model, the emergent structure of informal support networks functions as a buffer against work-related stress, thereby enhancing organisational and individual resilience. This interpretation aligns with the findings of S. Shahwan *et al.* (2024), R. Nagarajan *et al.* (2024) and A. Mihai *et al.* (2025), who examined the protective role of social support and resilience during the COVID-19 pandemic. These studies identified a direct positive association between social support and reduced levels of burnout. However, whereas S. Shahwan *et al.* primarily conceptualised support as a preexisting resource, the present model elucidates the process through which this resource is generated. It demonstrated that resilience should not be understood as an inherent individual trait, but rather as an emergent property that arises from the stabilisation of network ties through mechanisms of social exchange. In this way, the study complements the research of S. Shahwan *et al.* (2024), A. Mihai *et al.* (2025), and R. Nagarajan *et al.* (2024) by providing a theoretical rationale for how organisations can actively cultivate resilience, rather than relying exclusively on individual employee characteristics. A distinct component of the model is devoted to dysfunctions and challenges, with particular emphasis on the problem of isolation under hybrid work conditions. The analysis indicated that the erosion of the spatial context inhibits the spontaneous formation of social ties. This conclusion is consistent with the comprehensive literature reviews conducted by X. Wu (2024), S. Schruijer (2021), and M. Zhang *et al.* (2024), which examined the effects of remote work on employee loneliness. These researchers observed that the absence of physical interaction and non-verbal cues substantially intensifies feelings of detachment. This concern is shared in the present study; however, the proposed model further clarifies the underlying mechanism of this phenomenon. Specifically, remote work eliminates "accidental collisions", which normally act as triggers for homophily – that is, the formation of ties based on perceived similarity. Consequently, isolation should be understood not merely as a psychological outcome of reduced communication, as suggested by X. Wu (2024), but as a structural breakdown in the mechanisms of network formation. This finding reinforced the thesis that social support cannot be administratively "assigned" in digital environments without the deliberate creation of virtual spaces designed for informal interaction.

CONCLUSIONS

The theoretical analysis undertaken in this study supported the conclusion that the formation of informal support networks is neither random nor chaotic, but rather a structured and emergent process. This process is grounded in fundamental human needs for emotional and instrumental support and is activated through core principles of social interaction, notably homophily and reciprocity. The proposed threelevel model demonstrated that the emergence and long-term stability of such networks are directly contingent upon the surrounding context, including organisational conditions, group-level dynamics, and individual attributes. In this respect, the study contributed to bridging the longstanding divide between psychological and sociological approaches by advancing a dynamic model of network genesis. This shift redirects scholarly attention from static descriptions of the "support-burnout" relationship towards an analysis of the processes underlying social capital formation.

The findings also yielded important practical implications for management. The model articulates a "management paradox": although informal support networks constitute a critical resource for team resilience, direct administrative

intervention or attempts to deliberately "create" or "control" such networks tend to be counterproductive. These actions undermine the trust and reciprocity that form the foundation of informal social ties. Effective managerial influence must therefore operate indirectly, focusing on the cultivation of a supportive context rather than on the regulation of interpersonal connections themselves. Key leadership levers included fostering an organisational culture that values mutual assistance and, most importantly, the deliberate development of psychological safety within teams. A psychologically safe environment – one in which seeking help is normalised rather than stigmatised – functions as the catalyst that enables support mechanisms to emerge and operate effectively. Future research should prioritise empirical validation of the proposed model, particularly across diverse organisational and industrial contexts. A promising avenue for further investigation lies in examining how emerging work arrangements, especially hybrid and fully remote formats, reshape the processes of informal network formation.

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Неформальні мережі підтримки в колективі як механізм подолання проблеми професійного вигорання

Анотація. Стаття присвячена актуальній проблемі професійного вигорання, яка посилюється в умовах гібридної роботи та соціальної ізоляції. Метою дослідження стало розроблення та теоретичне обґрунтування комплексної моделі формування неформальних мереж підтримки в колективі, що інтегрує організаційні, групові та індивідуальні детермінанти цього процесу та пояснює його механізми. Показано, що традиційні формальні програми підтримки в колективі часто є неефективними, оскільки не враховують ключову роль соціального капіталу та «мезо-рівня» – реальних людських стосунків у колективі. Наукова проблема полягає у відсутності цілісної теоретичної моделі, яка б пояснювала процес формування (генезис) неформальних мереж підтримки. Дослідження вигорання традиційно демонструють «сліпу пляму», фокусуючись або на індивідуальних факторах (персоно-центричний підхід), або на формальних організаційних умовах (організаційно-центричний підхід), ігноруючи при цьому, як і чому спонтанні зв'язки виникають. За допомогою методів системного підходу, теоретичного синтезу і концептуального моделювання, у статті інтегровано знання з чотирьох наукових напрямів: теорій вигорання, соціологічних теорій мереж, моделей динаміки мереж та соціально-психологічних теорій (гомофілія, соціальний обмін). Центральним результатом роботи стало розроблення багаторівневої теоретичної моделі формування неформальних мереж підтримки в колективі. Модель пояснила, як рівень контекстуальних детермінант (організаційні (культура, лідерство), групові (психологічна безпека) та індивідуальні (емоційний інтелект, мотивація) фактори) створює умови для рівня ключових механізмів утворення підтримки в колективі. Ці механізми включали рушійні сили (потреби у підтримці) та принципи формування (гомофілія, реципрокність), які, в свою чергу, породжують рівень виникнення емерджентної структури з її макро-властивостями (щільність) та мікро-ролями («зірки», «брокери», «ізоляти»). Висновки статті розкрили «парадокс управління» (неможливість прямого контролю мереж) та їхні потенційні дисфункції («вигорання зірок», кластеризація). Практична цінність моделі полягає в обґрунтуванні переходу менеджменту від спроб «створити» підтримку до її «вирощування»

Ключові слова: соціальний капітал; психологічна безпека; організаційна культура; гомофілія; соціальний обмін; групова динаміка

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Personal predictors of psycho-emotional adaptation in children of combatants

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Abstract. The study aimed to conceptually substantiate the peculiarities of the mutual influence of psycho-emotional processes and states of children and parents participating in hostilities. A theoretical and analytical approach was used in the study, employing content analysis of empirical and monitoring sources. The theoretical review showed that the prolonged exposure of children to war was accompanied by the spread of clinically significant stress reactions, in particular, increased levels of anxiety, depression and emotional regulation disorders. A summary of international monitoring data showed that the population of Ukraine reported moderate to severe levels of anxiety and symptoms of post-traumatic stress disorder (PTSD), which created an unfavourable psycho-emotional environment for families with children. A review of the literature also demonstrated a significant impact of parents' psychological state on children's emotional functioning: symptoms of PTSD, hyperarousal and depressive manifestations in adults led to reduced emotional availability, impaired family interaction and increased risk of secondary traumatisation. The study established that the key predictors of adaptation were the level of resilience, types of coping strategies, and the nature of the locus of control. The study concluded that supporting children's psychological resilience required comprehensive family-oriented interventions and systematic management of parental stress responses. The results obtained can be used by practical psychologists, social workers, educational institutions and health care professionals to develop targeted programmes to support the psycho-emotional stability of children and families affected by military action

Keywords: resilience; coping strategies; support; stress; protective factors

INTRODUCTION

The research relevance is determined by the growing number of children whose parents are directly involved in combat operations, and therefore, the systemic impact of combat stress and psychotraumatic experiences of adults on the psycho-emotional development of schoolchildren. The psychological consequences of combat experience, in particular post-traumatic stress disorder (PTSD), depressive symptoms, increased anxiety, impulsivity, emotional exhaustion, and possible substance abuse, are key predictors of transgenerational transmission of traumatic experiences. They cause children to develop increased anxiety, emotional instability, hyperactivity, and a tendency toward maladaptive behaviour patterns. The impact of these conditions significantly changes the quality of family interaction and determines which emotional and cognitive strategies the child masters, their style of responding to stress, level of self-regulation, locus of control, and overall ability to adapt psychologically and emotionally. Family systems where one parent has combat trauma are often characterised by emotional distance, inconsistent rules, reduced emotional availability, or increased conflict. This creates an environment in which children do not receive sufficient confirmation of

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safety and predictability, which is critical for the formation of adaptive coping mechanisms. In such conditions, the child's personal and psychological characteristics, namely the level of internal/external locus of control, self-esteem, emotional regulation, and tolerance to frustration, become decisive determinants of how they will respond to stressful events. Without proper attention to these predictors, there is an increased risk of developing chronic anxiety, depressive tendencies, somatisation, behavioural problems and difficulties in social adaptation, which can later develop into persistent mental health disorders.

Various researchers have addressed the issue of the influence of individual psychological determinants on emotional adaptation processes in children, emphasising the multifactorial nature of this phenomenon and its sensitivity to specific developmental conditions. The study by T. Collins & D. Tam (2024) analysed the difficulties faced by families of children whose parents were in military service. The study described in detail the situations that complicated the emotional functioning of children, in particular the increased tension resulting from the instability of family life and the fragmentation of familiar social ties. The study emphasised factors caused by prolonged separations, the unpredictable nature of military service, and the increased emotional stress that developed in the family environment and affected children's experiences and coping mechanisms. The structure of parenting practices in military families and their relationship with indicators of child adaptation were studied by S.-K. Lee *et al.* (2024). The study identified several differentiated parenting profiles, which were associated with varying degrees of parental sensitivity and demandingness. The study traced how changes in parenting approaches correlated with children's behavioural, emotional and social responses, emphasising the dynamism of adaptation processes in the context of family role transformations. The results showed that the variability of children's adaptation largely depended on the flexibility of parental strategies and their ability to maintain emotional balance during periods of increased uncertainty. The socio-psychological challenges faced by young people during the war were the subject of a study by O. Shportun *et al.* (2025). The researchers identified a wide range of factors that determined the choice of adaptive and maladaptive coping strategies, including the intensity of stress experienced, the availability of social support, the level of subjective control, and the specifics of social interaction in crisis conditions. The study summarised the possibilities of psychological support that contributed to reducing the negative effects of stress and strengthening the individual's resources for constructive adaptation. The results emphasised the importance of timely intervention and the development of comprehensive support programmes for children and young people who are in a state of prolonged psychosocial stress.

M. Keleynikov *et al.* (2025) determined that during wartime, a higher number of PTSD symptoms in parents is associated with more serious behavioural and emotional difficulties in children. At the same time, they found that adaptive strategies of interpersonal emotion regulation used by parents (e.g., emotion acceptance, problem solving, reappraisal) significantly mitigate this negative association. A study by A. Mahar *et al.* (2023) determined that adolescents whose parents serve or have served in the military had poorer mental health and lower life satisfaction compared to adolescents from families with no military connection. They also reported more emotional problems, a constant feeling of hopelessness, and frequent risky behaviour. The authors concluded that adolescents in military families need additional mental health support. The risks of maladaptive coping strategies among military-related adolescents were analysed by T. Gilreath *et al.* (2022). The study summarised combinations of factors that predicted the probability of maladaptive behaviour. The study identified patterns of risk combinations that influenced the formation of ineffective stress coping strategies. R. Kirkham *et al.* (2025) summarised scientific approaches to understanding emotional regulation and coping among military personnel. The study systematised the dominant models of emotional response, characteristic forms of regulatory behaviour, and protective factors associated with difficult adaptation. As a result, general patterns of emotional functioning in military groups were identified. The psycho-emotional difficulties of participants in the educational process under martial law were also studied by B. Palamar *et al.* (2023). The study described changes in emotional stability, academic motivation, and behavioural responses. The study identified protective factors that influenced the effectiveness of overcoming psycho-emotional stress in different groups of participants in the educational environment.

Y. Omelchenko (2022) studied the specifics of providing psychological assistance to children in wartime conditions. The study outlined the main areas of work with children affected by hostilities. The study described the typical difficulties that specialists responded to and the characteristics of children's emotional reactions in crises. L. Pomytkina *et al.* (2021) analysed the psychological determinants of the formation of personal identity in older preschoolers. The study described the key personality characteristics associated with the development of identity structures in preschool-age children. The study identified predictors that influenced the variability of a child's individual development. The above-mentioned studies revealed gaps related to insufficient systematisation of personality psychological factors of adaptation of children of combatants, a limited amount of empirical data on the interaction of family and internal factors, and a lack of models that would combine the individual emotional characteristics of the child with the influence of the military experience of the parents. The study aimed to theoretically substantiate and determine the influence of the mechanisms of interaction between the personal resources of the child and the psychological state of combatant parents. The objectives of the study were to conduct a theoretical analysis of the psychological consequences of war for Ukrainian children and parents; to

determine the relationships between the psychological state of parents who are combatants, the characteristics of family dynamics, and the individual adaptive resources of children; to develop a theoretical model of the psycho-emotional adaptation of children of combatants, strengthening their resilience and developing effective coping strategies.

MATERIALS AND METHODS

The study was based on analytical and systematic approaches to the study of crisis psychology and family dynamics. The study was defined as theoretical, with an emphasis on systematic analysis of scientific sources, international and local statistical data, and its time frame covers the last four years (2020-2024), including the active phase of hostilities on the territory of Ukraine and their systemic impact on the psychological state of children and parents. Data collection was based on theoretical analysis methods, which ensured the comprehension of scientific sources. The results of psychological and psychiatric studies, reports from international organisations (UNICEF, 2025; World Health Organisation, 2025; Childhood disrupted, n.d.), analytical data (International Organisation for Migration, 2024) on children's mental health, and studies highlighting the impact of war on the family system were analysed. Furthermore, sources describing the individual psychological resources of children (resilience, coping strategies, locus of control), the psychological state of parents who have participated in combat operations (PTSD, emotional burnout, transgenerational trauma) and the mechanisms of family transmission of traumatic experiences were also addressed (Goto *et al.*, 2024; Naeem *et al.*, 2025; Nalyvaiko *et al.*, 2025). A theoretical analysis of data on crisis psychology, developmental traumatology, family stress theories, and models of intergenerational transmission of trauma was conducted.

The research process involved content analysis, comparative analysis, theoretical synthesis of scientific information, and modelling. Content analysis identified key themes and trends related to the psycho-emotional adaptation of children of combatants and revealed the interrelationships between the child's personal resources and the psychological state of the parents. Data on the risks associated with traumatic experiences, social isolation, disruption of educational activities, and manifestations of anxiety, fear, and depression in children were structured. A comparative analysis was used to compare the results of Ukrainian studies with international data, in particular Israeli data (Aloni *et al.*, 2020; Rachamim *et al.*, 2025), on the level of PTSD in parents, manifestations of emotional burnout and transgenerational effects of trauma. The obtained generalisations integrated Ukrainian and Israeli data into a general theoretical system of interaction between a child's personal resources and the psychological characteristics of parents that influence the effectiveness of psycho-emotional adaptation and possible prognostic factors of stability. Modelling was used to reveal the mechanisms of influence of the family environment and individual resources on psycho-emotional adaptation. The results were interpreted through the prism of crisis psychology and theories of family stress transmission, which assessed the impact of parents' psychological state, parenting styles, and overall family functioning on children's adaptation processes. Identification of key predictors of successful psycho-emotional adaptation, such as high resilience, effective coping strategies and internal locus of control in children, combined with a stable and supportive family system, was also emphasised.

RESULTS

Theoretical analysis of the psychological consequences of war for children and parents in Ukraine

After the full-scale invasion (2022), the psycho-emotional state of children deteriorated due to the sharp increase in military threats, prolonged social instability, and disruption of normal daily life. Summary data from UNICEF (2024) and the World Health Organisation (2020; 2025) showed an increase in anxiety, fears, emotional regulation disorders, learning difficulties and manifestations of depression among children of different age groups. Prolonged stressors, including the constant threat of danger, internal migration and the destruction of social infrastructure, led to emotional instability, mood swings, impulsive behaviour and regressive reactions. Children in frontline or liberated areas for long periods of time exhibited social isolation, reduced social activity and difficulties interacting with peers. Disruptions to education caused by distance learning, the destruction of schools or frequent changes of educational institutions exacerbated these problems. A UNICEF report for the first half of 2024 confirmed the prevalence of traumatic stress among Ukrainian children, manifested in increased excitability, sleep disturbances, regressive behaviour, and difficulties with emotional self-regulation. A large-scale cross-sectional study by R. Goto *et al.* (2024), which covered 8,096 adolescents from Ukraine and abroad, showed a high level of psycho-emotional stress: 32% of adolescents had signs of moderate or severe depression, 17.9% had moderate or severe anxiety, and 35% had clinically significant psychological trauma. These data indicate a significant prevalence of mental disorders among young people directly or indirectly affected by the war.

The family environment is substantial in shaping children's psycho-emotional state. Parental PTSD, emotional exhaustion and difficulties in regulating emotions directly affect children through changes in parenting styles, emotional availability and stability of family interaction (International Organisation for Migration, 2024; UNICEF, 2025). Children of parents who are frontline soldiers are more likely to experience secondary traumatisation, which is manifested through increased anxiety, fears, emotional regulation disorders and behavioural disorders. The psychological state of adults, including chronic fatigue, irritability and loss of motivation, exacerbates the difficulties in restoring stable family interaction. At the same time, the availability of adaptive resources partially mitigates the negative effects of stress. Such resources include family support,

stable intra-family relationships, parental involvement in the child's daily life, and the development of basic coping strategies. However, uneven access to psychological assistance, a shortage of qualified specialists, and barriers to seeking help have significantly limited the ability to respond in a timely manner to children's psycho-emotional difficulties. Key barriers identified by O. Nalyvaiko *et al.* (2025) and V. Dufynets *et al.* (2024) included low awareness among families about available support services and their effectiveness; stigmatisation of mental health, which reduced willingness to seek help; overburdened services and a shortage of child psychologists, especially in frontline and de-occupied communities; logistical difficulties caused by the displacement of families or the lack of stable infrastructure. The combination of these barriers significantly weakens families' ability to receive adequate psychological assistance and, consequently, affects the stability of children's psycho-emotional development in wartime conditions.

The conditions of war increase the vulnerability of family interactions, which affects parents' ability to provide emotional availability, a structured environment, and consistent parenting practices. A decrease in emotional availability due to anxiety, exhaustion, or PTSD symptoms in parents means that children do not receive the necessary sense of support and compassion, which makes it difficult to develop effective coping strategies. Disruption of emotional contact is one of the key factors in the development of increased anxiety, regressive behaviour, and difficulties with emotional regulation in children, especially in families where parents have experienced psychological trauma. In addition, the stability of the family environment is substantial in maintaining a sense of security, which is a basic condition for a child's adaptation. Chaotic living conditions, frequent moves, family separation, changes in adult roles and functions, or high levels of conflict reduce a child's ability to restore emotional balance and increase feelings of unpredictability. Children in such conditions are more likely to demonstrate difficulties in socialisation, reduced motivation to learn, increased irritability, and a tendency toward unique behaviour. A stable family structure, on the contrary, helps children develop a sense of control over their environment, which has a positive effect on the development of an internal locus of control and stress resilience (Naeem *et al.*, 2025).

The psycho-emotional state of parents is a key factor determining the quality of children's adaptation to stressful conditions. Psychotraumatic experiences, PTSD, emotional exhaustion and increased anxiety in parents directly affect children through the mechanism of direct emotional transmission. In this case, the child experiences the emotional state of the adult as part of internal experience: increased irritability, emotional detachment, or unpredictable affective reactions of parents cause increased anxiety, fears, difficulties with self-regulation, and behavioural dysfunction in the child. The lack of emotional availability of the adult limits the child's ability to receive the necessary sense of support, security, and understanding, which complicates the formation of effective coping strategies and resilience. Along with direct influence, the psycho-emotional state of parents is transformed into an indirect effect through changes in parenting styles and family climate. Studies show that parents with signs of PTSD or emotional exhaustion often develop maladaptive parenting styles: overprotection or emotional distance, inconsistency in rules and requirements, as well as authoritarianism or excessive control. Such styles disrupt the stability of the family environment, reduce the predictability of interaction, and weaken the structure of daily life, which in turn increases the child's emotional instability. Due to climate change, children begin to internalise the instability of adults, which manifests itself in increased anxiety, regressive behaviour, difficulties in concentration and communication with peers. It is important to emphasise that direct and indirect transmission of stress are interrelated: the emotional unavailability of parents reinforces the effect of maladaptive parenting styles, and changes in the family climate maintain a chronic sense of instability and unpredictability for the child (Blikhar, 2024). Thus, the psychotraumatic state of parents, combined with the destruction of the stability of the family environment, creates a complex mechanism of influence on the psycho-emotional development of children, which is manifested in a wide range of psychological, behavioural and social difficulties.

Interrelationships between the psychological state of parents participating in combat operations, family dynamics and personal resources of children

The results of the analysis demonstrated that the personal resources that determine the ability of Ukrainian children to adapt to the conditions of war and post-war stressors are resilience, effective coping strategies, and a formed locus of control. Coping strategies strengthen adaptive capabilities. Content analysis showed that active coping strategies (seeking social support, rational problem solving, cognitive reappraisal) correlate with lower levels of emotional maladjustment, while avoidance or passive strategies (ignoring the problem, emotional isolation) are associated with increased anxiety, fears, and behavioural disorders.

The indirect effects of PTSD are manifested through changes in family interaction and parenting styles. Parents' traumatic experiences can lead to overprotectiveness, strict control, or emotional detachment, which disrupts the development of a child's internal locus of control, autonomy, and resilience. Additional factors include veterans' comorbid conditions such as depressive symptoms, increased anxiety, emotional instability, or substance abuse, which further destabilise the family environment. Disruption of stability and increased conflict within the family exacerbate children's stress responses and limit their use of adaptive coping strategies. The interaction of family dynamics with the child's individual resources forms a key mechanism for their psycho-emotional adaptation in conditions of prolonged stress caused by war events. Analysis of scientific sources and data from international organisations

has shown that characteristics of family interaction, such as overprotection, anxious parenting styles, emotional distance and general instability in the family environment, have a significant impact on the development of resilience, effective coping strategies and the formation of locus of control in children. Overprotection, which often occurs in parents with high levels of anxiety or who have experienced traumatic events, limits a child's ability to develop autonomy and an internal locus of control. In such conditions, children are less likely to take the initiative in solving problems, relying on adults as their only source of protection. This leads to reduced stress resilience and less effective formation of adaptive coping strategies, in particular active coping or cognitive reappraisal strategies (Williamson *et al.*, 2017).

Anxious parenting styles, which often accompany parental PTSD or emotional exhaustion, also have a maladaptive effect on the child's individual resources. Constant warnings, fears, and demonstrations of danger by adults contribute to the consolidation of an external locus of control, the formation of a sense of unpredictability of the world, and a tendency to avoid stressful situations. Children in such conditions use passive coping strategies, which increases the risk of emotional dysregulation, anxiety and somatisation. Emotional distance, which can develop as a result of secondary traumatisation or parental emotional burnout, weakens the sense of security and reduces the child's ability to self-regulate effectively. The lack of sensitive parental support makes it impossible to develop resilience stably, since it is the emotional availability of adults that serves as the basis for the formation of stress recovery skills. Under such conditions, children demonstrate difficulties in processing emotions, low tolerance for frustration, and an increased tendency toward depressive and anxious manifestations. Family instability, expressed in a disrupted structure of interaction, conflict or inconsistency of rules, has an additional destabilising effect on personal resources. In an unpredictable environment, it is difficult for children to form an internal locus of control, as their experience is not applicable in prediction of the consequences of personal actions (Łodygowska & Szebanowa, 2018).

The instability of the family system also reduces the effectiveness of coping strategies, as the child is deprived of a model of emotionally regulated adult behaviour and therefore does not have the opportunity to adopt adaptive models of responding to difficulties. At the same time, the analysis showed that the interaction between negative characteristics of family dynamics and individual resources is not one-sided. In children with high initial resilience and an internal locus of control, destabilising factors are less intense: such children make more active use of social support, regulate emotions better, and are less prone to anxious or regressive behaviour. Strong personal resources can partially compensate for the impact of family stressors, but they cannot completely neutralise them (Pan *et al.*, 2021). Therefore, family dynamics and the child's individual resources interact closely, shaping both risks and adaptation potential. The quality of emotional bonds within the family, the stability of the upbringing environment, and the style of interaction determines a child's ability to develop resilience, adaptive coping strategies, and an internal locus of control, which are critically important in the context of prolonged military stressors.

A comparative analysis of the experiences of Ukraine and Israel has identified common risk predictors and contextual differences in the psycho-emotional adaptation of children under the influence of war stressors. In both countries, the key predictors are the psychological difficulties of parents, in particular manifestations of PTSD, emotional burnout and anxious parenting styles, which directly or indirectly affect the psycho-emotional state of children. To summarise the results, a comparative Table 1 was created.

Table 1. Analysis of common risk predictors and contextual differences in the psycho-emotional adaptation of children in Ukraine and Israel

Category	Ukraine	Israel	Common risk predictors	Contextual differences
Psychological consequences of parents' combat experience (PTSD, depression, anxiety, emotional exhaustion, etc.)	Prevalence among contract soldiers and veterans of combat-related psychological consequences of PTSD, depressive symptoms, generalised anxiety, emotional exhaustion and impulsivity, which correlate with difficulties in parent-child interaction	The presence of various forms of psychological reactions to combat events in parents, such as PTSD, anxiety disorders, and chronic stress exhaustion, affects the structure of emotional regulation and parenting styles	The psychological consequences of combat experience (PTSD, depression, anxiety, and emotional burnout) directly and indirectly increase the risk of anxiety, depression, dysregulation and secondary traumatisation in children	In Ukraine, the impact is exacerbated by factors such as internal migration, infrastructure destruction, and prolonged separation; in Israel, by the phenomenon of "continuous traumatic stress" and repeated safety threats
Parenting style	Anxious and inconsistent parenting styles; overprotectiveness or emotional distance	Similar maladaptive parenting styles in parents with PTSD or emotional difficulties	Anxious and overprotective parenting styles reduce the effectiveness of resilience and coping strategies in children	In Ukraine, the impact is further exacerbated by instability in living conditions and education; in Israel, by the prevalence of distressing events in everyday life

Table 1. Continued

Category	Ukraine	Israel	Common risk predictors	Contextual differences
Risks for children	Anxiety, fears, emotional regulation disorders, learning difficulties, and social isolation	Increased levels of PTSD, depressive symptoms, difficulties in interpersonal relationships, and emotional dysregulation	Emotional and behavioural disorders, difficulties with self-regulation and adaptation to stress	Social isolation and disruption to education are more pronounced in Ukraine; in Israel, there is an indirect impact due to recurring military threats
Children's personal resources	Resilience, active coping strategies, and an internal locus of control mitigate the impact of stressors	Similar resources compensate for the negative impact of parental PTSD	High resilience and an internal locus of control reduce maladjustment	In Ukraine, the effect is mitigated by a combination of social and everyday stressors; in Israel, it is due to repeated psychological pressure

Source: compiled by the authors based on R. Aloni *et al.* (2020), B. Mykhaylov *et al.* (2023), L. Rachamim *et al.* (2025), Y. Bondarenko *et al.* (2025)

Research in Ukraine and Israel shows that parental PTSD and emotional difficulties significantly affect the psycho-emotional state of children, increasing levels of anxiety, depressive symptoms and PTSD symptoms. This impact is manifested both through the direct effect of parental emotional availability and indirectly through changes in parenting styles (Rachamim *et al.*, 2025; Bondarenko *et al.*, 2025). At the same time, high levels of resilience, effective coping strategies and an internal locus of control in children mitigate the negative effects of family stressors, indicating the universal role of personal resources in psycho-emotional adaptation. Contextual conditions determine the specifics of psycho-emotional difficulties. In Ukraine, social isolation among children is more pronounced due to the prolonged war, large-scale destruction of housing and social infrastructure, frequent internal displacement, and separation from parents. The loss of a stable school environment and limited opportunities for interaction with peers fragments social ties, leading to avoidance of contact, reduced motivation to communicate, and difficulties in integrating into new groups. Therefore, social isolation among Ukrainian children has infrastructural and domestic roots and is exacerbated by prolonged social instability. In Israel, the main factor is constant, repeated threats (rocket attacks, sirens), which form the phenomenon of continuous traumatic stress. Social infrastructure and the school environment remain relatively stable, so social isolation is less pronounced. However, chronic stress caused by constant threats leads to emotional dysregulation: impulsive reactions, sudden mood swings, difficulty concentrating and self-control. Common to both countries is the significant impact of parental PTSD, which reduces the emotional availability of adults and contributes to maladaptive parenting styles. In Ukraine, this effect is further exacerbated by the breakdown of family structures and prolonged separation, while in Israel, it is exacerbated by the chronic exhaustion of parents due to repeated threats. Thus, although the basic risk factors are similar, in Ukraine, children's psycho-emotional problems are of a social-contact nature, while in Israel, they are manifested mainly as regulatory-emotional difficulties.

Analysis of the theoretical model of psycho-emotional adaptation of children of combatants

The theoretical model of psycho-emotional adaptation of children of combatants is constructed as a multi-level system of interaction between individual, family and parental psychological factors, which jointly determine the trajectories of a child's development and emotional stability in conditions of war and post-war stressors. Its structure comprises three key blocks: the child's individual resources, the psychological state of combatant parents, and the characteristics of the family environment, each of which functions as a separate but interdependent component of the adaptation system (Fig. 1).

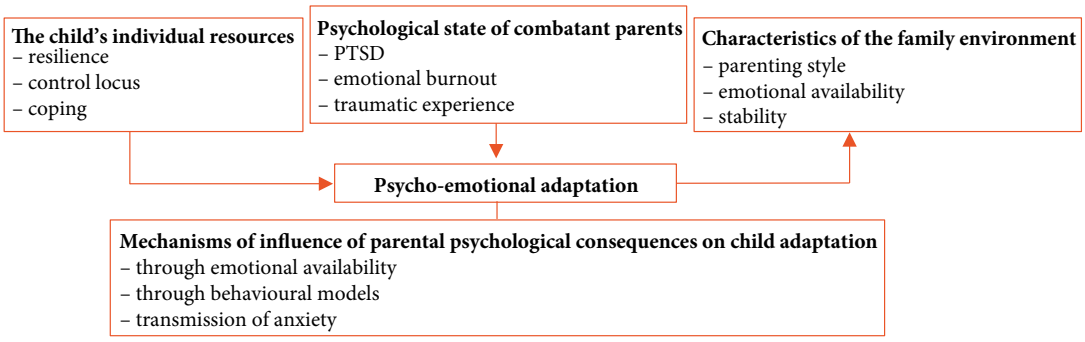

Figure 1. A theoretical model of effective psycho-emotional adaptation of children in wartime conditions has been created
Source: compiled by the authors based on E. McElroy *et al.* (2024), E. Pfeiffer *et al.* (2024)

The first block of the model is denoted as the internal basis for stability and the ability to cope with stress. Resilience determines mental flexibility and the potential for recovery after traumatic events, ensuring the ability to return to a basic level of functioning even in difficult conditions. The locus of control, which is formed in the process of interaction with the environment, determines the child's perception of their role in influencing events: an internal locus promotes active responses, while an external locus can increase anxiety and helplessness. Coping strategies encompass self-regulation tools, from problem-oriented actions to emotional management skills, and determine the extent to which a child can respond constructively to stressors without forming maladaptive behavioural patterns. The second block is one of the most significant external factors influencing a child's psycho-emotional development. PTSD symptoms, including hyperarousal, avoidance, intrusive memories, and emotional numbness, significantly alter the nature of parental functioning. They reduce emotional availability, make it difficult to maintain stable behaviour, and increase the risk of inconsistent parenting practices. The emotional exhaustion that accompanies traumatic experiences can lead to alienation, decreased sensitivity, and sometimes increased irritability or impulsivity. Traumatic experiences also have an intergenerational dimension: children learn models of stress response, emotional scenarios and worldviews from their parents, which can shape their propensity for anxiety, hyper-responsibility or emotional instability. The third block of the model mediates between the parents' state and the child's individual capabilities. Parenting style is central, as anxious or overprotective styles can reduce a child's autonomy and exacerbate fears, while supportive styles promote the development of confidence, independence, and coping skills. The emotional availability of parents determines the quality of emotional interaction: it lack reduces the child's ability to receive external regulation, which is especially important during the stages of psychological security formation. The stability of the family system creates a structured environment in which the child can predict adult reactions, comprehend rules and feel protected; instability, on the other hand, increases psycho-emotional risks and impairs the child's ability to use personal resources.

The mechanisms of parental PTSD's impact on a child's adaptation are realised through several interrelated channels. First, reduced emotional availability disrupts the child's emotional regulation processes and complicates the formation of trust and a basic sense of security. Through behavioural models, children learn both adaptive and maladaptive ways of responding to stress, which shape long-term coping patterns. The mechanism of anxiety transmission is manifested in the fact that children not only observe but also emotionally assimilate their parents' anxious attitudes and expectations, responding to the world with similar emotional reactions. In summary, the model shows that effective psycho-emotional adaptation in children is formed when the child's strong individual resources are realised in a supportive, stable and emotionally sensitive family environment capable of compensating for some of the negative effects of parental trauma. The combination of high levels of parental PTSD, low family life structure and maladaptive parenting styles significantly increases the risk of anxiety, depressive symptoms, emotional regulation problems and behavioural disorders in children. In this sense, the model serves not only as a description of influences, but also as a conceptual basis for the development of psychological support programmes for military families, both at the level of individual support for children and at the level of family-oriented and parental interventions.

Practical recommendations for providing psychological and emotional support to children of combatants

Recommendations based on an analysis of international practices by UNICEF, the World Health Organisation and the International Organisation for Migration emphasise the need for a comprehensive approach to supporting children of combatants, incorporating the level of the child, parents and family system. Firstly, child-centred efforts should seek to enhance resilience by creating an environment that provides a sense of security, predictability and emotional support. Supporting a positive self-image, belief in personal abilities and the development of stress recovery skills are in line with UNICEF (2025) recommendations on developing children's mental resilience in armed conflict contexts. Another essential principle is the development of adaptive coping strategies that help children recognise and regulate their emotions, use social support and constructively overcome difficulties. Such approaches emphasise the significance of developing emotional self-regulation skills to reduce the impact of traumatic stress. Social integration of children is emphasised, in particular, strengthening of their relationships with peers, which contributes to the formation of a sense of belonging and creates additional resources for overcoming stressful experiences.

Support for parents, especially those who have experience of combat, is the second key area of recommendations. International organisations emphasise the need to increase their emotional availability, which involves the ability to establish stable emotional contact with the child, even in conditions of personal stress or psychological exhaustion. Awareness and control of personal reactions can reduce the risk of transmitting anxiety or hyperreactivity to the child, which is important for the prevention of secondary traumatisation and correlates with the World Health Organisation (2025) recommendations for working with veterans. A substantial component of support is also maintaining stable family roles and predictable routines, as a structured environment reduces the level of uncertainty that often accompanies children in families where the father or mother has combat experience. In addition, parents are advised to recognise the possible impact of PTSD symptoms and combat trauma on the family atmosphere and, if necessary, seek help in line with the practices of the International Organisation for Migration (2024) in the field of mental health

for combatants. At the family system level, the recommendations emphasise the importance of creating conditions that promote healthy family interaction and prevent the transgenerational transmission of traumatic experiences. Stable and open communication, the development of problem-solving skills and mutual support help to reduce the risks of emotional isolation and misunderstanding. This approach is consistent with family-oriented support models developed by UNICEF (2024) for families experiencing conflict or loss. The prevention of transgenerational trauma involves the creation of a safe emotional environment in which combat experiences do not become a source of excessive anxiety, aggression, or emotional coldness towards children. International organisations emphasise that preventing the transmission of trauma between generations is key to maintaining a child's psychological well-being. In addition, supporting family resources, particularly emotional and social resources, creates a foundation for stability and adaptive functioning of the family system in difficult life circumstances. The child can then use their potential, resilience, ability to self-regulate their emotions, and constructive coping strategies more fully, which are key predictors of successful psycho-emotional adaptation.

DISCUSSION

The results of the study demonstrated that the key personal and psychological predictors of the psycho-emotional adaptation of children of combatants were their level of resilience, the development of constructive coping strategies, and their locus of control. High resilience ensures a child's ability to restore emotional balance after stressful events, while active, problem-oriented coping mechanisms contribute to more effective management of experiences and behavioural reactions in difficult situations. These findings are consistent with the results of S. Valero-Moreno *et al.* (2021), demonstrating that even under adverse pandemic conditions, the internal psychological resources of the family, including the resilience and self-regulation skills of children, determined their level of emotional well-being. The researchers emphasised that children's ability to adapt to stress depended on a combination of individual and family resources, which is fully consistent with the results obtained. Similarly, the findings of K. Watson *et al.* (2025) confirmed the importance of adaptive coping strategies for maintaining emotional stability in adolescents in situations of increased family stress. The study demonstrated that children who used active and flexible coping strategies were better able to control their emotional reactions and interact more effectively with their social environment, which is fully consistent with the results of this study. This indicates that coping mechanisms are one of the central factors of adaptation in the context of psychotraumatic events experienced by military families. At the same time, the data demonstrated that a child's personal resources cannot be considered separately from the conditions of the family environment. Adaptation processes are significantly influenced by the quality of upbringing, the level of emotional support, and the stability of interactions within the family. These patterns corresponded with the findings of V. Panula *et al.* (2020), proving that the psychosocial well-being of parents is a significant factor in the development of children's social competence. The study emphasised that the level of parental stability and the ability to provide emotional support directly influence the formation of children's ability to regulate emotions and build healthy interpersonal relationships. In view of this, the results of this study confirmed that even a high level of resilience in a child may be insufficient in conditions of chronic family stress or emotional coldness. Similar trends were observed in S. Scaini *et al.* (2023), determining that emotionally unstable or anxious parenting styles significantly increased the probability of children developing internal anxiety, emotional regulation difficulties, and problematic behaviour.

In addition, this study emphasised the impact of PTSD in combatant parents. The results showed that pronounced PTSD symptoms indirectly reduce children's emotional regulation by decreasing parental sensitivity and increasing emotional distance. At the same time, P. Watson & A. Osborne (2025) demonstrated that children of parents with PTSD demonstrated impaired social interaction, increased anxiety, and a tendency toward social isolation, a trend that fully confirmed the results of this study. The results of this study also showed that an anxious parenting style can systematically increase the risk of emotional dependence and reduced autonomy in children. This was consistent with the findings of N. Zhang *et al.* (2020), demonstrating that increased emotional care and control by parents in military families was often accompanied by lower levels of adaptability in children. The results of this study were also consistent with the review by A. Ohlsson *et al.* (2024), which emphasised that the instability of parental responses after military missions had a negative impact on children's emotional security. Establishing the mechanism of anxiety transfer from parents to children was an important aspect. The results of this study demonstrated that parental anxiety serves as a predictor of anxiety and depressive symptoms in children. This was consistent with the findings of M. Rogers *et al.* (2025), determining similar patterns in children of Australian military families, where the emotional state of parents was directly correlated with behavioural maladjustment in children. Similar results were obtained in a study by R. Pessoa dos Santos *et al.* (2021), emphasising the role of mutual support within the family during military missions as a factor that mitigated children's anxiety reactions.

The results of the study showed that the stability of the family system is one of the most significant factors in maintaining the psycho-emotional balance of children. This was fully consistent with the findings of P. Lester *et al.* (2024), establishing that children of military personnel demonstrated higher levels of adaptability in conditions of structured family practices and emotional sensitivity on the part of adults. In addition, the psycho-emotional adaptation of children of combatants is shaped by a combination of individual resources, the psychological state of parents,

and characteristics of the family environment. A study by G. Maina *et al.* (2021) also emphasised that even in families with other types of maladaptive factors, the interaction of individual and family variables determined the characteristics of child adaptation. The results also showed that an important condition for the effective psycho-emotional adaptation of children of combatants is the level of overall functioning of the family system. This trend was consistent with the findings of M. Farnsworth & C. O'Neal (2024), determining that the psychological well-being of adolescents from military families depended largely on how effectively the family functioned as a whole system, and that family support enhanced the adaptability of the coping strategies chosen by children. The results of the study confirmed that the vulnerability of children's psycho-emotional sphere increases in conditions of impaired communication or conflictual relationships between parents.

The characteristics of children's emotional sensitivity identified in the study, in particular, increased reactivity in response to sudden changes in the family environment, also empirically correlated with the conclusions of E. Caffo *et al.* (2021). In particular, the study showed that during crisis events (pandemic, military threats, family stressors), the deterioration of mental health in children and adolescents was closely associated with high emotional vulnerability and insufficient development of emotional regulation. This was also consistent with the findings of H.-J. Chen *et al.* (2025) determined that adolescents' motivational resilience and internal resources had a positive impact on their psycho-emotional well-being and academic performance. Although their study focused on Taiwanese adolescents, including immigrant children, the parallels with the present findings emphasised that intrinsic motivation and emotional resilience are universal predictors of adaptation. The analysis revealed that the level of parental involvement, in particular emotional closeness, participation in daily activities and stability of interactions, correlates with the psycho-emotional stability of children. The role of individual cognitive-emotional characteristics of children, in particular the ability to self-reflect, control impulses and construct positive interpretations of stressful events, was also identified. These findings correlate with those of D. Bastiaansen *et al.* (2020), demonstrating that the quality of life of children with mental disorders largely depended on individual cognitive resources and emotional regulation skills. Therefore, a child's intellectual and emotional resources serve as a significant predictor of their socio-psychological functioning. Thus, the results of the study confirmed the multidimensional nature of the psycho-emotional adaptation of children of combatants and showed that it is the integration of the child's individual resources with a supportive family environment that can partially compensate for the negative effects of parental PTSD, as well as associated depressive symptoms, increased anxiety, emotional instability, or substance abuse. This fully correlates with the above-mentioned studies, which indicate the universality of such patterns in military families in different countries.

CONCLUSIONS

Theoretical analysis showed that prolonged exposure of children to war conditions led to persistent psycho-emotional disorders, including increased anxiety, depressive reactions, difficulties with emotional regulation, and behavioural disorders. The psycho-emotional state of children was closely dependent on the psychological state of adults: PTSD, depression, hyperactivity, and self-regulation disorders in parents worsened the quality of family interaction and caused secondary traumatisation, increasing the risks of maladjustment in children. The analysis highlighted the key role of the family environment in shaping a child's adaptive abilities. Supportive parenting practices and emotional stability in the family acted as protective factors, while an authoritarian or anxious-overprotective style, characteristic of parents with traumatic experiences, was associated with emotional regulation disorders and increased anxiety in children. A synthesis of theoretical sources confirmed the importance of resilience, adaptive coping strategies, and an internal locus of control in ensuring a child's psycho-emotional stability.

A comparison of the Ukrainian and Israeli contexts revealed a common pattern, as the psycho-emotional adaptation of children is determined by the level of psychological well-being of their parents. At the same time, differences in the structure of stressors lead to differences in the nature of disorders. In Israel, the influence of continuous traumatisation dominates, while in Ukraine, the psycho-emotional consequences are exacerbated by a combination of military, migration, social and educational factors. The theoretical model that summarised these provisions reveals the psycho-emotional adaptation of children as a result of the interaction of individual characteristics, family dynamics and the psychological state of parents. The greatest adaptive potential is formed in a situation where the child's strong personal resources are combined with a supportive and stable family environment. On the other hand, a combination of severe parental PTSD, emotional instability and unsystematic parenting practices significantly increases the risk of anxiety, depression and behavioural disorders in children. A limitation of the study is that some of the available data were based on secondary sources and broad estimates, which limited the possibility of detailed analysis. Prospects for further research include the development of empirical models using longitudinal data, which can be used for tracking the dynamics of children's psycho-emotional adaptation.

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Особистісні предиктори психоемоційної адаптації дітей учасників бойових дій

Анотація. Метою дослідження було концептуально обґрунтувати особливості взаємовпливу психоемоційних процесів і станів дітей та батьків-учасників бойових дій. У роботі застосовувався теоретико-аналітичний підхід із використанням контент-аналізу емпіричних і моніторингових джерел. Теоретичний огляд засвідчив, що тривале перебування дітей у ситуації війни супроводжувалося поширенням клінічно значущих стресових реакцій, зокрема підвищенням рівнів тривоги, депресивності та порушень емоційної регуляції. Узагальнення даних міжнародних моніторингів показало, що населення України повідомляли про помірний або тяжкий рівень тривожності, а також мали симптоми посттравматичного стресового розладу (ПТСР), що формувало несприятливе психоемоційне тло для сімей із дітьми. Аналіз літератури також продемонстрував значний вплив психологічного стану батьків на емоційне функціонування дітей: симптоми ПТСР, гіперзбудливість і депресивні прояви дорослих зумовлювали зниження емоційної доступності, порушення сімейної взаємодії та підвищували ризик вторинної травматизації. Встановлено, що ключовими предикторами адаптації виступали рівень резилієнтності, типи копінг-стратегій і характер локусу контролю. Зроблено висновок, що підтримка психологічної стійкості дітей вимагала комплексних сімейно орієнтованих інтервенцій та системної роботи з батьківськими стресовими реакціями. Отримані результати можуть бути використані практичними психологами, соціальними працівниками, освітніми установами та фахівцями системи охорони здоров'я для розроблення цільових програм підтримки психоемоційної стійкості дітей і сімей, які постраждали від воєнних дій

Ключові слова: резилієнтність; копінг-стратегії; підтримка; стрес; захисні чинники

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Health-preserving factors of socio-psychological adaptation / maladaptation of women during the period of global changes

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Abstract. In the modern world, ecological, political, socio-economic changes are taking place, which negatively affect the state of psychological health of citizens and require updating the adaptive resources of the individual. This applies, first of all, to women, who must remain calm, bear responsibility for children, for the psychological climate in the family, while also fully fulfilling professional duties. The aim of the article was to highlight the results of a study of the factors of socio-psychological adaptation / maladaptation of Ukrainian women, associated with the influence of psychological health, in the context of global changes. The following methods of empirical data analysis were used in the study: questionnaires, psychodiagnostic testing, analysis of percentage indicators, factor analysis. The article presented an analysis of the results of an empirical study, which indicate that a third of respondents (37.4%) had a high level of psychological health; 17.6% of women have a very low level of psychological health. It was found that women aged 25-39 differed from others to a greater extent in a high level of psychological health, which allowed them to adapt most constructively to modern conditions. Factor analysis identified 7 factors that were interpreted as factors of psychological adaptation and 7 factors of psychological maladaptation of the personality. The adaptation factors include five factors of constructive adaptation (holistic psychological health, moral self-reflection, benevolent softness, responsible sociability and responsible activity) and two factors of non-constructive adaptation (irreflexive adaptability, aggressive sthenicity). The factors of psychological maladaptation in war conditions are: spiritual and personal instability, external rigidity, optimistic infantilism, social and everyday orientation, external depression, fear of economic crisis, cultural maladaptation. The research concluded that psychological health determines a woman's ability to adapt constructively to society

Keywords: woman's personality; psychological health; adaptability; global world changes; criteria; indicators; factor analysis

INTRODUCTION

Adaptation to new forms of existence (mastery of digital technologies, adjustment to wartime conditions, adaptation to new climatic anomalies, etc.) does not always occur successfully. Quite often, individuals are unable to adapt quickly to socio-economic changes and new social relations within society, which leads to neurotic personality development. In this context, adjustment disorders are becoming increasingly widespread among many people. Anxiety, insomnia, aggressiveness, and depression act as indicators of an unsatisfactory state of psychological health and hinder an individual's psychological adaptation within society. Women who perform multiple social roles are more vulnerable to these risks. Women's adaptation under contemporary conditions emerges as a process encompassing psychological, social, and spiritual dimensions. Socio-economic instability in Ukraine, labour migration,

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the burden of domestic responsibilities, shelling, and financial pressure exacerbate women's adaptation problems. The study of women's socio-psychological adaptation is not only an academic task but also a practical necessity for Ukrainian society. The results of empirical studies conducted by Ukrainian scholars mainly highlight external factors and the specific features of women's adaptation under conditions of war and socio-economic instability.

Women are required to maintain emotional stability while simultaneously bearing responsibility for children, for the psychological climate within the family, and fully performing their professional duties. D. Astanova (2022) understood the capacity for psychological adaptation as the ability to adjust to situations and to perceive change constructively. The scholar noted that the development of an individual's adaptive capacities is determined primarily by their sense of responsibility. A. Rizquha (2023) identified social (interpersonal) abilities as an adaptive psychological mechanism, which are determined by self-awareness and contribute to the development of leadership qualities. Researchers P. Nguyen & T. Duong (2022) argued that most women adapt through self-directed learning by developing professional competence. However, it should be noted that there are both external and intrapersonal factors of socio-psychological adaptation / maladaptation. External factors of women's maladaptation include war, financial instability, threats to life, prolonged power outages, technological innovations (digitalisation), and cultural changes. External social factors create significant challenges for women's psychological adaptation. Contemporary women face numerous psychological traumas and material instability. War has created unprecedented challenges for adaptation (Bocheluk & Bocheluk, 2022). Chronic stress caused by threats to life, forced migration, destruction of familiar environments, and the need to integrate into new communities generates additional long-term strain. Women's psychological adaptation is facilitated by communication within reference groups and psychological assistance provided by psychologists. Another external factor of women's socio-psychological maladaptation is digitalisation-related challenges – new forms of professional employment and remote interaction – which create risks of information overload and occupational burnout. Although digital technologies open up opportunities for self-realisation, they also generate information overload, which contributes to professional burnout.

Alongside external factors of socio-psychological adaptation / maladaptation, there are purely internal (psychological) factors that promote the activation of adaptive capacities. One of the psychological mechanisms of adaptation is assertiveness. O. Tsykalenko & O. Vlasova (2024) noted that assertiveness is a significant factor that helps Ukrainian women overcome life challenges associated with changes in the social and cultural environment. According to the researchers, women's resilience is the most important psychological resource of their socio-psychological adaptation. Coping strategies such as problem-solving, seeking social support, and emotional regulation contribute to the activation of adaptive capacities. A study by A. Kosia *et al.* (2021) showed that women also frequently resort to avoidance or defensive coping strategies, which may temporarily reduce stress but hinder constructive adaptation.

Another intrapersonal factor that facilitates the activation of adaptive capacities during wartime is mental and psychological health. Psychology differentiates between the concepts of "psychological" and "mental" health. Mental health is defined as a state of personal well-being that determines behavioural self-regulation and enables effective coping with stress. Yu. Bohonkova *et al.* (2021) noted that the harmonious development of the integrated psyche constitutes the norm of mental health, which is associated with mental functions (emotional, volitional, and intellectual) and ensures adaptive processes and an individual's emotional well-being. According to L. Karamushka (2022), indicators of deviations in mental health include chronic states of fear, despondency, anxiety, worry, depression, and aggression. However, in the process of life, the personality functions on several levels: biological, mental, psychological, social, and spiritual, which determine the holistic psychological formation – psychological health, which is a multi-level structure and covers the above-mentioned areas of personality functioning. S. Maksymenko *et al.* (2021) noted that at the biological level, psychological health determines the coordination of organ functioning; at the mental level, it ensures mental self-regulation of behaviour; at the social level, it determines the individual's ability to coexist harmoniously with other people.

Psychological health is not limited to mental health; it integrates psychosomatic, mental, social, and spiritual substructures. It is worth noting that psychological health is related to the spirituality of the individual (conscience, morality, humanity), which distinguishes it from purely mental health. The basis of mental health is higher mental functions, and the basis of psychological health is the holistic development of a harmonious personality. S. Maksymenko *et al.* (2021) brought together the categories of mental, psychological and spiritual health, considering them as stages of personal development. The alternative to mental health is illness, and the alternative to psychological health is an individual's inability to develop personally. According to the definition of I. Vlasenko *et al.* (2022), psychological health is an integrative system that ensures the integrity of the personality and contributes to the realisation of its potential. It is a prerequisite for an active lifestyle, effective self-realisation, adaptation and interaction with the environment. In the context of the ongoing war in Ukraine, there is an urgent problem related to the deterioration of women's psychological health as a result of emotional burnout in the process of experiencing prolonged stress. Thus, the problem of maintaining psychological health as the basis for the socio-psychological adaptation of the individual is one of the most pressing psychological issues of today.

The aim of the article was to highlight the results of an empirical study of the psychological health of Ukrainian women and to identify health-preserving factors of socio-psychological adaptation / maladaptation in a period of global change. The hypothesis of the study presented in the article was the assumption that psychological health is the basis for the socio-psychological adaptation of the individual to global changes. The influence of psychological health on the development of adaptive abilities is particularly relevant in the extreme conditions of war.

MATERIALS AND METHODS

Based on theoretical analysis, a model of psychological health was identified, which has four hierarchical components (spiritual-meaningful, social, mental, psychosomatic) (Pavlyk, 2023). Dichotomous criteria were identified for each component. The criteria for the formation of the spiritual-meaningful component were moral self-reflection, a spiritual-optimistic perception of the world, responsibility, and creative self-realisation. The indicators of its non-formation were externality, unawareness, unrealised creative potential, and a pessimistic worldview.

The social component was determined by the ability to decentralise, friendliness, social adaptability, and tolerance to frustration. The criteria for its underdevelopment were selfishness, aggressiveness, social maladaptation, and frustration. The criteria for the mental component were emotional stability, flexibility of thinking, self-control, and stress resistance. Emotional lability, rigidity, weak-willedness, and neuroticism were evidence of the mental component's underdevelopment. The psychosomatic component included activity, good health, a positive attitude, and healthy habits. The immaturity of this component was manifested in harmful habits, passivity, poor health, and a negative attitude. In accordance with the criteria, psychodiagnostic scales were determined and integrated into the "Psychological Health of the Individual" questionnaire, which allows establishing indicators of individual criteria and an integral indicator of psychological health (Pavlyk, 2023). The questionnaire contains 160 psychodiagnostic statements-questions. For example, the statement: "Long hours of work exhaust me, and it takes me a long time to recover" corresponds to the "Lethargy" scale. The questionnaire was accompanied by the following instruction: "Rate your agreement with each statement on a 3-point scale: 0 – STRONGLY DISAGREE, 1 – PARTIALLY AGREE, 2 – STRONGLY AGREE". The questionnaire is presented in detail in previous publications (Pavlyk, 2023). The validity of the author's methodology was measured using the cross-sectional method (test-retest). The correlation coefficients between the results of the first and repeat tests were in the range of 0.60-0.85 at $p \leq 001$, which indicates the reliability of the questionnaire.

In addition to indicators of psychological health, the characteristics of the socio-psychological adaptability of women were studied using the "Adaptability" methodology (Prykhodko *et al.*, 2017), which made it possible to determine the level of adaptive potential of the personality in accordance with the criteria of "Behavioural regulation", "Moral Normativity," "Communicative Competence," and "Suicidal Risk." The results were classified according to the following levels of psychological health and socio-psychological adaptability: low, below average, above average, and high. In order to study the difficulties women face in adapting to global changes, the study used the author's questionnaire "Attitudes towards global changes," which presents a list of eight clusters of global changes (ecological, biological, demographic, social, economic, technical, geopolitical, and cultural). Respondents were given the following instruction: Rank global changes in order of increasing difficulty of your adaptation to them (1 – easiest to adapt to, 8 – most difficult to adapt to) (Pavlyk, 2024).

In 2023, an empirical study of psychological health and socio-psychological adaptability was conducted, involving 95 women (46 respondents aged 19-24, 26 respondents aged 25-39 and 23 women aged 40-66) from the cities of Kyiv and Kremenchuk. The results were interpreted by calculating the arithmetic mean for each world change (for the data from the questionnaire "Attitudes to world changes") and by calculating the percentage distribution of respondents according to psychological health indicators, which was determined by counting the number of respondents who had a certain level of manifestation of the phenomenon under study.

$$x(\%) = \frac{a*100\%}{n},$$

where n – total number of respondents, a – number of respondents within one level (low, below average, above average and high). To analyse the structure of the indicators, exploratory factor analysis was performed using SPSS 13. Factors were extracted using Principal Component Analysis method. The adequacy of factor analysis was confirmed by the Kaiser-Meyer-Olkin (KMO) coefficient (KMO = 0.72). The number of factors was determined based on Kaiser's criterion (eigenvalues > 1). To improve the interpretability of the results, Varimax orthogonal rotation was applied. Variables with factor loadings of at least 0.30 were included in the interpretation.

During the study, the ethical standards set out in the Declaration of Helsinki (1964) were observed. Participation by respondents was voluntary. Individual results were not disclosed. Participants had the opportunity to receive individual consultations, which served as an incentive for respondents to participate in the study. The study was conducted in three stages. The first stage was a psychodiagnostic examination (March-April 2023). The second stage was the processing and statistical analysis of empirical data (May-June 2023). The third stage was psychological counselling (optional) (June-July 2023).

RESULTS AND DISCUSSION

The analysis of mean indicators of the difficulty of adapting to global changes revealed that women find it most difficult to adapt to biological changes (new diseases, epidemics, pandemics) and social transformations (increasing social

inequality, civil conflicts) (Pavlyk, 2024). Of particular note is the fact that for women aged 19-24, adaptation to social changes is more difficult than for older women. This can be explained by the fact that life experience enables older individuals to perceive difficult social situations more calmly and to make well-reasoned decisions during periods of war and social instability. Second in terms of adaptation difficulty are economic changes (reduction in social benefits), environmental changes (climatic anomalies), and geopolitical changes (globalisation of the world economy). Cultural, technological, and demographic changes are considered the least difficult for women to adapt to. Older women demonstrate higher levels of adaptation to technological changes (for example, the digitalisation of various spheres of work) than younger women. This can be explained by the fact that younger people have greater experience in using new gadgets and digital technologies than women over the age of 40.

The results of the study of psychological health showed that more than one third of Ukrainian women have a good level of psychological health, which provides a basis for their successful socio-psychological adaptation. Almost one quarter of respondents demonstrated a level of psychological health above average, while more than one third of Ukrainian women showed below-average (17.6%) and low (17.6%) levels of psychological health. This indicates that 35.2% of women lack sufficient psychological resources to cope with the challenges of contemporary life and therefore require psychological support. The percentage distribution of indicators of women's adaptive potential across different age categories is presented in Figure 1. According to the study results, women aged 25-39 were the most stress-resistant and well adapted, with 70.9% (almost three quarters) demonstrating high and above-average levels of adaptive potential.

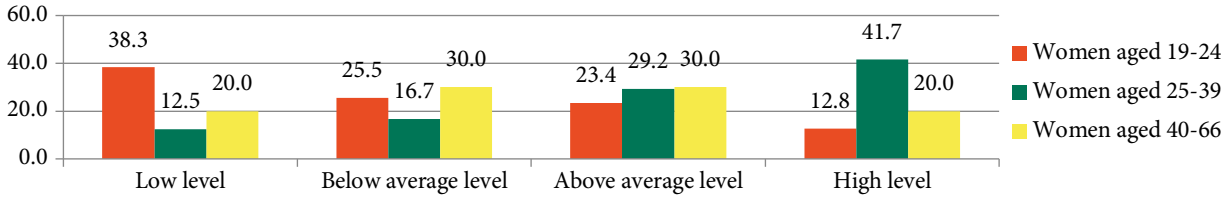

Figure 1. Percentage distribution of indicators of adaptive potential of women in different age categories
Source: compiled by the author

Psychological adaptation is most difficult for young women aged 19-24, among whom individuals with low and below-average adaptive potential predominate. This can be explained by the fact that psychological self-regulation is underdeveloped in young people due to their lack of life experience. The study showed that, in general, almost half of all women (51.7%) need psychological support aimed at improving psychological health and developing adaptive abilities. To determine the psychological factors of adaptation/maladaptation of Ukrainian women to global changes, a statistical method of factor analysis was used. Based on the calculation of the total deviations of the initial values, the extraction of the sums of squares of the loads and the percentages of deviation, 14 factors were identified, which were interpreted as factors of psychological adaptation (7 factors) and factors of psychological maladaptation of the personality (also 7 factors). The factors of socio-psychological adaptation include five factors of constructive adaptation (holistic psychological health, moral self-reflection, friendly gentleness, responsible sociability and responsible activity) and two factors of non-constructive adaptation (aggressive theatricality, non-reflective adaptability).

Below is a description of each factor (factor loadings are indicated in brackets). The first – the main factor of socio-psychological psychological adaptation, which has a deviation of 36.11% – is the factor of holistic psychological health of the personality (R = 0.93). This factor is characterised by high factor loadings for all criteria of psychological health, namely: spiritual-optimistic worldview (R = 0.55), creative fulfilment (R = 0.56), social adaptability (R = 0.56), flexibility of thinking (R = 0.74), friendliness (R = 0.52), self-control of emotions (R = 0.73) and behaviour (R = 0.73), stress resistance (R = 0.58), energy (R = 0.71), activity (R = 0.66), good mood (R = 0.74), healthy habits (R = 0.52), which undoubtedly has a positive effect on the adaptive potential of the personality (R = 0.77), in particular, on behavioural regulation (R = 0.78), communicative competence (R = 0.55) and moral normativity (R = 0.24). As a result, psychological health mainly affects the psychoregulatory side of human adaptation and has much less to do with the moral normativity of the individual. In other words, both psychologically healthy and unhealthy individuals are capable of acting in accordance with the moral norms of society. Thus, although a woman's moral development is quite important, it does not determine her psychological health.

This factor is also marked by negative factor loads on all negative criteria of psychological health, namely: pessimistic worldview (R = -0.72), unawareness (R = -0.56), externality (R = -0.49), creative unrealisation (R = -0.65), social maladaptation (R = -0.67), egocentrism (R = -0.46), aggressiveness (R = -0.61), intolerance to frustration (R = -0.69), rigidity (R = -0.55), emotional lability (R = -0.73), weak-willedness (R = -0.69), neuroticism (R = -0.68), lethargy (R = -0.70), passivity (R = -0.67), depressiveness (R = -0.77), bad habits (R = -0.64), and suicidal risk (R = -0.71). Thus, this factor combines all the criteria of psychological health and psychological adaptability of the personality, which confirms the hypothesis about the

leading role of psychological health in the process of human adaptation to global changes. The second factor of psychological adaptation is moral self-reflection (4.09% deviation), which is associated with the adaptive potential of the individual (R = 0.25) and is based on moral normativity (R = 0.47), self-reflection (R = 0.39), responsibility (R = 0.29), decentralisation (R = 0.31) and contributes to the development of communicative competence (R = 0.29) and the ability to realise one's own responsibility (R = 0.49). It should be noted that this factor is associated with the development of the spiritual-semantic component (R = 0.22) and affects individuals who easily accept economic changes but have difficulty adapting to cultural changes in society. In other words, these are women who are oriented towards spiritual values and oppose certain changes in contemporary culture.

The third factor (4.87% deviation) is aggressive assertiveness, which is characteristic of younger women (R = -0.45). These individuals demonstrate adaptability to modern conditions (R = 0.35) and pronounced activity (R = 0.27), which is based on aggressiveness (R = 0.54), egocentricity (R = 0.50), inability to decentralise (R = -0.31), lack of moral normativity (R = -0.42) and healthy habits (R = -0.40). Such active behaviour, which is not regulated by moral norms, can lead to conflict situations or negatively affect both the environment and the woman herself. This factor can be defined as a factor of non-constructive adaptation. The fourth factor of psychological adaptation (2.99% deviation) is friendly gentleness. The psychological mechanism of adaptation is "personality flexibility" (lack of rigidity (R = -0.33) due to weak-willedness (R = 0.48), passivity (R = 0.28) in the presence of emotional stability (R = 0.32), friendliness (R = 0.29) and moral normativity (R = 0.22). This factor is based on a combination of contradictory tendencies (on the one hand, personal weakness in the form of weak-willedness (R = 0.48) and harmful habits (R = 0.29), and on the other hand, a positive attitude towards the world, which ensures adaptability and emotional stability). Individuals who are influenced by this factor are distinguished by their natural orientation, they keenly feel the difficulties of adapting to environmental changes (R = 0.43) and strive to improve people's attitudes towards the environmental crisis in the world.

The fifth factor (2.43% deviation) – non-reflective adaptability – contributes to a woman's adaptation to global changes (R = 0.30) through the development of the social (R = 0.29) and psychosomatic (R = 0.25) components of her psychological health. However, it should be noted that the lack of self-reflection (R = -0.32) causes emotional lability (R = 0.23) and personal rigidity (R = 0.21). Such women are easy-going about demographic (R = -0.34) and technical (R = -0.29) changes, but have difficulty adapting to economic (R = 0.26) and, especially, biological changes (R = 0.51). This factor can also be attributed to factors of non-constructive adaptation, as it is more pronounced in younger women due to insufficient experience or development of self-reflection. The next factor of psychological adaptation (2.00% deviation) is responsible communication, which is based on communicative competence (R = 0.34) and acceptance of personal responsibility for global changes (R = 0.24). Such women feel that they are well adapted to modern conditions (R = 0.21), they do not pay attention to environmental changes (R = -0.56), but they are concerned about demographic changes (R = 0.47), as they feel responsible for the social context of society's development. The last factor of psychological adaptation (1.73% deviation) is responsible activity. This factor was based on a woman's psychosomatic health and combines healthy habits (R = 0.36), energy (R = 0.31), activity (R = 0.25) with a high level of responsibility (R = 0.46) for everything that happens around.

Based on the names of the factors, it should be noted that the main factors in the development of an individual's adaptive abilities are spiritual and moral qualities. The factors of socio-psychological maladaptation are: spiritual and personal instability, external rigidity, optimistic infantilism, socio-domestic orientation, external depression, fear of economic crisis, and cultural maladaptation. The first factor of psychological maladaptation (8.18% deviation) is spiritual and personal instability, which manifests itself in a low level of adaptive potential of the individual (R = -0.38), underdeveloped moral normativity (R = -0.42), behavioural self-regulation (R = -0.27), and the psychosomatic component of psychological health (R = -0.22) with a sufficiently pronounced neurotic symptom complex: lethargy (R = 0.40), neuroticism (R = 0.37), rigidity (R = 0.29), weak-willedness (R = 0.23), and suicidal risk (R = 0.29). At the same time, this factor is controversially associated with many spiritual qualities: decentralisation (R = 0.56), responsibility (R = 0.46), self-reflection (R = 0.45), creative fulfilment (R = 0.42), a spiritually optimistic worldview (R = 0.41), friendliness (R = 0.47), sociability (R = 0.45), tolerance to frustration (R = 0.57), flexibility of thinking (R = 0.34), and activity (R = 0.32). This factor mainly affects older women (R = 0.47) who have difficulty adapting to technical (R = 0.25) and economic (R = 0.21) changes. Thus, this phenomenon may be interpreted as the psychological fragility of a spiritually oriented personality that finds it difficult to adapt to contemporary realities.

The second factor of psychological maladaptation (6.25% deviation) is interpreted as external rigidity. It also mainly affects older women (R = 0.57), who find it difficult to adapt to technical (R = 0.50), environmental (R = 0.43), biological (R = 0.34) and demographic (R = 0.34) changes. However, adapting to social (R = -0.61), geopolitical (R = -0.51) and economic (R = -0.40) global changes does not cause difficulties. These women are characterised by externality (R = 0.42) – a tendency to shift responsibility onto others or circumstances, egocentrism (R = 0.37), rigidity (R = 0.26), lack of self-reflection (R = -0.28), inability to decentralise (R = -0.27) and an optimistic worldview (R = 0.26). The lack of desire for change and acceptance of responsibility may limit the development of their adaptive abilities. The third factor (3.12% deviation) is interpreted as

optimistic infantilism. It is characteristic mainly of younger people and is based on a spiritually optimistic worldview (R = 0.37) and communicative competence (R = 0.33), but is associated with a certain degree of immaturity in personal attitudes towards the world, as evidenced by increased energy (R = 0.26) and neuroticism (R = 0.23), unawareness of one's life (R = 0.22) and one's own responsibility in globalisation processes (R = -0.27). This factor causes an unwillingness to make constructive proposals for solving global world problems (R = -0.56) and affects women, who tend to easily accept geopolitical changes (since they do not show significant interest in global world problems), but have difficulty adapting to social changes (R = 0.45) (since their interests are mainly focused on interpersonal communication).

The fourth factor of psychological maladaptation (2.77% deviation) is social and domestic orientation, which is associated with creative unrealisation (R = 0.43), harmful habits (R = 0.28) and indifference to global geopolitical changes (R = -0.55). The compensatory psychological mechanisms here are social psychological qualities (R = 0.40) and tolerance to frustration (R = 0.21), which seem to shield women from the negative influences of the modern world. The fifth factor of psychological maladaptation (2.60% deviation) is external depression, which, although based on communicative competence (R = 0.23), it links such a destructive characteristic as externality (R = 0.32) with a lack of good mood (R = -0.33), energy (R = -0.21), and inability to decentralise (R = -0.25). In other words, this is a factor of a woman's emotional exhaustion, her inability to take responsibility for constructive solutions to problematic situations. This factor affects older women who do not take demographic changes into account (R = -0.51) but have difficulties adapting to cultural (R = 0.40) and economic changes (R = 0.23).

The next factor of psychological maladaptation (2.24% deviation) is the fear of economic crisis, which causes a feeling of maladaptation to modern conditions (R = -0.47) due to the difficulties of adapting to economic changes (R = 0.40). The last factor of psychological maladaptation (1.79% deviation) is cultural maladaptation, which is based on the difficulties of adapting to cultural changes (R = 0.49). Such women are spiritually oriented, distinguished by developed emotional control (R = 0.23), an indifferent attitude to economic changes (R = -0.32), but they lack the willpower to acquire healthy habits (R = -0.24) to adapt to the conditions of war and global changes. Thus, the factors for the development of women's adaptive potential are mainly a combination of spiritual-moral and emotional-volitional qualities, which determines the development of a mechanism of psychological self-regulation. The main factors of maladaptation are mainly pathogenic emotional states and volitional deviations, which are prone to manifest themselves in individuals with psychological health defects. Thus, the hypothesis regarding the deterministic influence of psychological health on the state of socio-psychological adaptation of the individual to global world changes in wartime is confirmed.

In discussing the results of the study, it should be noted that some aspects of the patterns of psychological health presented in the article are confirmed by research conducted by foreign and domestic scientists. When considering the mechanisms of psychological health, researchers highlight the psychosomatic, socio-psychological, personal and spiritual aspects of life that regulate a person's psychological health and influence the process of their adaptation to living conditions. The study by I. Vizniuk *et al.* (2021) aimed to identify the factors that influence the development of an individual's adaptive abilities. Scientists argued that psychological stability determines a person's ability to adapt, which is ensured by physiological, social, and personal factors. In particular, psychosomatic health (endurance, energy, positive attitude) determines social adaptation in modern society. Some scientists considered psychosomatic health to be a factor in an individual's adaptation to new conditions (Vizniuk *et al.*, 2021). S. Maksymenko *et al.* (2021) noted that 50% of health is determined by a person's healthy lifestyle, which has a positive effect on adaptation processes. Health fasting has a positive effect on metabolism and psychological health (Wang & Wu, 2022). In the context of this article, these findings indicate that psychosomatic factors, such as stress levels and emotional stability, have a significant impact on an individual's ability to adapt to changing conditions. Empirical data obtained in the study also confirm this relationship, demonstrating that women with high levels of psychosomatic well-being show greater flexibility and adaptability in complex social situations. Thus, the results of the study presented in the article complement the scientific picture, emphasising the importance of psychosomatic health as a determining factor for the realisation of an individual's adaptive potential.

The issue of psychological health's impact on an individual's adaptive abilities has been raised by many foreign researchers. According to their research, the leading mechanism of socio-psychological adaptation is neuropsychological stability, which determines the resilience of an individual in the process of socio-psychological adaptation (Maruta, 2020). G. Arslan *et al.* (2021) statistically proved that psychological flexibility contributes to an optimistic attitude towards life and the development of adaptive abilities. This position is confirmed by the results of the presented study, which show that the leading factors for successful socio-psychological adaptation are spiritual and moral qualities combined with flexibility of thinking. Other researchers studied such qualities of psychological health that contributed to adaptation and psychological well-being as: emotional balance, volitional stability, affective equilibrium, mental stability, emotional balance, positive emotions, resilience, self-regulation, responsibility (Orap *et al*, 2021). In the context of the present study, these qualities correspond to the factor of holistic psychological health. I. Vizniuk *et al.* (2021) considered psychosomatic health as a factor in the social adaptation of individuals in postmodern society and note that the psychological condition for the actualisation of adaptive potential is the ability to realise

one's own motivation. V. Vince *et al.* (2023) also argued that the motivation to achieve success influences the success of socio-psychological adaptation in wartime. The empirical data obtained also confirm these conclusions, particularly in the context of women's adaptation to social change in difficult conditions. This study found that individuals with a high level of psychological self-regulation and the ability to mobilise their own motivation demonstrate higher levels of adaptability, especially in conditions of social instability. Thus, the results of this study confirm that psychological self-regulation is a key mechanism of adaptation that allows individuals to respond effectively to the challenges of the modern social environment. This is consistent with the theoretical positions presented by I. Vizniuk *et al.* (2021) and V. Vince *et al.* (2023), who emphasised the importance of motivation for active adaptation and psychosomatic health.

Studying the peculiarities of the socio-psychological adaptation of teachers (the pedagogical community is predominantly female), V. Piddyachy (2022) focused on the effectiveness of coping strategies that help overcome stress by restoring the mental balance of the individual. This position is confirmed by the presented study on the influence of such psychological health factors as friendly gentleness, responsible sociability and responsible activity, which determine optimal coping strategies in complex social situations. According to H. Stelmashchuk *et al.* (2023), personal dispositions are an effective factor in mastering optimal coping strategies in problematic social situations. This can be interpreted as a determining link between the spiritual-meaningful and social components of psychological health: the social component (the ability to behave constructively in complex social situations) is determined by the value-meaningful component (values, dispositions). V. Galahan & Ya. Raevska (2024), studying the social factors of psychological adaptation, proved that interpersonal relationships and the balance between work and personal life significantly affect the preservation of mental health. I.V. Yevtushenko (2023) emphasised the importance of such social factors of psychological health as adequate social relationships. Thus, in the process of scientific discourse, it can be concluded that psychological health and socio-psychological adaptation have a reciprocal influence on each other: psychological health depends on a person's social relationships and, in turn, contributes to the harmonisation of their interpersonal relationships.

Many researchers have concluded that spiritual factors play a leading role in the development of an individual's adaptive potential: meaningfulness of life, self-actualisation, awareness of one's inner world, responsibility, and the search for one's own psychological resources (intellectual, volitional, emotional) (Yıldırım *et al.*, 2021). L.Y. Gumenyuk (2017) highlighted spirituality and religiosity as culturally significant resources that allow Ukrainian women to find meaning in difficult circumstances. O. Tsykalenko & O. Vlasova (2024), researching the assertiveness of Ukrainian migrant women as a factor in their socio-psychological adaptation, proved that there is a positive correlation between assertiveness and the level of subjective well-being. T.M. Tytarenko (2024), considering the practices of a healthy present, emphasised the significant role of conscious life creation in preserving one's psychological health during war. The researcher proved that changes in one's usual way of life affect one's attitude towards one's health. The empirical data obtained also confirm these conclusions. In particular, the results of this study showed that individuals who actively reflect on their lives demonstrate a greater ability to adapt in wartime conditions. Meaningfulness of life, responsibility, and the ability to create life are indeed criteria that determine the success of psychological adaptation in such conditions. Thus, the data obtained confirm the theoretical positions expressed in the works of T.M. Tytarenko (2024), as well as other scientific conclusions regarding the importance of spiritual and meaningful components for psychological health and adaptation.

S. Khan *et al.* (2020) considered psychological health disharmonies that manifest themselves in the form of anxiety, loss of self-control, conflict, and hinder social adaptation. Anxiety and emotional tension significantly limit an individual's adaptive abilities (Yıldırım *et al.*, 2021). These statements are consistent with the empirical data presented in the study. In the context of the presented study, these qualities correspond to factors of socio-psychological maladaptation (for example, the factor of "fear of economic crisis"). In particular, women with a high level of psycho-emotional well-being show greater flexibility in adapting to changes in the social environment, which confirms the importance of this component for the adaptation process. Thus, the study presented in the article has broadened the view of the health-preserving factors of socio-psychological adaptation/maladaptation of Ukrainian women to global changes.

CONCLUSIONS

A study of the psychological health of modern Ukrainian women showed that one-third of respondents have a high level of psychological health, 27.5% have above-average psychological health, 17.6% of respondents demonstrate below-average psychological health, and 17.5% of women have low psychological health and require psychological assistance. The study showed that women aged 25-39 differed from other age groups in their high level of psychological health, which allowed them to better adapt to modern conditions. The social and psychological adaptation of women to global changes is determined by the flexibility of their psyche and good psychological health. Women's ability to self-regulate psychologically is important in the adaptation process.

Statistical analysis of empirical research data showed that psychological health is the basis for the psychological adaptation of the individual to global changes. Based on the study, seven factors were identified that are interpreted as factors of psychological adaptation and seven factors of psychological maladaptation of the individual. The factors of adaptation include five components of

constructive adaptation (holistic psychological health, moral self-reflection, friendly gentleness, responsible sociability and activity) and two factors of non-constructive adaptation (non-reflective adaptability, aggressive rigidity). The factors of psychological maladaptation include: spiritual and personal instability, external rigidity, optimistic infantilism, social and domestic orientation, external depression, fear of economic crisis, and cultural maladaptation. The study concluded that psychological health is a key factor determining a woman's ability to adapt constructively to her social environment.

The factors of socio-psychological adaptation are mainly spiritual qualities combined with flexibility of thinking, which is the basis of the mechanism of psychological self-regulation. In contrast, the foundations of socio-psychological maladaptation factors are pathogenic emotional states and volitional deviations, which indicate impairments in psychological health. Promising directions for further psychological research into the development of adaptive capacities of Ukrainian women during periods of global change include the implementation of psychological support for women of different age groups, aimed at preserving and harmonising psychological health. Such forms of support may include psychological training, lectures, and counselling.

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CONFLICT OF INTEREST

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Наталія Павлик

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Анотація. У сучасному світі відбуваються екологічні, політичні, соціально-економічні зміни, які негативно впливають на стан психологічного здоров'я громадян і вимагають актуалізації адаптаційних ресурсів особистості. Це стосується, передусім, жінок, які мають зберігати спокій, нести відповідальність за дітей, за психологічний клімат в родині, виконуючи й повною мірою ще й професійні обов'язки. Метою статті було висвітлення результатів дослідження факторів соціально-психологічної адаптації / дезадаптації українських жінок, пов'язаних з впливом психологічного здоров'я, в умовах світових змін. У дослідженні застосовувалися такі методи аналізу емпіричних даних: анкетування, психодіагностичне тестування, аналіз відсоткових показників, факторний аналіз. У статті представлено аналіз результатів емпіричного дослідження, які свідчать, що третина респондентів (37,4 %) мали високий рівень психологічного здоров'я; у 17,6 % жінок рівень психологічного здоров'я дуже низький. Встановлено, що жінки 25-39 років більшою мірою відрізнялися від інших високим рівнем психологічного здоров'я, що дозволило їм найбільш конструктивно адаптуватися до сучасних умов. За допомогою факторного аналізу було визначено 7 факторів, які інтерпретовано як фактори психологічної адаптації та 7 факторів психологічної дезадаптації особистості. До факторів адаптації належать п'ять факторів конструктивної адаптації (цілісне психологічне здоров'я, моральна саморефлексія, доброзичлива м'якість, відповідальна комунікабельність та відповідальна активність) і два фактори неконструктивної адаптації (нерефлексивна адаптивність, агресивна стенічність). Факторами психологічної дезадаптації в умовах війни є: духовно-особистісна нестійкість, екстернальна ригідність, оптимістичний інфантилізм, соціально-побутова спрямованість, екстернальна депресивність, страх економічної кризи, культуральна дезадаптованість. Проведене дослідження дозволило зробити висновок: психологічне здоров'я визначає здатність жінки до конструктивної психологічної адаптації в соціумі

Ключові слова: особистість жінки; психологічне здоров'я; адаптивність; глобальні світові зміни; критерії; показники; факторинй аналіз

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