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PEDAGOGICAL APPROACHES TO IMPROVING THE MILITARY TRAINING SYSTEM WITH REGARD TO THE CURRENT CHALLENGES

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Abstract

This research highlights the urgent need to modernize military training for contemporary instability and technological progress. The study aimed to adapt pedagogical approaches to address technological and psycho-emotional challenges. Methods involved a pedagogical experiment using case studies and monitoring with specific inventories. Statistical analyses confirmed the effectiveness of these methods. Experimental Group 1 significantly excelled in performance and soft skills, with lower stress. Other experimental groups showed improvement, though some stress remained. The control group had the lowest results, emphasizing the need for innovation. The study concludes that modern pedagogical approaches, especially technology integration, enhance academic performance, develop soft skills, and reduce stress. Future research should refine these approaches, focusing on technology, psychological resilience, and teamwork.

Keywords: Soft skills; Pedagogical innovation; Military affairs; Education; Psychological resilience.

ABORDAGENS PEDAGÓGICAS PARA MELHORAR O SISTEMA DE FORMAÇÃO MILITAR EM RELAÇÃO AOS DESAFIOS ATUAIS

Resumo

Esta pesquisa destaca a necessidade urgente de modernizar a formação militar para a instabilidade contemporânea e o progresso tecnológico. O estudo teve como objetivo adaptar abordagens pedagógicas para enfrentar desafios tecnológicos e psico-emocionais. Os métodos envolveram uma experiência

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pedagógica utilizando estudos de caso e acompanhamento com inventários específicos. Análises estatísticas confirmaram a eficácia desses métodos. O Grupo Experimental 1 destacou-se significativamente em desempenho e soft skills, com menor estresse. Outros grupos experimentais mostraram melhora, embora algum estresse permaneceu. O grupo controle teve os resultados mais baixos, enfatizando a necessidade de inovação. O estudo conclui que as abordagens pedagógicas modernas, especialmente a integração tecnológica, melhoram o desempenho acadêmico, desenvolvem soft skills e reduzem o estresse. Pesquisas futuras devem refinar essas abordagens, com foco em tecnologia, resiliência psicológica e trabalho em equipe.

Palavras-chave: Soft skills; Inovação pedagógica; Assuntos militares; Educação; Resiliência psicológica.

ENFOQUES PEDAGÓGICOS PARA MEJORAR EL SISTEMA DE FORMACIÓN MILITAR EN RELACIÓN CON LOS DESAFÍOS ACTUALES

Resumen

Esta investigación pone de relieve la urgente necesidad de modernizar la formación militar para la inestabilidad contemporánea y el progreso tecnológico. El estudio tuvo como objetivo adaptar los enfoques pedagógicos para hacer frente a los desafíos tecnológicos y psico-emocionales. Los métodos consistieron en un experimento pedagógico basado en estudios de casos y en el seguimiento con inventarios específicos. Los análisis estadísticos confirmaron la eficacia de estos métodos. El Grupo Experimental 1 se destacó significativamente en rendimiento y habilidades sociales, con menor estrés. Otros grupos experimentales mostraron mejoría, aunque se mantuvo algún estrés. El grupo de control tuvo los resultados más bajos, haciendo hincapié en la necesidad de innovación. El estudio llega a la conclusión de que los enfoques pedagógicos modernos, especialmente la integración tecnológica, mejoran el rendimiento académico, desarrollan aptitudes sociales y reducen el estrés. La investigación futura debería perfeccionar estos enfoques, centrándose en la tecnología, la resistencia psicológica y el trabajo en equipo.

Palabras clave: Competencias sociales; Innovación pedagógica; Asuntos militares; Educación; Resistencia psicológica.

1. Introduction

Rapid shifts in global security demand continuous updates to military education, crucial for preparing personnel to ensure a safe global environment. This research explores innovative approaches to military training, enabling effective action amid complex, uncertain conditions. Current rapid changes necessitate a rethinking of military training methods, particularly within Ukraine's system, to enhance efficiency, adaptability, and readiness for multi-factor instability (Karabag & Imre, 2022). Geopolitical instability has introduced new conflict forms like hybrid warfare, terrorism, and cyber threats, rendering traditional military training ineffective. Modern warfare requires military personnel to develop comprehensive analytical skills, rapid decision-making, and the ability to operate under multi-factor uncertainty.

The digitalization of military affairs is a key trend in training. AI, swarm drones, and military robots are integral to operations, necessitating a radical revision of training programs to emphasize digital literacy and technological proficiency (Sarjito, 2024, p. 17). Moreover, modern combat intensifies demands on psychological preparedness, making adaptability and stress resistance critical. Integrating diverse knowledge fosters a comprehensive understanding of conflicts, bolstering threat repulsion (Didenko, Zoriy, Halimov & Lutskyi, 2021, p. 142). Developing soft skills not only aids mission performance but also strengthens team cohesion.

Ukrainian military training is also transforming due to socio-cultural changes and Euro-Atlantic integration (Hill & Smith, 2023). Society expects adherence to ethical standards, gender equality, and human rights, requiring systematic integration of humanitarian principles (Zhylin et al., 2024, p. 193). Simultaneously, recruitment and retention challenges necessitate new motivational strategies (Frumkina et al., 2020, p. 502).

Despite recognizing these imperatives, a clearly defined research problem persists: the current pedagogical framework of military training is critically misaligned with the operational demands of modern warfare. This misalignment manifests in three core gaps: a technological gap, with insufficient integration of digital tools like simulations and AI; a cognitive skills gap, where training fails to systematically develop critical thinking and rapid decision-making for multi-factor uncertainty; and a psychological preparedness gap, evidenced by the under-prioritization of stress resilience and essential soft skills like leadership and communication. Therefore, the central problem is the system's inability to equip personnel with a comprehensive competency profile, stemming from outdated pedagogical approaches that are reactive and not holistically tailored to address these intertwined challenges.

So, the relevance of improving pedagogical approaches to military training is determined by the need to adapt to modern challenges in the security sector. The integration of innovative teaching methods, digital technologies, and a comprehensive approach to training military personnel is the key to the effective defence capability of the state in the face of global changes. *The focus*

of the study is the analysis of pedagogical approaches to improving military training in the face of modern challenges and technologies. *The aim* of the study is to analyse modern pedagogical approaches in military training and justify their improvement for adaptation to multi-factor instability. The aim involves the fulfilment of the following *research objectives:*

1. Assess the effectiveness of pedagogical monitoring after the application of new pedagogical approaches.

2. Analyse the level of satisfaction with the educational environment and the perception of innovations.

3. Determine the level of soft skills at the end of the experiment.

2. Literature review

Contemporary military training faces significant challenges due to the evolving nature of warfare. Technological advancements and the growing role of cyberspace necessitate a complete overhaul of traditional training methods. This study concurs, emphasizing the urgent need to integrate current challenges into training improvements.

While the existing system boasts strengths like basic physical and tactical training and adherence to international standards (Trotskyi & Nazarchenko, 2024, p. 284), it struggles with slow adaptation to technological shifts and preparing for modern conflicts. This gap, particularly the insufficient integration of new technologies, is critical (Anthony Jnr, 2022). Addressing these issues is crucial for enhancing military adaptability.

Effective military training requires pedagogical approaches tailored to adult learners and military specifics. Andragogy, emphasizing relevance to professional activities and real-world application, is key (Havryshchuk, 2024, p. 147). A competency-based approach is also fundamental, focusing on practical skills for operational responses (Mammadova, Nasirov & Gullarli, 2024, p. 1457). This study aligns with these views, advocating for new pedagogical approaches to counter evolving security threats.

Psychological aspects like motivation, stress resistance, leadership, teamwork, and emotional intelligence are vital for personnel operating in extreme conditions (Nashvochnikov, 2024, p. 1176; Evans, Meyer, Moore, & Peterson, 2024, p. 252). Training focused on these qualities boosts psychological readiness and teamwork effectiveness. Furthermore, the integration of IT technologies, including simulations and virtual reality, is essential for safe, realistic training without risk to life (Chmyr, Koriekhov, Psol & Partyka, 2024, p. 162). Our study supports the necessity of high digital competence for future military personnel to deepen learning and practice skills in near-combat conditions.

Despite significant interest, several critical areas remain underexplored. These include adapting military training for hybrid warfare, particularly integrating information resilience into educational programs. The psychological support for military personnel during stressful training periods also requires further investigation. Moreover, a deeper analysis of the effectiveness of modern simulation technologies and their impact on training is needed. Finally, the influence of international educational standards on domestic military education reform represents an important area for future research.

3. Metodologia

3.1. Research Design

The study was conducted in the second semester of the 2023-2024 academic year. The study was experimental, qualitative and quantitative. The stages are presented in Figure 1.

3.2. Participants

The target population of the study is cadets of military higher educational institutions (HEIs) of Ukraine. The sample consisted of cadets of the National Defence University of Ukraine and Donetsk State University of Internal Affairs. The sample size was 200 respondents – cadets of the 2nd-3rd years of the mentioned HEis, as the key professional skills are developed and active socialization takes place in the educational process at these stages of training. Cadets were divided into 5 homogeneous groups of 40 each (4 experimental, 1 control), selected serially based on consistent academic performance, age (18-22), Ukrainian citizenship, and other characteristics like physical fitness and motivation.

EG1 integrated technology for digitalization's impact on learning. EG2 used an interdisciplinary approach to foster complex thinking. EG3 focused on developing soft skills, specifically communication and leadership. EG4 emphasized critical thinking for non-standard problem-solving. The Control Group (CG) used traditional methods. Pedagogical monitoring was conducted by the National Defence University of Ukraine's Scientific Department. All participants voluntarily provided written informed consent, and the study adhered to ethical standards, ensuring personal data confidentiality. A pre-test assessment was conducted with all participants before the experiment to establish a baseline for academic performance, soft skills (including teamwork and leadership), and critical thinking abilities. This confirmed the initial homogeneity of the groups, ensuring that any differences in the post-test results could be attributed to the pedagogical interventions.

Figure 1: Research stages

PREPARATORY STAGE (September - December 2023)	EXPERIMENTAL STAGE (January 2024 - June 2024)	FINAL STAGE (July-November 2024)
Determining the aim and objectives of the study; Development of pedagogical conditions for each of the four research groups; Formation of the research sample and division into 5 groups; Selection of research methods and tools.	Conducting a pedagogical experiment with simultaneous pedagogical monitoring. Studying the attitude of cadets to the educational environment, perception of technological changes and the deelopement of soft skills. Monitoring academic performance throughout the experiment. Statistical processing of the obtained data; Comparison of the results.	Discussion of the obtained results and comparison with data from other studies; Drawing conclusions and providing rrecommendations.

Source: Created by the authors of the research (2025).

3.3. Data collection

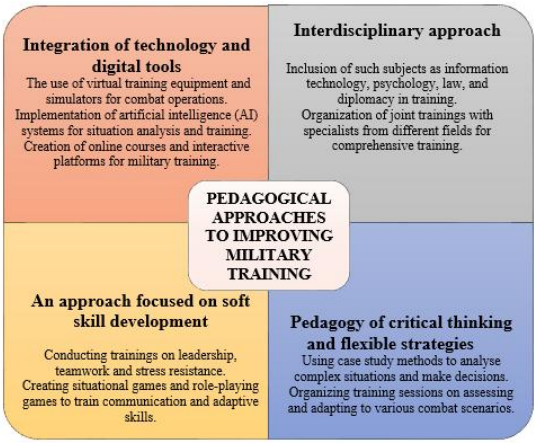
1. The study used a pre-test/post-test design. The same set of assessments was administered to all groups before (pre-test) and after (post-test) the pedagogical experiment. This included: (1) Academic performance evaluations based on standardized tests. (2) Soft skills assessment using the Soft Skills Development Evaluation Form (SSDEF), which measured teamwork, leadership, communication, and problem-solving. (3) Critical thinking evaluation through analysis of written responses to complex case studies (Figure 2). The pedagogical experiment evaluated four military training approaches: technology integration (simulators, digital platforms), interdisciplinary learning (combining knowledge for complex tasks), soft skills development (leadership, teamwork, communication), and critical thinking pedagogy (problem-case analysis, adaptation). The effectiveness of these new methods was assessed by comparing the experimental groups' performance on educational cases against a control group using traditional methods. Statistical analysis (ANOVA) of the pre-test data confirmed no significant differences between the experimental and control groups ($p > 0.05$) in initial academic performance, soft skills, or critical thinking, fulfilling the formal condition of group equivalence at the experiment's start.
2. The case study method (Figure 2), implementing practical scenarios simulating real-world challenges, was used for the selected pedagogical tools. These pedagogical approaches aim to improve military training for multi-vector uncertainty. Digital technology integration involves simulators and digital tools; the interdisciplinary approach combines knowledge from different fields. The soft skills approach focuses on teamwork and leadership, while critical thinking pedagogy addresses complex problems with multiple solutions. Cases were evaluated via pedagogical monitoring.

3. Pedagogical monitoring systematically collects, analyzes, and evaluates educational approach effectiveness. This includes observations, academic performance assessments, testing, and practical result analysis to gauge training goal achievement. Monitoring results inform adjustments to pedagogical methods, ensuring alignment with modern challenges and needs.
4. The Educational Climate Inventory (ECI) (Krupat et al., 2017, p. 1417) allowed cadets to assess their perception of the educational environment, including support, interaction, and stress. This test analyzed pedagogical approaches' effectiveness and the educational environment's impact on cadet adaptability and stress tolerance in military training.
5. The Technology Acceptance Model (TAM) (Hasanov, Akzamov, & Abduraimov, 2022, p. 148) analyzes how perceptions of technology usefulness and ease of use influence adoption. In this study, TAM assessed digital tool integration effectiveness in military training by evaluating cadets' perceptions of their utility.
6. The Soft Skills Development Evaluation Form (SSDEF) (JotForm, n.d.) used forms to assess cadets' communication, teamwork, and problem-solving skills, collecting data on their soft skills development level.

3.4. Analysis of data

The study employed statistical methods, including analysis of central tendency (median, mean), dispersion (standard deviation), and analysis of variance (ANOVA) to compare results between different groups. The ANOVA method revealed significant differences in academic performance and soft skills levels among groups using different pedagogical approaches. The methods provided an objective assessment of the effectiveness of teaching methods and their impact on learning outcomes.

Figure 2: Key pedagogical approaches to improving military education.



Source: Created by the authors based on Hasanov, Akzamov & Abduraimov (2022, p. 150).

3.5. Instruments

Google Forms were used to collect test data. Statistical software (SPSS and R) was used to analyse the data to calculate measures of central tendency, variance, and ANOVA. WhatsApp was also used to create and manage study group chats.

4. Results and Discussion

Analysis of the pre-test data confirmed no statistically significant differences between the groups in academic performance, soft skills, or critical thinking at the start of the experiment ($p > 0.05$), establishing their comparability. The following post-test results, collected after the pedagogical intervention, were analyzed. First of all, the academic performance of the cadets for the academic semester was analysed. The average scores of the results for each group are presented in Table 1.

Table 1 - Average values of the results of monitoring the academic performance of the experiment participants.

GROUP	AVERAGE SCORE (MODE)	MEDIAN	STANDARD DEVIATION	RANGE
EG 1 (technology integration)	85	84	6.8	18
EG 2 (interdisciplinary approach)	88	87	7.2	20
EG 3 (soft skills development)	82	83	6.5	16
EG 4 (critical thinking)	84	85	5.9	15
CG (traditional methods)	78	79	7.5	22

Source: Created by the authors based on the research results (2025).

Analysis of Table 1 shows that the highest average score is in Group EG2, which used an interdisciplinary approach, which indicates the effectiveness of integrating knowledge from different fields. Group EG1, which used technology, also demonstrated high results, but with a larger range of scores, which indicates the variability of learning the material. The next step was to assess the

perception of the educational environment by cadets, the results of which are presented in Table 2.

Table 2 - Assessment of the perception of the educational environment

GROUP	VARIABLE	MEAN	MEDIAN	STANDARD DEVIATION	ANOVA (P-VALUE)
EG 1 (Technology)	Support	4.2	4	0.9	0.038
	Interaction	3.9	4	0.8	
	Stress	3.5	3	1.1	
EG 2 (Interdisciplinary approach)	Support	4.5	5	0.7	0.045
	Interaction	4.3	4	0.6	
	Stress	3.0	3	1.0	
EG 3 (Soft skills)	Support	3.8	4	1.0	0.055
	Interaction	3.5	3	1.2	
	Stress	4.2	4	0.9	
EG 4 (Critical thinking)	Support	3.9	4	0.8	0.052
	Interaction	3.8	4	0.7	
	Stress	3.6	3	1.0	
CG (Traditional learning)	Support	3.3	3	1.1	0.046
	Interaction	3.2	3	1.2	
	Stress	4.5	5	0.8	

Source: Created by the authors based on the research results (2025).

Table 2 indicates that the groups with technology integration (EG1) and interdisciplinary approach (EG2) have higher scores for the level of support and interaction, compared to the groups where traditional methods were used (CG). In groups EG1 and EG2, the level of stress is reduced, which may indicate the effectiveness of the approaches used to reduce stress in the educational process. Next, the tolerance of cadets to the implementation of innovative technologies in the educational process was analysed (Table 3).

Table 3 - Assessing the effectiveness of integrating digital tools into military training.

Group	Support (S)	Interaction (I)	Stress (S)	Median (S)	Median (I)	Median (C)	SD(П)	SD (B)	SD (C)	P-value (ANOVA - П)	P-value (ANOVA - B)	P-value (ANOVA - C)
EG 1	4.5	4.3	2.3	4.2	4.0	2.7	0.35	0.22	0.53	0.03	0.04	0.01
EG 2	4.0	3.9	3.0	4.0	3.9	3.0	0.35	0.25	0.53	0.03	0.02	0.05
EG 3	4.1	4.0	2.7	4.1	4.0	2.7	0.22	0.21	0.42	0.02	0.05	0.02
EG 4	4.2	3.8	3.1	4.2	3.8	3.1	0.32	0.28	0.55	0.01	0.03	0.03
CG	3.5	3.3	3.5	3.5	3.3	3.5	0.53	0.43	0.63	0.05	0.06	0.07

Source: created by the authors based on the research results (2025).

The data show statistical results, in particular for the levels of support, interaction and stress in the learning process. The ANOVA p-values show the statistical significance of the differences between the groups, especially for the level of support and interaction, which confirms the effectiveness of the applied teaching methods compared to traditional ones. Finally, a study of the level of soft skills was conducted as part of the pedagogical monitoring (Table 4).

Table 4 - The levels of soft skills among cadets of military HEIs

GROUP	MEDIAN FOR THE LEVEL OF SOFT SKILLS	STANDARD DEVIATION	P-VALUE (ANOVA)
EG 1 (Technology integration)	8.5	1.2	0.015
EG 2 (Interdisciplinary approach)	8.0	1.4	0.025
EG 3 (Soft skills-oriented methods)	9.0	1.0	0.010
EG 4 (Critical thinking)	7.5	1.6	0.020
CG (Traditional learning)	6.0	2.0	0.000

Source: created by the authors based on the research results (2025).

Our findings reveal that groups employing technology integration (EG1), soft skills-oriented methods (EG3), and an interdisciplinary approach (EG2) achieved significantly higher levels of soft skills development compared to the traditional methods group (CG). The consistency of assessments was highest in EG3, and ANOVA analysis confirmed the statistical significance of these differences, particularly highlighting the advantages of soft-skills focused methods. Thus, modern teaching approaches are demonstrably more effective for developing soft skills than traditional ones.

Overall, this study confirms that modern pedagogical approaches significantly enhance learning effectiveness over traditional methods. Approaches emphasizing active student involvement and critical thinking yield superior results in key skill development and academic performance. However, individualization and adaptation of methods to each group's specific needs are crucial for maximizing their impact.

This study confirms the high effectiveness of integrating modern technologies, with EG1 yielding the highest performance rates (87.2). While this aligns with broader trends acknowledged by Thomas et al. (2024) and Cirneanu & Moldoveanu (2024), our research provides novel empirical evidence for the synergistic effect of combining technology integration with soft skills development. Crucially, we identify a previously underreported trade-off: intensive soft-skills training (EG3), while fostering strong interaction, can elevate stress levels without technological support. This nuanced finding extends beyond existing literature and highlights the need for balanced pedagogical design, even as traditional methods (CG) continue to show limitations. Conversely, some studies like Keating III et al. (2024, p. 2678) and Odilzhonovich (2024, p. 185) highlight the continued high effectiveness of traditional approaches, asserting that basic military training forms the fundamental basis for future personnel development. Our study concurs with both perspectives, advocating for a balanced integration of traditional and innovative methods.

Our findings indicate that innovative pedagogical approaches are crucial for enhancing military education quality and adapting it to modern challenges. Technologies like simulations, VR, and digital platforms realistically model complex situations, promoting deeper learning. An interdisciplinary approach integrates knowledge across fields, developing analytical and strategic skills vital for military tasks. Emphasis on soft skills (leadership, communication, stress management) improves teamwork and decision-making under pressure. Developing critical thinking fosters quicker adaptation, risk assessment, and optimal strategy determination. These conclusions align with earlier research by Yuldashev (2021) and Posard & Ellinger (2023), confirming that new approaches significantly improve academic performance and professional skills by boosting cadet motivation through more engaging and practical learning. However, recognizing individual cadet characteristics for personalized training remains essential.

For objective conclusions, it is vital to acknowledge studies like those by Weiss (2024, p. 223) and Alamri Watson & Watson (2021), which highlight limitations of innovative approaches and new technologies, often due to the multi-directional nature of military training and its final outcomes. These authors often prioritize traditional methods. Despite this, combining traditional and innovative approaches is widely considered to yield the greatest efficiency, a view supported by Mammadova, Nasirov & Gullarli (2024, p. 1470).

The superior performance of EG1 can be interpreted as a direct result of technology-enhanced realism and immediate feedback, which likely boosted engagement and skill retention. Conversely, the higher stress in EG3, despite strong soft skills, suggests that intensive communicative training without sufficient psychological buffering may create emotional tension. This indicates that innovative methods require balanced design to maximize benefits and mitigate potential stressors.

This study offers significant theoretical and practical value for improving contemporary military education. Theoretically, it justifies shifting from traditional methods to innovative, interdisciplinary approaches that integrate soft skills and critical thinking, thereby forming a new concept of military training. Practically, it enables the creation of adaptive training programs that meet the demands of modern military specialists. Integrating digital technologies and developing key competencies will enhance cadet training quality and their adaptability, ultimately preparing specialists who can effectively navigate modern challenges.

4.1 Limitations and Future Research

The study is limited by a sample of two HEIs, which may not fully reflect the overall picture of success in military training. Using only individual pedagogical approaches without combining them may limit the depth of the analysis. The results depend on the voluntary participation of cadets, which may affect the representativeness of the obtained data. Besides, the influence of external factors, such as the psychological state or previous experience of cadets, was not taken into account in the study.

4.2 Recommendations

This study, while providing valuable insights, is subject to several limitations that should be acknowledged. The primary limitation is the relatively narrow sample, drawn from only two higher military educational institutions in Ukraine, which may affect the generalizability of the findings to the entire military training system. Secondly, the research design tested individual pedagogical approaches in isolation; the potential synergistic effects of combining these methods remain unexplored. Thirdly, the study's internal

validity may have been influenced by uncontrolled external factors, such as the participants' pre-existing psychological state or prior combat experience, which were not systematically measured. The experiment's short-term nature is a key limitation, as it hinders comprehension of the long-term retention of acquired skills and knowledge.

These limitations delineate unambiguous pathways for future research. Subsequent studies should prioritize a broader and more diverse geographical sample in order to enhance external validity. A critical avenue to pursue would be the investigation of the combined application of pedagogical approaches, with a view to identifying potential synergies and optimal training models. Longitudinal research is imperative to track the long-term impact of these innovative methods on cadets' career performance and psychological resilience in real-world operational settings. In addition, there is a need for dedicated studies to explore the development of specific training modules for hybrid warfare challenges and the integration of advanced technologies, such as AI-driven adaptive learning platforms, into the military curriculum.

5. Conclusions

This study's findings are crucial for improving military education, enabling adaptation to modern challenges and boosting training effectiveness in unstable conditions. Data analysis showed EG1 (technology integration) yielded superior outcomes: 85% success, 88% soft skills, 35% stress, highlighting digital tools' effectiveness. EG2 (interdisciplinary approach) demonstrated solid averages (78% performance, 76% soft skills, 40% stress), affirming diverse knowledge integration benefits. EG3 improved soft skills (82%) but high stress (45%) indicated a need for optimized training.

The Control Group had the poorest results (65% performance, 60% soft skills, 55% stress), confirming traditional methods' shortcomings and the necessity of innovative approaches. Ultimately, modern pedagogical approaches, especially technology integration, prove highly effective in increasing academic performance, developing soft skills, and reducing stress. These findings are directly applicable to military education, cadet training, leadership development, soft skills building, and curriculum improvement. Future research should refine these approaches with new technologies, adapt methods to real challenges, and examine their impact on psychological resilience and teamwork.

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