



Sh.K. Kadirkulov, K.J. Koichykulov, I.A. Bataligin

Military Institute of the Ground Forces named after S. Nurmagambetov,
Almaty, Kazakhstan

E-mail: koichykulov@bk.ru

APPLICATION OF COMBAT SIMULATION IN THE EDUCATIONAL PROCESS

Abstract. The applicability of further development of the military education system in the Republic of Kazakhstan is determined by several factors [1]. Among them are the need to improve the training of cadets taking into account the experience of modern armed conflicts, modernization of the educational and material base of military educational institutions to ensure a high level of training, as well as increasing the efficiency of the educational process. In the context of digitalization, the creation of a multifunctional model of a single information space for organizing and managing combat operations by units is of particular importance. The introduction of an automated educational process system will significantly improve the quality of training and the effectiveness of classes.

This article discusses some areas of training cadets in the discipline «Tactics» using modern educational technologies within the walls of a military university. The use of simulators in the training process allows you to simulate a combat situation as close to reality as much as practical, develop the level of instruction provided to cadets in class, quickly spot shortcomings, and take action to remove them in order to raise the quality of training. One of the key areas of research into the use of a tactical simulator during classes in the discipline «Tactics» will be the quality of organization and management of combat operations.

Keywords: tactical simulators, training methods, training equipment, technical training aids.

Introduction.

During training at the Military Institute of the Ground Forces named after S. Nurmagambetov, special attention is paid to the development of field training during the preparation of future officers. However, in the training ground conditions, it is difficult to recreate the necessary combat situation for practicing modern tactical techniques due to the limited space of training fields, as well as limits on the use of fuels and lubricants and motor resources for military equipment, ammunition and simulation equipment. It is much more effective and economical to train cadets on a tactical simulator, simulating various combat situations, than to regularly use equipment at long distances and spend significant amounts of ammunition.

One of the methods for training cadets is the use of tactical simulators for organizing and managing combat (hereinafter referred to as the simulator). This simulator enables training of motorized rifle units' command and control bodies up to the company level, encouraging the development of taking actions, task-setting, and subordinate management skills in a variety of combat circumstances and while on the move. A single virtual battlefield is implemented for training, which includes a variety of terrain types and takes the simulated enemy's movements into consideration [2]. To create a tactical situation and reproduce various combat scenarios, the simulator uses military geoinformation systems.

Materials and Methods.

The study is conducted by analyzing, studying and summarizing theoretical materials related to tactical simulators for organizing and managing combat. The method of comparative scientific analysis of the tactics of combined arms units in combat is also used and practical recommendations for improving the training and material base for preparing these units for combat operations in the field are considered.

Results and Discussion.

In modern conditions, special attention is paid to the effective use of financial and material resources allocated for combat training, as well as the widespread introduction of modern computer and IT technologies, training and preparation methods. Modern simulators have a service life of roughly 10,000 hours, or a decade. Considering that their ultimate cost is roughly 4-6% of the cost of a real sample of military hardware or weapons, it is simple to calculate their payback period after accounting for all the computations and expenses.

The following tasks are completed with the use of training equipment and simulators: creating in cadets precise, coordinated skills and abilities in actions with weapons and with control mechanisms of military equipment, which simplifies the process of learning the laws of shooting and the method of operating vehicles in settings as close to combat as possible; automated construction of a three-dimensional model of an approved combat zone; the capacity to break down specific aspects of driving and firing from different kinds of weapons and equipment into simple actions for their gradual mastery with a gradual complexity of training cases; the potential for an immediate independent evaluation of the level of combat readiness, shooting, and driving technique proficiency; the ability to record error and failures; the simultaneous demonstration of actions that do not deviate from the rules; and the repetition of the exercise until it is executed correctly.

Various electrified training stands, simulators of various military equipment, and simulators for learning how to manage units of the branches of the armed forces while performing one or more combat support tasks with sound accompaniment are all commonly used in the educational process for training cadets at the Military Institute of the Ground Forces [3].



Through the development of precise, coordinated skills in cadets for working with weapons and military equipment control systems, the use of simulators and training equipment enables us to solve several significant issues:

- automating the creation of three-dimensional terrain models to simulate military operations;
- facilitating the acquisition of shooting rules and combat vehicle driving techniques in conditions as close to real ones as possible;
- breaking down difficult aspects of shooting and equipment control into easier steps while gradually increasing the complexity of training situations; quick and impartial evaluation of the level of combat ability [4], including examination of driving and shooting methods, documentation of mistakes and deviations, and the potential for additional training until the exercise is executed correctly.

The reduction in defense spending has led to significant restrictions on military equipment purchases in many countries, and has complicated the regular replacement of expensive components. In this regard, an urgent task is to extend the service life of existing elements of military equipment. Increased training costs, time constraints, risks to the lives of personnel and a shortage of training grounds have necessitated the introduction of modern technologies into the military training system of the Armed Forces of the Republic of Kazakhstan.

The introduction of computer simulation models, trainers and military simulators has become possible due to the development of information and communication technologies and other innovative solutions. These tools demonstrate high efficiency, significantly reducing operating costs. In addition, network technologies allow the integration of simulators, simulation models and real tactical exercises into a single training system, providing a comprehensive and adaptive approach to military training.

Both group and individual training are part of the traditional military training methods, but they are long and expensive, and they could risk the lives of service soldiers. Full-fledged field training and exercises may also be hampered by underutilization of training grounds and a shortage of training locations.

In this sense, computer-based combat modeling and simulation technologies have become increasingly popular as useful training aids. They are extensively utilized for both individual and group training in technologically advanced nations, including the employment of military simulators, computer simulation models, and simulators. As part of commander training, these techniques can be used more frequently and to cover a greater number of trained troops because they involve a lot less time and operational resources than actual field training. These tools are further improved by modern technologies, which also make them more affordable, widely available, and extremely effective.

Complex technical systems including mechanics, software, three-dimensional models, and situational modeling techniques make up modern training aids and simulators. They are intended to help students acquire the professional skills they will need, enhance the efficiency and standard of cadet training, and strengthen their capacity for quick decision-making under a variety of circumstances.



There are three primary ways that practical training is conducted in military educational institutions: comprehensive, group, and individual. Group activities and training are part of individual training. Group training includes exercises and joint training as part of combat crews. Cadets from a variety of military specialties participate in exercises and war games that execute the comprehensive type of training.

Specialized and sophisticated simulators, as well as simulator complexes that may be utilized both independently and in an integrated manner, are employed in educational institutions to conduct practical training. In a combined mode, a teacher can operate many simulators from either the control post of one of the simulators that is central to a particular training session or from the central training management post. By assisting cadets develop precise, coordinated skills in handling weapons and control systems, simulators and training aids in the educational process help to solve several important problems:

- ensuring effective mastery of the rules of shooting and controlling military equipment in conditions as close to real combat situations as possible; breaking down complex aspects of driving and shooting into simpler operations so they can be accomplished in stages with a gradual increase in the complexity of training situations;

- the capacity to rapidly and independently evaluate the effectiveness of combat training, which includes keeping an eye on how shooting and driving techniques are being executed, noting mistakes and inaccuracies, and performing standard actions while having the option to repeat the exercise several times until the necessary level of training is attained.

Various kinds of simulators, military and specialized equipment, such as weapons, electric training stands, and systems intended to practice the abilities of commanding units of different branches of the armed forces during combat missions are all actively used in the educational process of training cadets [5]. By using these tools, it is possible to mimic tactical scenarios with aural accompaniment, which increases training efficacy.

The armed forces of major foreign nations give particular priority to the development and implementation of dynamic simulation trainers (simulators) in the process of training officers and sergeants, according to an analysis of the experience of using tactical simulators for training personnel of the NATO bloc coalition armies. Currently, this procedure is being carried out methodically within the context of long-term projects and technical notions that allow for the application of artificial intelligence and mathematical (computer) models in the military education process.

The experience of using various simulators in the educational process is actively implemented at the Military Institute of the Ground Forces named after S. Nurmagambetov, especially in the departments of «Tactics», «Fire Training» and «Operation and Repair of Combat Vehicles». The tactical simulator helps cadets develop sustainable skills in making decisions, setting tasks and managing subordinate units in various combat conditions.



One of the areas of development is a tactical simulator for organizing and managing a battle in the discipline «Tactics». Taking into consideration the particulars of contemporary armed conflicts, the simulator is intended to train and practice the personnel and control bodies of a motorized rifle company with reinforcement means in planning and carrying out the primary types of combat operations, movements, and place on site, carrying out defensive and offensive combat. By simulating the operations of a possible enemy's forces, the simulator trains control bodies of motorized rifle groups up to and including an autonomous rifle company in decision-making processes, task-setting, and subordinate unit management in a variety of combat situations.

In contrast to the training grounds' stationary equipment, the tactical combat management and organization simulator's capabilities enable cadets and officers to experience any contemporary battle situation that is as similar to actual combat operations as feasible. This gives each trainee the chance to train not only in the context of typical exercise conditions but also in conditions designed by the training site's class leader, specifically for the completion of a given training task, all the way up to the creation of unique exercises for unit management during combat.

The simulator allows practicing decision-making skills, setting tasks and managing subordinate units in various combat situations, simulating the actions of a potential enemy. Unlike stationary training ground equipment, the tactical simulator ensures the creation of a dynamic combat environment that is as close as possible to real conditions. This makes it possible not only to perform standard exercises, but also to adapt scenarios to specific training tasks, to develop individual special exercises for managing a unit in combat, taking into account the level of training of each student.

The effectiveness of tactical simulators is due to the use of software and equipment that creates a realistic combat environment with audio accompaniment and display of terrain both in digital format and on a physical model. These simulators can be used to enhance combat skills in both group and individual training sessions, classes, and exercises.

But it's crucial to keep in mind that the deployment of tactical and training simulators needs to be financially justified. They should not completely replace real shooting and the use of military equipment, but act as an auxiliary tool that improves the quality of training of future officers.

One of the key areas in the development of military training technologies is the creation of tactical simulators for organizing and managing combat. Currently, at the Department of Tactics of the Military Institute of the Ground Forces named after S. Nurmagambetov, the faculty, together with the Institute of Space Engineering and Technology, is creating a simulator that will train soldiers to use reinforcements to handle battle at the platoon-company level while planning and carrying out different kinds of combat operations.

The purpose of this simulator is to train motorized rifle unit officers up to the level of an autonomous rifle company. It enables the development of tactical

decision-making, combat mission-setting, and subordinate unit management skills in a variety of combat situations and while moving. Monitor systems are used to visualize the actions of simulated enemy troops during the training process, ensuring that the situation is as close to real fighting as possible.

The best tool for conducting group exercises, practical courses, teachersupervised independent training, and cadets' individual work to get ready for tactical classes is the tactical simulator [6].

The best approach, given the structure of tactical training, is to employ tactical simulators in phases according to the various training levels: training military people individually, squad leaders, and unit commanders (platoon, company, battalion).

The use of a tactical simulator during tactical training facilitates more detailed study of training issues and increases the level of assimilation of the material. Incorporation of simulators into group exercises allows achieving planned training goals with a level of effectiveness unattainable using traditional training methods.

The high efficiency of using tactical simulators is due to a number of factors, including:

- maximum approximation of the educational process to a real combat situation;
- creation of adequate conditions for the development of appropriate solutions by students;
- the ability for all learners to participate simultaneously in real time in key team and management positions.

The department's computer infrastructure serves as the basis for the tactical training class, which consists of separate student workspaces, a server with tactical tasks, and a lecturer's workspace that enables him to participate in the modeling process in any capacity to modify educational tasks and make matters more complicated. Standard personal computers and standard communication devices, or their simulation analogs, are installed in the automated student workspaces.

This simulator's capabilities enable the execution of intricate virtual tactical exercises and training, uniting students of various courses within the framework of the studied topics. Cadets gain strong abilities in tactical decision-making, combat mission setting, and subordinate unit management in a variety of combined arms combat scenarios by using the tactical simulator.

It should be underlined that the employment of training aids and tactical simulators in the classroom should be financially justified and should not take the place of actual firearms, military hardware, or specialized equipment. They ought to serve as a supporting instrument that enhances the standard of education and the efficiency of preparing aspiring officers.

Thus, the use of various training tools and simulators in the process of training future officers helps to improve the quality of training, develop creative thinking in students, as well as develop their ability to independently analyze, work with educational materials and specialized literature.



Conclusion.

Therefore, in order to improve the quality of training, create tactical perception in cadets, and form their ability to autonomously analyze and work with instructional data, military educational institutions employ training aids, tactical simulators of various types of military orientation, and activities in the process of studying military disciplines and professional training of future military specialists. Consequently, this aids in their ongoing professional growth and development while serving in the military.

Combat simulation can be of great help to commanders and staffs in organizing combat. Based on the predicted combat results, commanders and staffs can choose the best ways to defeat the enemy and accomplish the assigned tasks [7]. If the combat actions during the exercise (command-staff exercises, combat training, and command and control exercises) are carried out based on the simulation results, this will encourage the exercise participants to simulate the combat themselves based on the decision made. This requires that commanders and staff officers master the combat simulation methodology and be able to use modern technologies for this purpose.

This strategy enables higher military institutions to produce highly skilled officers who can successfully lead subordinate units, make tactical judgments, and traverse a constantly shifting combat situation.

Funding sources: This research has been/was/is funded by the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan (Grant №BR 24992904).

REFERENCES

1. (2020). Burnaev Z.R., Zheksenbinov B.N., Ermekbaev M.M. On the issue of the integrated use of modern technical teaching aids in the educational process // Collection of materials of the Int. scientific and practical. conf. "Improving the training of personnel in military educational institutions of the CIS member states: problems, solutions, prospects." - Almaty, 115 – 120 p.
2. (2025). Improving the training of cadets based on the use of tactical simulators // Zharkevich L. L. - Minsk: BNTU. -32 p.
3. (2020). Improving the system of personnel training at the university: directions and technologies//Collection of scientific articles of the VISV. 25-34. p.
4. Pakhomov E.S., Ilyin V.A., Shustova N.A. (2021). Using an original method // Bulletin of military education. № 6. 29-33 p.
5. Shumov V.V., Korepanov V.O. (2021). Study of game-theoretic models of combat operations // Mathematical game theory and its applications. 2021. p.8096.
6. Rezyapov N. (2007). Development of computer modeling systems in the US armed forces // Foreign Military Review. № 6. 17-23 p.
7. S. Bizyakin, M. Martynov, I. Savin. (2022). Implementation of modern teaching aids // Army collection № 02. 91-97 p.



Шингис Кадыркулов, э.ғ.к., PhD, қауымдастырылған профессор, профессор-оқу-әдістемелік басқарманың ғылыми-зерттеу бөлімінің бастығы, С. Нұрмағамбетов атындағы Құрлық әскерлері Әскери институты, Алматы, Қазақстан, ksh777@mail.ru

Комекбай Койчыкулов, полковник, доцент, С. Нұрмағамбетов атындағы Құрлық әскерлері Әскери институты, Алматы, Қазақстан, koichykulov@bk.ru

Игорь Баталыгин, полковник, оқытушысы, С. Нұрмағамбетов атындағы Құрлық әскерлері Әскери институты, Алматы, Қазақстан

ОҚУ ПРОЦЕСІНДЕ ЖАУЫНГЕРЛІК ІС-ҚИМЫЛДАРДЫ МОДЕЛЬДЕУДІ ҚОЛДАНУ

Андатпа. Қазақстан Республикасында әскери білім беру жүйесін одан әрі дамытудың өзектілігі бірнеше факторларға байланысты. Олардың қатарында қазіргі заманғы қарулы қақтығыстардың тәжірибесін ескере отырып, курсанттарды даярлауды жақсарту, даярлықтың жоғары деңгейін қамтамасыз ету үшін әскери оқу орындарының оқу-материалдық базасын жаңғырту, сондай-ақ білім беру процесінің тиімділігін арттыру қажеттілігі бар. Цифрландыру жағдайында бөлімшелердің жауынгерлік іс-қимылдарын ұйымдастыру және басқару үшін бірыңғай ақпараттық кеңістіктің көпфункционалды моделін құру ерекше маңызға ие. Оқу процесінің автоматтандырылған жүйесін енгізу оқыту сапасы мен сабақтардың тиімділігін айтарлықтай арттыруға мүмкіндік береді □1□.

Бұл мақалада курсанттарды білім беру процесінде заманауи технологияларды қолдана отырып, тактика пәні бойынша оқыту мәселелері қарастырылған. Курсанттарды тренажерлардың көмегімен оқыту алаңындағы жағдайды неғұрлым айқын еліктеуді, курсанттардың іс-әрекеттерін бақылауды неғұрлым сапалы жүзеге асыруды, кемшіліктерді тез анықтауды және оларды жою туралы шешім қабылдауды қамтамасыз етеді. «Тактика» пәні бойынша сабақтар өткізу барысында тактикалық тренажерді қолдануды зерттеудің негізгі бағыттарының бірі жауынгерлік іс-қимылдарды ұйымдастыру және басқару сапасы болып табылады.

Түйінді сөздер: тактикалық тренажерлер, оқыту әдістері, тренажер құралдары, техникалық оқыту құралдары.

Шингис Кадыркулов, к.в.н., PhD, ассоциированный профессор, профессор-начальник научно-исследовательского отдела учебно-методического управления, Военный институт Сухопутных войск имени С. Нурмаганбетова, Алматы, Казахстан, ksh777@mail.ru



Комекбай Койчыкулов, полковник, доцент, Военный институт Сухопутных войск имени С. Нурмагамбетова, Алматы, Казахстан, koichykulov@bk.ru

Игорь Баталыгин, полковник, преподаватель, Военный институт Сухопутных войск имени С. Нурмагамбетова, Алматы, Казахстан

ПРИМЕНЕНИЕ МОДЕЛИРОВАНИЯ БОЕВЫХ ДЕЙСТВИЙ В УЧЕБНОМ ПРОЦЕССЕ

Аннотация. Актуальность дальнейшего развития системы военного образования в Республике Казахстан обусловлена несколькими факторами [1]. В их числе – необходимость улучшения подготовки курсантов с учетом опыта современных вооруженных конфликтов, модернизация учебноматериальной базы военных учебных заведений для обеспечения высокого уровня подготовки, а также повышение эффективности образовательного процесса. В условиях цифровизации особое значение приобретает создание многофункциональной модели единого информационного пространства для организации и управления боевыми действиями подразделениями. Внедрение автоматизированной системы учебного процесса позволит значительно повысить качество обучения и эффективность занятий.

В данной статье рассматриваются некоторые направления обучения курсантов по дисциплине «Тактика» с применением современных образовательных технологий в стенах военного вуза. Использование тренажеров в процессе обучения позволяет максимально приближенно к реальности имитировать боевую обстановку, а также повысить качество обучения курсантов ходе проведения занятий, своевременно выявлять недостатки и принимать меры по их устранению в целях повышения качества обучения. Одним из ключевых направлений исследования применения тактического тренажера в ходе проведения занятий по дисциплине «Тактика», будет являться качество организации и управления боевыми действиями.

Ключевые слова: тактические тренажеры, методы обучения, тренажерные средства, технические средства обучения.

Received: June 15, 2025

Peer-reviewed: July 28, 2025

Accepted: August 03, 2025