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The Use of Simulation-Based Teaching Methods and Information Technologies for the Professional Development of Future Border Guard Officers in the Study of Specialized Academic Subject Areas

Artem Bratko[1*], Vitalii Grinchenko[2], Valentyna Miroshnichenko[3], Oleksandr Mihaylenko[4], Dmytro Chernousov[5] and Oleksandr Sitailo[6]

[1*]Doctor of Military Science, Associate Professor, Professor of the Border Guard Service Department, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

[2]Senior Lecturer, Border Guard Service Department, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

[3]Doctor of Pedagogical Sciences, Professor, Professor of the Pedagogy Department, National University of Life and Environmental Sciences of Ukraine, Ukraine

[4]Candidate of Military Science, Associate Professor, Professor of the Border Guard Service Department, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

[5]Senior Lecturer, Border Guard Service Department, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

[6]Senior Lecturer, Border Guard Service Department, Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine, Ukraine

E-mail: [1]bratkoav84@gmail.com, [2]gvv2773@ukr.net, [3]mvi_2016@ukr.net, [4]alex1178@ukr.net, [5]lehih1991@gmail.com, [6]aleksitajlo@gmail.com

ORCID: [1]https://orcid.org/0000-0001-5503-3318, [2]https://orcid.org/0000-0002-2158-4389, [3]https://orcid.org/0000-0002-3931-0888, [4]https://orcid.org/0000-0002-6385-536x, [5]https://orcid.org/0000-0002-9012-2372, [6]https://orcid.org/0000-0002-8698-7840

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Abstract - **This article explores the integration of simulation-based teaching methods and information technologies in the professional development of future border guard officers at the Bohdan Khmelnytskyi National Academy of the State Border Guard Service of Ukraine. The study emphasizes the importance of aligning educational practices with the realities of professional activities in the border guard agency. It highlights the necessity for continuous self-development, self-education, and self-realization among future officers. The research employs pedagogical observation, surveys, and experimental methods, to assess the effectiveness of simulation-based training. The findings indicate that simulation-based methods, combined with modern information technologies, significantly enhance cadets' motivation, cognitive engagement, and professional competencies. The article concludes that the implementation of these methods is essential for fostering the professional growth of future border guard officers, ultimately contributing to their readiness for real-world challenges in border security.**

Keywords: **Simulation-based Teaching Methods, Professional Development, Border Guard Officers, Information Technologies, Specialized Academic Subjects, Professional Formation**

I. INTRODUCTION

The current realities of the border guard agency personnel's professional activities in Ukraine necessitate a training approach focused on self-development, self-education, and self-realization of future border guard officers. This awareness requires the organization of high-quality training in higher military educational institutions, which depends not only on acquiring knowledge and forming professional competencies but also on their constant updating and continuous professional growth. One of the approaches to solving this issue is to bring the educational process closer to future professional activity with its problems and situations, i.e., to reproduce the subject matter and military-social contexts of future professional activities in training (Talezadehlari et al., 2014).

The integration of information technologies into the educational process has become a significant trend in modern pedagogy (Chowdhury, 2022). The use of digital tools and platforms can enhance the learning experience, making it more interactive and engaging. The objective of this article is to validate the application of simulation-based teaching techniques and information technologies to advance the professional education of future border guard officers within specialized academic subjects (Sri et al., 2021).

The article establishes the effectiveness of simulation-based teaching methods as part of professional development strategies for future border guard officers studying specialized academic disciplines (Kokila et al., 2018).

II. Tasks of the Article

- The study examines the present professional development practices for future border guard officers in Ukraine.
- The research aims to pinpoint the fundamental elements of simulation-based teaching methods and their application to border guard officer training.
- The study seeks to determine how healthy information technologies improve professional skills when combined with simulation-based training for cadets (Pragadeswaran et al., 2024).
- This study aims to develop an implementation framework that combines simulation-based teaching approaches with information technologies for specialized academic curricula of future border guard officers.

This study ***hypothesizes*** that professional development outcomes for future border guard officers will improve significantly through the integration of simulation-based teaching approaches and information technology into their training curriculum. The research anticipates that cadets trained with simulation-based methods supported by information technologies will show greater motivation and cognitive engagement along with superior professional competencies than those taught through conventional methods (Zorpette et al., 2023).

III. Literature Review

The formation of a person as a labor subject and their transformation into a professional as a result of social activity in the labor sphere is presented (Ziaziun et al., 2019; Nychkalo et al., 2020). The mechanisms of psychophysiological support for the professional development of a specialist are the subject matter of research (Bocheliuk, 2019). At the same time, Maksymenko & Kokun, (2019) draw attention to the fact that "the professional formation of a young person while studying at a higher educational institution is an important stage in their socialization, where the leading activity is educational and professional. Professional training in higher educational institutions for future specialists covers acquiring the fundamental principles of their professional space, that is, the system of values, worldview, and practical experience necessary for effective professional activity" (Maksymenko & Kokun, 2019).

The content, main directions, and stages of cadets' educational and cognitive activities play an important role in their professional development. If a future officer consciously chooses a specialty and considers it worthy and significant for themselves and society, this positively impacts the quality of their educational and cognitive activity. Moreover, as (Turkot, 2011) emphasizes, "the dynamics of professional development is quite complex and changes throughout the entire study period".

The scientific standpoint of (Stoliarchuk, 2018) is interesting. The researcher proposes to carry out reflective and project-based learning as a means of optimizing the formation of the personality of a future specialist. "The urgent tasks of psychological support for their professional development in the context of the implementation of reflective and project-based learning are: 1) monitoring of progress and assistance in solving urgent problems of professionalization (goal setting, design, operationalization, reflection); 2) identification, enrichment, and realization of the personal and professional potential of the future specialist; 3) prevention and correction of problems of personal and professional development of the future specialist" (Stoliarchuk, 2018).

The decisive role of practice in professional development is emphasized in the approach that "after completing the pedagogical practice, the student becomes different: their internal standpoint changes, the system of personal values and professional and pedagogical guidelines is transformed, the cognitive content of the 'Self-Image' is enriched, and life and professional experience is expanded" (Podolyak & Yurchenko, 2008).

Vynoslavska, (2005) studied the individual's professional development in the context of professional self-determination. The author notes that "professional self-determination is a person's definition of themselves concerning the criteria of professionalism developed in society and accepted by this person. One person considers the criterion of professionalism to be simply belonging to a profession or obtaining special education, and accordingly, they evaluate themselves from these positions; another person believes that the criterion of professionalism is an individual creative contribution to their profession, enrichment of their personality through the profession, and accordingly, from this higher 'bar,' a person defines and realizes themselves differently" (Vynoslavska, 2005).

Most authors consider the professional development of a personality as "the integration of the processes of personality formation at the individual physiological and professional level in ontogeny, from the beginning of professional self-determination, development, and to the end of active work" (Vynoslavska, 2005; Rezvykh, 2024; Sopivnyk et al., 2017). Scientists tend to recognize the infinity of human development and the need to continue this process in different periods of life and professional activity.

The interest in the concept of professional development of future officers can be traced in the works of (Nechepurenko et al., 2019; Sagaydak & Avramenko, 2016), and other researchers. Scientists reveal the psychological and pedagogical peculiarities and patterns of behavior of the future officer's personality at certain stages of their professional development. They associate the professional development of an officer as a specialist with the formation of them "as a personality and as a professional capable of performing tasks in any area of professional activities and of any complexity" (Matokhniuk et al., 2020; Miroshnichenko, 2018; Otreshko, 2004). Vasiuk & Vyhovska, (2015) insist on

using educational and cognitive tasks. At the same time, the authors also note that "the motivation for choosing a profession is important in the formation of a personality. A conscious attitude toward the choice of profession determines the personality's focus on familiarization with the content of the profession, practical testing of their capabilities, mastering active ways of preparing for future work, and self-education of professionally important qualities", understanding them as the basis for the professional development of future border guard officers.

The educational sector has recently focused extensively on incorporating information technologies into teaching practices (Akram et al., 2022; Tong et al., 2010). Digital tools and platforms have transformed knowledge delivery and acquisition methods, resulting in improved student learning experiences. Learning Management Systems (LMS) now play a crucial role in delivering courses while monitoring student progress and enabling communication between teachers and students (Bradley, 2021). These platforms act as centralized hubs that consolidate resources, assignments, and assessments to improve educational process efficiency. Multimedia tools, including video simulations and interactive modules, have transformed educational practices (Febliza et al., 2023). These educational tools offer students dynamic access to complex concepts through hands-on learning experiences, which are especially valuable in practical fields like border security training. Simulation-based training provides a secure setting for learners to practice real-world scenarios while simultaneously improving their decision-making and problem-solving skills.

The advent of mobile technologies has broadened educational reach by enabling students to access learning materials at any time from any location (Haleem et al., 2022). The adaptable learning approaches facilitate students to take charge of their own education while respecting various learning preferences. Data analytics has become an essential element in education that enhances teaching effectiveness, according to (Alam, 2023). Educators who analyze student performance data can discover learning gaps and customize instruction to suit individual needs, which helps create personalized learning experiences. Educational practices are undergoing transformation thanks to the emergence of virtual and augmented reality technologies (Roopa et al., 2021). Immersive technologies open up extraordinary possibilities for students to investigate complex environments and scenarios not easily duplicated in conventional classrooms. Specialized fields like border security benefit from enhanced knowledge retention and engagement through immersive experiences.

Astremska et al., (2023); Mykhalko et al., (2023) examine socio-professional law enforcement officer development through philosophical and legal perspectives. The primary focus is analyzing professional development for future law enforcement officers during their higher legal education. Professional development develops different implications when applied to border education. The body of scientific literature, including these studies, fails to address the issue of using simulation-based teaching methods for the professional development of future military specialists.

IV. METHODOLOGY

The study started off by conducting an initial stage focused on assessing the state of the problem related to the professional development characteristics and core concepts of future border guard officers in specialized academic fields. A combination of research methods was used to achieve this goal through the analysis and synthesis of theoretical literature relevant to the topic. The foundational review established an extensive understanding of existing professional development frameworks and viewpoints within this specific context.

Researchers used pedagogical observation techniques together with surveys to investigate the special features of simulation-based teaching methods. The surveys used interviews along with questionnaires to collect both qualitative and quantitative information about educator and student views and experiences with these teaching methods. The analysis of independent characteristics from collected data enabled researchers to gain a nuanced understanding of practical applications of simulation-based approaches. The study explored how information technologies were incorporated into these methods and showed that digital tools and platforms improve simulation-based learning effectiveness.

Systematization and generalization techniques demonstrated the validity of using simulation-based teaching methods for the professional development of future border guard officers. The research included organizing and combining results from both scientific literature and empirical data to identify the advantages and obstacles of these methods while emphasizing the role of information technologies in creating interactive and immersive learning environments.

A pedagogical experiment was conducted to evaluate the effectiveness of simulation-based teaching methods, which comprised two distinct stages: 1) the ascertaining stage and 2) the formative stage. The ascertaining stage of the experiment involved gathering baseline data about participants' professional development indicators, and during the formative stage, educators introduced simulation-based teaching practices supported by information technologies. Each step involved specific tasks, which allowed for a thorough analysis of these methods and their effects on professional development.

The researchers used mathematical statistics to examine the results from both experimental and control groups. The statistical evaluation provided a basis for testing the reliability of professional development indicator differences, thereby demonstrating the success of simulation-based teaching through empirical data. The professional

development diagnosis of future border guard officers relied upon comparative analysis. The comparison examined student outcomes from simulation-based learning supported by information technologies against traditional teaching methodologies. The analysis explained how various teaching methods performed differently across specialized academic disciplines.

The methodological framework established for this research delivers a thorough investigation into how simulation-based teaching methods backed by information technologies support the professional growth of prospective border guard officers while creating reliable and actionable results for educational practices.

V. Results and Discussion

Professional development relies on border guard cadets' increasing motivation together with pedagogical guidance and a broad social environment supporting professional growth plus mastery of communication functions. Through the use of several research methods, it has been found that the greatest potential for the professional development of future border guard officers in the study of specialized academic subject areas is contained in the following disciplines: "Military Leadership and Management of Daily Activities of Border Guard Units," "Personal Security and Use of Force," "Fundamentals of Combat Support," "Moral and Psychological Support," and "Border Guard Service," among others. The content of these academic subjects motivates cadets to intensify their educational and cognitive activities, particularly when addressing critical practical issues.

In this regard, Zahnybida, (2011) notes that activating the motivational sphere is possible at a certain level of mastering special knowledge and professional skills. According to the scientist, a higher level of cognitive motivation is characteristic of students who possess generalized mental work methods. Motivational factors, as activators of educational and cognitive activity—including independent work—contribute to the formation of specific cognitive goals. The further deployment of motives within the sphere of consciousness leads to the transformation of goals into cognitive programs with clear parameters of activity aimed at meeting educational and cognitive (academic) needs (Zahnybida, 20111). One of the interactive forms of organizing the education of future border guard officers in training sessions on these academic subjects is the use of simulation-based methods in their professional training.

Simulation-based methods include utilization tours to border guard units, where functional duties for the relevant position are performed, simulation-based training, role-playing and business games, case studies, situational tasks, and simulation tasks, among others. Given that future border guard officers will have to work in "rather difficult and extreme conditions," professional development involves, on one hand, the accumulation, enrichment, and expansion of professional knowledge, skills, and experiences of professional activities, and on the other hand, it involves the socialization of the future officer's personality into a professional environment. As Otreshko (2004) notes, we are discussing the "socio-professional formation of the personality" of the future border guard officer. It was proposed to use simulation-based training, situational and simulation tasks, simulation analysis, time management, case methods, professional business and role-playing games, and professional development training to activate professional thinking in the study of specialized academic subjects.

Investigating the role of real responsibility in activating the learning activities of cadets, Kalinichenko, (2005) notes that "the training activities of future specialists are significantly intensified when they are aware of its role and are interested in both the process and the result of their learning." Therefore, according to the researcher, in the study of specialized academic subjects, attention should be focused on developing the motivational and instrumental spheres (Kalinichenko, 2005).

During the simulation-based training and the use of case methods, a motivational and acmeological training environment was created to form the motivational and acmeological components of professional development. It was assumed that implementing these simulation-based methods would facilitate cadets' interaction and amplify motives for professional development, taking into account the changing conditions of future professional activities. In specific professional situations simulated through the use of simulation training methods, professional skills necessary for the professional development of future border guards are formed, which require independence, initiative, creativity, perseverance, and other qualities.

As for pedagogical guidance in the process of professional formation of future border guards, its essence consists of creating levers of influence on their consciousness, providing the necessary assistance, and choosing and using simulation training methods. Conducting interdisciplinary simulation training as one of the simulation training methods contributed to the formation of the professional intelligence of future border guards. It was assumed that the productivity of thinking would be revealed in the process of actively and purposefully processing the available knowledge and new information. It was predicted that by participating in the educational training, cadets would immerse themselves in a professional situation, allowing them to project their professional development.

The introduction of simulation-based methods was carried out with the understanding that the educational activity of future border guard officers is ensured by the course of cognitive processes, where the perception of professionally oriented information takes a prominent place. In the process of direct interaction with the cognitive task (content of the training exercise), the perception and awareness of the performance of professional actions arise and occur. The state that arises as a result of this interaction is an understanding of the specifics of professional activities by future border guard officers. When solving cognitive simulation-based

tasks, sensitivity to the unknown is distinguished by its dynamics. It is reflected in acquiring new experiences and mastering various professional roles during the simulation-based training, ensuring cadets are open to building images of skilled tasks.

The actualization of self-educational activities of future border guard officers for active participation in simulation-based training exercises aimed to form a reflective and acmeological component of cadets' professional development. Their self-educational activity was considered a process of acquiring knowledge about the specifics of professional activities through independent studies, systematic, purposeful work with primary sources, scientific, educational, and methodological literature, etc.

The content and complexity of practical tasks and simulation-based training situations depend on the stage of professional development of future border guard officers:

- **Module I:** Obtaining basic ideas about future activities.
- **Module II:** Acquiring basic professional knowledge, skills, and abilities.
- **Module III:** Developing skills through independent solutions of simulation-based situational tasks in different conditions of activity.
- **Module IV:** Consolidation of previously acquired skills.

The structural and logical scheme of professional development of future border guard officers during their studies at a higher military educational institution has been drawn up approximately following the specified stages (modules), taking into account interdisciplinary connections. Knowledge and skills in the academic subject area referred to as "Military Leadership and Management of Daily Activities of Border Guard Units" are based on the knowledge and skills gained during the study of specialized academic subjects such as "Fundamentals of Combat Support," "Moral and Psychological Support," and "Border Guard Service," all while employing simulation-based teaching methods.

The organization of the experimental work in higher military educational institutions demonstrated that the indicators of professional development of future border guard officers, who were divided into control and experimental groups, were almost identical according to the results of the entrance control. The author's materials for the workshop of simulation-based situational professionally oriented tasks titled "Training of Professional Development of Future Border Guard Officers" for interdisciplinary educational and methodological support of the academic subjects referred to as "Military Leadership and Management of Daily Activities of Border Guard Units," "Fundamentals of Combat Support," "Moral and Psychological Support," and "Border Guard Service" have been developed and systematized. The training included tasks aimed at applying theoretical knowledge to solve simulation-based situational, professionally oriented tasks and generating new ideas for professional development.

The developed training tasks were aimed at forming all indicators of professional development of future border guards. Methods of simulation analysis, time management, and game methods were used as sources of motivation for cadets, applying professional knowledge, abilities, and skills to solve practical tasks of conditional professional situations with the aim of assimilating professional experience by future border guards. We are convinced that the use of simulation methods in the process of studying professional disciplines contributes to the formation of communicative qualities and creative professional thinking of future border guards.

As practice shows, cadets are not sufficiently involved in dynamic cognitive activity if the educational material is irrelevant to their future professional activities. Conversely, their activity increases dramatically if the material contains specific problems that must be dealt with in their future professional activities. In this case, their cognitive activity is driven by a personal interest in researching professional problems, studying the experience of solving them, and mastering more effective methods of professional activities (Miroshnichenko, 2018). This explains the significant interest of future border guard officers in training sessions that use simulation-based methods of teaching.

Cognitive skills are essential for solving cognitive tasks. "Scientists divide cognitive skills into the following: specific, partial (subject), which reflect the specifics of a particular subject and are manifested in the acquisition of specific knowledge; generalized, which ensure the course of cognitive activity in the study of all academic subject areas; general, which are associated with independent cognitive activity (the ability to work with literature, observe, make a plan, etc.)" (Miroshnichenko, 2018). In the context of our research, the most interesting are general cognitive skills and specific, partial (subject) skills that reflect the specifics of professional academic subject areas.

It is also important to use interactive teaching methods, adhering to the principle of linking learning to practice (Sopivnyk et al., 2017; Matokhniuk et al., 2020; Miroshnichenko et al., 2019). Combining several simulation-based methods in the study, specialized academic subjects contributes to the professional development of future border guard officers. In our opinion, I. Darmanska's remark about "the importance for the formation of a future manager to involve all scientific and pedagogical staff in the process of motivation growth and create conditions for enabling the desire to realize motivation, etc." (Darmanska, 2019) is correct. Considering this scientific standpoint, we propose introducing a special course called "Professional Development of a Border Guard Officer."

The use of simulation-based teaching methods aims to solve the following tasks: formation of interest in the profession of border guard; orientation to achieve success in professional

activities; striving for professional development and gaining experience; searching for ways to solve professional situations; development of perseverance in acquiring professional knowledge and a creative approach to their application; and the ability to engage in analytic and predictive thinking.

To analyze the results of the formative stage of the experimental study, the digital indicators of the dynamics of professional development of future border guard officers at the entrance and final control stages were compared (Table I).

TABLE I DYNAMICS OF PROFESSIONAL DEVELOPMENT OF FUTURE BORDER GUARD OFFICERS

Levels of professional development	Experimental group (n = 123)				Control group (n = 121)			
	At the beginning of the experiment		At the end of the experiment		At the beginning of the experiment		At the end of the experiment	
	Persons	%	Persons	%	Persons	%	Persons	%
High	11	8.5	23	18.7	11	9.9	14	11.6
Average	34	27.2	44	36.6	32	26.4	39	32.2
Low	78	64.3	56	54.7	78	63.7	68	56.2

The results showed that there are positive dynamics in the professional development of future border guard officers in both groups. However, compared to the control group, there were more intensive dynamics in the experimental group, indicating the effectiveness of simulation-based methods in studying specialized academic subjects (Fig. 1).

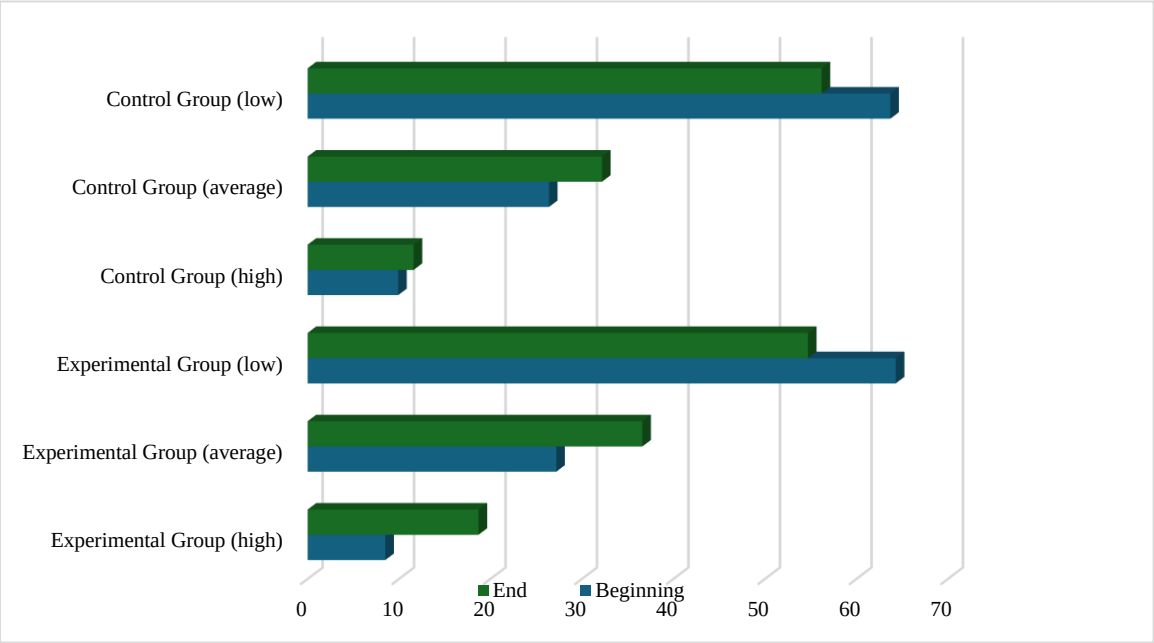

Fig. 1 Changes in the Levels of Professional Development for Both the Experimental and Control Groups Before and After the Experiment

To quantify the changes, we calculated the percentage increase in the number of cadets in the high and average categories for the experimental group:

High Level

- Increase = (23 - 11) / 11 x 100 = 109.09%
- Average Level:
- Increase = (44 - 34) / 34 x 100 = 29.41%

For the control group, the changes are as follows:

High Level

- Increase = (14 - 11) / 11 * x 100 = 27.27%
- Average Level:
- Increase = (39 - 32) / 32 * x 100 = 21.88%

These calculations demonstrate that the experimental group not only increased the number of cadets in the high level of professional development significantly more than the control group but also showed a substantial increase in the average level.

The efficacy of simulation-based teaching methods as factors influencing the professional development of future border guard officers has been established. Among the topical issues of professional development that can be addressed using simulation-based methods, we highlight the creation of simulation-based cognitive tasks that promote the development of creative thinking. It is important that instructors be able to diagnose the structure of the motives for the professional development of cadets so that future border guard officers will form a conscious attitude toward the

educational material. Additionally, interdisciplinary connections must be realized, as must the development of students' activities in the study of specialized academic subjects.

The use of simulation-based teaching methods in the training of future border guard officers intensifies the search for optimal forms of influence on the motivational components of their professional development. Such forms include cadets' inclusion in simulation-based training, situational and simulation-based tasks, simulation analysis, time management, case methods, professional and business role-playing games, professional development training, and activation of professional thinking. The integration of information technologies into simulation-based methods further supports the professional development of future border guard officers. Digital platforms and tools can facilitate immersive learning experiences, enabling cadets to engage with realistic scenarios and simulations that mirror the complexities of their future roles. This technological integration not only enhances the learning experience but also prepares cadets for the digital landscape they will encounter in their professional lives.

The use of simulation-based methods in the training of future border guard officers contributes to the development of qualities such as professionalism, education, erudition, literacy, ingenuity in actions, balanced behavior, sensible decision-making, critical thinking, a persistent and objective attitude toward new beginnings, and foresight. The findings of this study highlight the importance of simulation-based methods, supported by information technologies, in fostering a well-rounded and competent future workforce in border security.

VI. Conclusion

Our research supports the recommendation to incorporate simulation-based teaching techniques for professional development in specialized academic subjects of future border guard officers. For the professional development of future border guard officers, these imitation-based teaching methods must be implemented. The approach matches higher education goals that focus on transforming learning to support students' cognitive development and professional advancement.

The results of our research confirm our original assumption that simulation-based training methods enormously improve both the learning experience and professional preparedness of border guard officer trainees. Engaging cadets through real-life scenarios helps them master practical skills while developing essential critical thinking and decision-making abilities required for their future roles.

Our research delivers practical benefits through its potential application towards curriculum development and instructional methods in military educational settings. Educators who incorporate simulation-based methods into specialized academic courses establish dynamic educational settings that better equip cadets to handle professional challenges. This investigation demonstrates its scientific uniqueness by examining which pedagogical conditions lead to successful simulation-based teaching applications in border guard officer education. This study expands current educational research by demonstrating how simulation-based teaching methods can be customized to fulfill the distinctive requirements of aspiring border guard officers. Through its findings, this study benefits future border guard officers by improving their professional development. Prospective research should determine the educational requirements necessary for incorporating simulation-based teaching methods into the professional training of prospective border guard officers in specialized academic disciplines. Through this study of simulation methods, we may discover optimal practices and approaches that enhance training effectiveness and benefit both cadets and their training institutions.

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