Enhancing combat readiness via evidence-based pedagogical innovations in National Guard of Ukraine officer training

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Abstract. This study examines the effectiveness of innovative pedagogical conditions in enhancing combat readiness among future officers of the National Guard of Ukraine (NGU). Utilising a quasi-experimental design, we implemented and evaluated a set of pedagogical interventions integrating recent combat experience into officer training at the Kyiv Institute of the National Guard of Ukraine. The study involved 74 trainee officers divided into experimental (n=35) and control (n=39) groups. Results demonstrated significant improvements in the experimental group across functional, psychological, and reflective components of combat readiness, with increases of 43%, 25%, and 32%, respectively, in high-level readiness. These findings underscore the importance of rapidly integrating field experiences into military education, offering valuable insights for enhancing officer training in dynamic conflict environments. The study contributes to the broader understanding of adaptive military education strategies and provides a framework for implementing evidence-based training reforms in military institutions globally.

Keywords: combat readiness · military education · experiential learning · National Guard of Ukraine · officer training · combat experience integration · pedagogical conditions

1 Introduction

Ukraine's military policy has undergone significant changes over the past decade, particularly in response to the Russian invasion in 2022 [1]. These changes have

necessitated a critical review of the educational process in military institutions, especially in preparing future officers of the National Guard of Ukraine (NGU) for combat operations.

The evolving military landscape in Ukraine has created new challenges for officer training. These include dealing with increased average age of subordinate personnel, making quick decisions under uncertainty, and increased responsibility for subordinates' lives and health [9]. Moreover, the constant changes in weaponry and tactics, particularly the increased use of unmanned aerial vehicles (UAVs) by the enemy, require adaptations in training content and methods [11].

While there has been substantial research on military education reform, particularly in adopting NATO standards [3, 14], there is a gap in the literature regarding the integration of recent combat experience into officer training programs, especially in the context of an ongoing conflict. This study aims to address this gap by examining the effectiveness of specific pedagogical conditions implemented in the Kyiv Institute of the National Guard of Ukraine to enhance future officers' readiness for combat operations.

This study aims to experimentally test the effectiveness of these pedagogical conditions in preparing future NGU officers for combat operations. By doing so, we seek to contribute to a broader understanding of how military education can be adapted to meet the demands of contemporary warfare.

This paper is organised as follows. First, we review the relevant literature on military officer training and combat readiness development. Next, we describe our research methodology, including the pedagogical conditions implemented and the experimental design. We then present our results, followed by a discussion of our findings and their implications for military education policy and practice. Finally, we conclude with recommendations for implementing these findings and suggestions for future research.

2 Literature review

The training of military officers and the development of combat readiness have been subjects of extensive research globally. Tyler et al. [15] analysed data from a decade of combat operations to assess the preparedness of military surgeons, highlighting the importance of adapting training to meet the challenges of contemporary warfare. Their study emphasised the need for increased exposure to specific medical procedures and curriculum adjustments based on actual combat experiences.

In the context of combat readiness, Nkewu and Van Dyk [12] investigated the factors influencing soldiers' willingness to deploy in peacekeeping operations. Their research underscored the importance of psychological factors, including confidence in self, team, leaders, and training, as well as morale and esprit de corps, in determining combat readiness.

Military education approaches vary internationally, reflecting different strategic contexts and organisational cultures. In the United States, Hanson [5] examined the combat readiness of the Eighth Army before the Korean War, challeng-

ing prevailing assumptions about the preparedness of U.S. forces. This historical perspective highlights the importance of rigorous training programs and the potential disconnect between perceived and actual combat readiness.

In China, Fan et al. [4] emphasised the importance of combat readiness training for mobile medical service units in military hospitals, particularly in the context of information-based warfare. Their work highlights the need for military education to adapt to technological advancements and changing warfare paradigms.

Yakovenko et al. [16] and Karpenko [6] have explored the introduction of practical experience into the educational process of higher education institutions. However, their work does not explicitly address the unique challenges of integrating combat experience in real-time during an ongoing conflict.

Military education and training often draw on established learning theories and models. The experiential learning theory developed by Kolb [7] is particularly relevant to military training, emphasising the importance of concrete experience, reflective observation, abstract conceptualisation, and active experimentation. This theory aligns well with the integration of combat experience into officer training programs.

Another relevant framework is the concept of situated learning, proposed by Lave [8], which emphasises that learning is inherently social and situated in a specific context. This theory supports the use of realistic training scenarios and the involvement of experienced combatants in the training process.

Despite a growing body of literature on military education reform, particularly in the context of adopting NATO standards [3, 14], there is a notable gap in research regarding the integration of recent combat experience into officer training programs, especially in the context of an ongoing conflict:

1. Limited research on real-time integration of combat experience into training programs during ongoing conflicts.
2. Lack of studies specifically addressing the unique context of the Ukrainian military, particularly the National Guard, in the current conflict.
3. Insufficient exploration of the effectiveness of specific pedagogical conditions in enhancing combat readiness in the face of rapidly evolving warfare tactics and technologies.

This study aims to address these gaps by examining the effectiveness of specific pedagogical conditions implemented in the Kyiv Institute of the National Guard of Ukraine, with a focus on integrating recent combat experience into the training of future officers.

3 Methods

3.1 Research design

This study employed a quasi-experimental design to test the effectiveness of specific pedagogical conditions in preparing future NGU officers for combat operations. It was conducted over six months at the Kyiv Institute of the National Guard of Ukraine.

Participants were future officers enrolled as applicants at the Kyiv Institute of the National Guard of Ukraine. A total of 74 students participated in the study, divided into an experimental group (EG, $n = 35$) and a control group (CG, $n = 39$). Participants were assigned to groups based on their existing class assignments to minimise disruption to their regular training schedule.

The Ethics Committee of the Kyiv Institute of the National Guard of Ukraine approved the study. All participants were provided with detailed information about the study and gave their informed consent before participating.

3.2 A methodology for studying and implementing combat experience

A methodology for studying and implementing combat experience (CE) in the educational process was proposed [11], which was subsequently tested and reflected in the content of the Regulations on the internal quality assurance system at the Kyiv Institute of the National University of Kyiv [2]. The algorithm for this methodology is presented in figure 1.

The algorithm consists of the following steps:

1. *Input data* – materials generated and summarised by combatants who have obtained CE are transferred to the higher education institution.
2. *Discussion* – the content of the received information is discussed at a meeting of the profiling department.
3. *Decision* – a decision is made on whether to introduce the CE into the educational process.
4. *Implementation method* – if CE is to be implemented, the method is determined:
    5. *With additional study* – test through optional (additional) classes, possibly involving the carrier of the received CE.
    6. *Without additional study* – determine educational components, content modules, classes, and educational issues where the information will be considered; review types of classes and their methods.
7. *Revision* – form new educational and methodological materials; if necessary, create appropriate information, material, and technical support.
8. *Feedback* – discuss the results of CE implementation based on feedback received from students; in case of negative feedback, revise the content of the class, study issues, type of classes, or methodology.
9. *Output* – observe positive changes in the levels of achievement of the programme learning outcomes for future officers.

This algorithm provides a systematic approach to integrating combat experience into the educational process, ensuring that valuable field knowledge is effectively transferred to future officers.

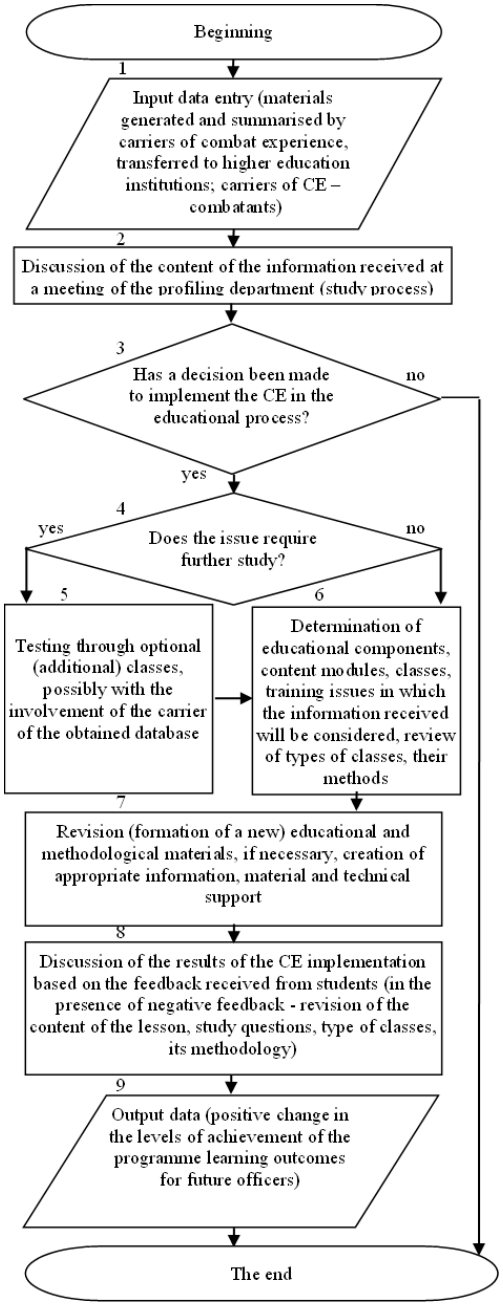

Fig. 1. Scheme of the methodology for studying and implementing databases in the educational process.

3.3 Pedagogical conditions

Based on the analysis of scientific sources and the authors' personal experience, the following pedagogical conditions were implemented in the experimental group:

1. Filling vacant positions with service members who have participated in combat missions
2. Conducting planned binary and additional classes involving combatants
3. Updating educational programs based on stakeholder surveys, including combatants
4. Revising teaching materials based on proposals from combatants
5. Using educational literature compiled by combatants
6. Obtaining new models of weapons and equipment used in combat areas
7. Developing training facilities to simulate combat conditions

These conditions were implemented across the components of the educational process: legal and regulatory, human resources, educational and methodological, informational, and material and technical (table 1 [10]).

Table 1. The structure of pedagogical conditions for the development of future NGU officers' readiness for combat by components of the educational process.

Components of the educational process	**The structure of pedagogical conditions for forming the readiness of future NGU officers for combat**
legal and regulatory	defining the procedure for studying and implementing combat experience in the normative legal acts of the military educational institutions;
human resources	1) filling vacant positions of academic and pedagogical staff with servicemen who took part in combat (special) missions; 2) planning internships for research and teaching staff in the areas of combat (special) missions to acquire combat experience; 3) conducting planned binary and additional classes involving combatants;
educational and methodological	1) updating the content of existing educational programs based on the results of a survey of stakeholders, including combatants; if necessary, creating new academic programmes in more relevant specialities; 2) updating the content of teaching and learning materials based on proposals made by combatants;
informational	use of educational and methodological literature compiled by combatants;
material and technical	1) obtaining new models of weapons and equipment used in the areas of combat (special) missions; 2) development of training facilities

The experimental group received training that incorporated the above pedagogical conditions. This included:

1. Binary classes conducted by academic staff and combat-experienced practitioners
2. Bilateral tactical platoon exercises, such as "Setting up a patrol base – search and assault"
3. Increased practical training time at Kyiv garrison units
4. Use of advanced simulation systems and equipment (e.g., "Scythian" laser battle simulation system)

The control group continued with the traditional training program without these specific interventions.

3.4 Data collection and analysis

Data were collected at two-time points: before the implementation of the pedagogical conditions (pre-test) and after their implementation (post-test). The readiness of future NGU officers for combat operations was assessed using three components:

1. Functional component
2. Psychological component
3. Reflective component

Statistical analysis was performed using the computer program "Statistics in Pedagogy" [13]. The chi-square (χ^2) test was used to compare the distributions of readiness levels between the experimental and control groups, with a significance level set at 0.05.

4 Results

4.1 Pre-test comparison

Prior to the implementation of the pedagogical conditions, the experimental group (EG) and control group (CG) were compared to ensure initial equivalence. Chi-square tests revealed no significant differences between the groups on any of the three components of combat readiness:

1. Functional component: $\chi^2 = 0.1732$, critical value = 5.991, $p > 0.05$
2. Psychological component: $\chi^2 = 0.8456$, critical value = 5.991, $p > 0.05$
3. Reflective component: $\chi^2 = 0.1843$, critical value = 5.991, $p > 0.05$

These results indicate that the EG and CG were statistically similar at the outset of the study.

Table 2. Results of the formation of future NGU officers' readiness for combat operations in the control and experimental groups.

Level	Control group		Experimental group	
	pre-test	**post-test**	**pre-test**	**post-test**
by functional component				
Low	16	10	16	5
Medium	13	16	11	7
High	10	13	8	23
by psychological component				
Low	23	16	20	7
Medium	9	13	6	10
High	7	10	9	18
by reflexive component				
Low	12	11	12	6
Medium	14	15	11	6
High	13	13	12	23

4.2 Post-test comparison

Following the implementation of the pedagogical conditions, significant differences emerged between the EG and CG (table 2):

1. Functional component: $\chi^2 = 10.884$, critical value = 5.991, $p < 0.05$
2. Psychological component: $\chi^2 = 6.0001$, critical value = 5.991, $p < 0.05$
3. Reflective component: $\chi^2 = 7.9124$, critical value = 5.991, $p < 0.05$

These results indicate statistically significant differences between the EG and CG on all three components of combat readiness after the intervention.

4.3 Within-group changes

The EG showed significant improvements from the pre-test to the post-test on all components:

1. Functional component: $\chi^2 = 16.7979$, critical value = 5.991, $p < 0.05$
2. Psychological component: $\chi^2 = 10.2593$, critical value = 5.991, $p < 0.05$
3. Reflective component: $\chi^2 = 6.9277$, critical value = 5.991, $p < 0.05$

The CG did not show significant changes from the pre-test to the post-test:

1. Functional component: $\chi^2 = 2.0863$, critical value = 5.991, $p > 0.05$
2. Psychological component: $\chi^2 = 2.5131$, critical value = 5.991, $p > 0.05$
3. Reflective component: $\chi^2 = 0.078$, critical value = 5.991, $p > 0.05$

The EG demonstrated substantial improvements in the proportion of students achieving a high level of readiness for combat operations:

1. Functional component: 43% increase
2. Psychological component: 25% increase
3. Reflective component: 32% increase

Concurrently, there was a significant decrease in the proportion of EG students with a low level of readiness:

1. Functional component: 32% decrease
2. Psychological component: 37% decrease
3. Reflective component: 17% decrease

In contrast, changes in the CG were minimal and not statistically significant.

These results strongly suggest that the implemented pedagogical conditions were effective in enhancing the combat readiness of future NGU officers across all measured components.

5 Discussion

5.1 Interpretation of findings

The results of this study provide strong evidence for the effectiveness of the implemented pedagogical conditions in enhancing the combat readiness of future NGU officers. The significant improvements observed in the experimental group across all three components – functional, psychological, and reflective – suggest that the integrated approach of incorporating combat experience into officer training yields comprehensive benefits.

These findings align with the experiential learning theory proposed by Kolb [7], which emphasises the importance of concrete experience and reflective observation in the learning process. The involvement of combat-experienced personnel in training, as well as the use of realistic simulations, likely provided students with valuable concrete experiences to reflect upon and integrate into their understanding of combat operations.

The substantial increase in the proportion of students achieving high levels of readiness, particularly in the functional component (43% increase), suggests that the practical, hands-on aspects of the training were especially effective. This is consistent with the situated learning theory of Lave [8], which posits that learning is most effective when situated in authentic contexts.

5.2 Comparison with previous research

Our findings extend the work of Tyler et al. [15], who emphasised the importance of adapting training based on actual combat experiences. While their study focused on military surgeons, our research demonstrates that this principle applies more broadly to general officer training as well.

The improvements in the psychological component of combat readiness observed in our study align with the findings of Nkewu and Van Dyk [12], who

highlighted the importance of psychological factors in combat readiness. Our results suggest that the implemented pedagogical conditions not only improved tactical skills but also enhanced psychological preparedness for combat situations.

5.3 Implications for military education policy and practice

The success of the implemented pedagogical conditions has important implications for military education policy and practice.

Firstly, military education institutions should prioritise incorporating recent combat experience into training programs. This could involve rotating combat-experienced personnel into teaching roles on a regular basis and frequently updating the curriculum based on field reports.

Additionally, the effectiveness of tools such as the "Scythian" laser battle simulation system indicates that investing in advanced training technologies can significantly improve officer preparedness.

Moreover, the enhancement of the psychological component of readiness underscores the importance of dedicated training in this area. Programs could include stress management techniques and methods for making decisions under pressure.

Lastly, the positive outcomes from binary classes and bilateral exercises suggest that collaborative learning approaches should be given greater emphasis in military education.

5.4 Limitations and future research directions

1. The relatively small sample size ($n = 74$) may limit the generalizability of the findings.
2. The study was conducted in the specific context of the Ukrainian National Guard. Further research is needed to determine if these findings generalise to other military contexts or countries.
3. The study was conducted during the ongoing military conflict in Ukraine:
   (a) The unique and rapidly changing nature of the conflict may have influenced the findings, making them less generalisable to other settings or peacetime military training.
   (b) The availability of resources, personnel, and training environments during an active conflict may differ significantly from those in non-combat situations, potentially affecting the implementation of pedagogical conditions.
   (c) The psychological and physical states of participants, who may have been directly or indirectly affected by the conflict, could also impact the study's outcomes, leading to results that may not be fully representative of typical military education scenarios.
   (d) Last but not least, the ongoing conflict may have necessitated frequent adjustments to training programs and priorities, which could influence the consistency of the pedagogical approaches applied.

5.5 Practical recommendations

Based on our findings, we recommend the following for implementing these pedagogical conditions in other military training contexts:

1. Establish formal processes for rapidly incorporating combat lessons into training curricula.
2. Develop mentorship programs pairing experienced combat veterans with trainee officers.
3. Invest in advanced simulation technologies that can provide realistic combat scenarios.
4. Implement regular psychological resilience training alongside tactical skill development.
5. Foster partnerships between military education institutions and active combat units to facilitate the exchange of personnel and knowledge.

Potential challenges in scaling up this approach may include:

1. Limited availability of combat-experienced personnel for teaching roles.
2. Resistance to curriculum changes from established faculty.
3. Budgetary constraints for implementing advanced training technologies.
4. Difficulty in standardising the integration of rapidly changing combat experiences.

To address these challenges, we recommend a phased implementation approach, starting with pilot programs and gradually expanding based on feedback and results.

6 Conclusion

This study has demonstrated the effectiveness of specific pedagogical conditions in enhancing the combat readiness of future officers of the National Guard of Ukraine. By integrating recent combat experience into the training program, we observed significant improvements in the functional, psychological, and reflective components of combat readiness among trainee officers.

The key findings of this study include:

1. A substantial increase in the proportion of students achieving high levels of combat readiness in the experimental group, with a 43% increase in the functional component, 25% in the psychological component, and 32% in the reflective component.
2. Significant decreases in the proportion of students with low levels of readiness across all components in the experimental group.
3. The effectiveness of pedagogical conditions such as involving combat-experienced personnel in teaching, using advanced simulation technologies, and implementing binary classes and bilateral exercises.

These findings have important implications for military education policy and practice, suggesting a need for:

1. Regular integration of recent combat experiences into officer training curricula.
2. Investment in realistic simulation technologies for training.
3. Emphasis on psychological preparedness alongside tactical skills.
4. Adoption of collaborative learning approaches in military education.

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