Information Technologies in the System of Military Engineer Training of Cadets

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ABSTRACT
The necessity of enhancement of the information component in the military engineer training is determined by the result of a comparative analysis of global and national engineering education standards. The purpose is to substantiate the effectiveness and relevance of applying information technology in the system of military engineer training of cadets. The methodological part of paper includes analyses of the problem information approach, system integrity and competency-based approaches. The article proves the effectiveness of using information technology in the system of military engineer training of cadets; describes the conditions and results of using information technology in the system of military engineer training of cadets. The obtained results can be used in the system of military engineer education, as well as in general in the system of military education when providing military engineer training of cadets.

Introduction

Over the past years, there have been considerable changes in the equipment of enterprises and military units with computer machines. The military industry of Russia promptly responds to the demands of the Ministry of Defense, designing, developing, building and producing advanced analogs of the existing military products: BTR-82, BTR-82A, BMP-3, RS-24 Yars, Su-35S, Irbis-E, etc.

Operation and maintenance of these top-of-the-line military warfare requires appropriate training of military personnel, primarily, cadets of military engineer schools. The main emphasis is made on applying information technology in the course of study.

Therefore, as a consequence, changes in the content, forms and methods of the engineering activity arrangement take place. This is primarily related to applying

computer-based and telecommunication technology (Gladkov, 2006; Kazantsev and Perov, 2015).

The broad usage of computers in all fields of activity of a contemporary engineer, including production management, design development, simulation, construction, production, operation of military technology raises higher demands to the professional competence of a graduate, particularly to his IT proficiency.

The technological development of the educational process in higher educational institutions is the development and introduction of systems and educational software, best practices, organizational forms of training, computer technology, based on the effective organization of educational process. Specific requirements for introduction of new technologies in the educational process are manifested differentiation of training and the possibility of choosing a future profession, changes in forms and methods of organization and communication activities of students and teachers, tolerance and education of youth.

However, it should be noted that many theoretical and practical problems in particular the introduction of modern information and computer technologies in teaching methodology and accounting disciplines require further investigation today. There remain unresolved issues that directly affect a clear justification of effective use of the latest computer and information technologies in teaching of special subjects.

Methodological Framework

The necessity of enhancement of the information component in the military engineer training is determined by the result of a comparative analysis of global and national engineering education standards (Bernstein et al., 2016).

For example, with a better fundamental component of the engineer training and comparable professional and special component of training, Russian schools fall behind foreign foreign military schools in terms of computer equipment (Dolzhenko and Shatunovsky, 1990).

However, some scholars and experts worry that excessive application of computers in education can affect the development of engineering qualities, such as intuition, designer's way of thinking, ability of thorough analysis of technical objects and processes' properties (Kazantsev and Perov, 2015; Vaganova, 2014; Gladkova and Gladkov, 2015; Gladkova, 2015; Markova and Gladkova, 2008; Medvedeva and Marik, 2015).

A solution of this controversy can be found in developing and implementing engineering education programs, based on the system integrity approach to the study process organization (Tai *et al.*, 2016).

This approach is not brand new and is particularly popular in engineering pedagogy (Kutepov, 2003).

At the same time, the progressing differentiation of engineers' activities by the types of works and by the subject industry attribute impedes the development of the universal didactic model of the military engineer training of cadets (Sun *et al.*, 2016). Therefore, developing a didactic model of military engineer training in compliance with a particular education standard with account of the continuously changing information environment of a professional's activity and regional peculiarities is a relevant task (Tonello, 2016).

To our opinion, the system of military engineer training of cadets who are trained in mechanical and machine-building, electrotechnical, radiotechnical, and other majors will be effective provided the following organizational and pedagogical requirements are met (Smyth *et al.*, 2016):

- firstly, the strategy of special, professional and information training will be developed by the graduating faculty based on a system integrity approach and will be promptly revised depending on the social demand;
- secondly, IT will be applied in the pedagogical process comprehensively, as a combination of three interrelated components — study objects, tools for studying the engineering subjects, and new education technology;
- thirdly, the study of subjects will be provided continuously, stage by stage, in a sequence during the entire education period with account of the principles of organization of the education and information environment;
- fourthly, beside the general education programs, the course schedules will include applied topics focused on the subject field and professional environment of the future military engineer activity;
- fifthly, the IT elements used in the course of study will be appropriately combined with the traditional technology and supported by the current technical means.

The state standards that are currently in effect allow implementing computer-focused personnel training technology in each particular technical higher education school (Scherer *et al*, 2016).

For example, the Tyumen Higher Professional Military Engineering Command Academy introduced additionally a new course, Mechanical Engineer's Workplace Software and Hardware, as well as Applied Programming, adapted to comply with the education standards of related majors. They familiarize students with the principles of development of software and information support for addressing applied tasks, computer graphic basics, rules of use of standard software and particular professional engineering software suites.

Besides, the study of such subjects as Mathematic Modeling and Optimization of Technological Processes and Equipment, Systems of Automated Design Development is provided for cadets.

However, changing only the content part of the curriculum will definitely not result in automatic improvement in the level of information proficiency. It is required to develop relevant methodological and information support materials, use innovative technology at all stages of the future military engineer training.

Results and Discussion

The difficulty in implementation of the system integrity approach in the circumstances of a military higher educational institution resides primarily in the existence of a considerable gap between the level of IT application in various profiling faculties and in the absence of a uniform methodology for their implementation in the education process.

Experts of both military engineering higher educational institutions and other higher educational institutions that train engineers work to settle down this issue.

To our opinion, a high level of military engineer training that would meet the demands and prospects of development of the society, technology, production

science, the Ministry of Defense and the military industry can be achieved through creating an integral system for military engineer training of cadets that would provide:

- forming practical skills of use of standard software in cadets, such as the AiToSas software, the integrated system for automation of mathematical and engineering calculations Mathcad, Mathlab, etc.;
- studying by cadets of the methods for computer-assisted design development for individual units, machines, devices, conveyors, analysis of computer models at all stage of the design development process — from conceptual design to certification of finished products;
- studying the general regularities of design development through formation in students of a system of knowledge and skills of stage-by-stage goal-setting and selection of methods for its goal-achievement as a basis for further systematic design of particular technical objects;
- formation in cadets of the skills of practical application of methods for computer engineering at the calculation and graphic work, processing experiment results, and course and graduation design development;
- application of computer-based engineering, including own research and development in the field of modeling and optimal design of processes, for performance of technical projects in collaboration with military industry enterprises.

Currently, cadet training involves 3D design development, starting from weapons and military machinery (power units ED-200/T400, BMP, etc.), engineer ammunition (mines TM-89, grenades RGD and RGO, etc.), and ending with various devices (circuit boards, etc.) and assembly units (military vehicles, etc.).

In modern conditions of development of information technologies and information of all the social and economic processes is a primary necessity of the use of information systems in teaching accounting disciplines. The rapid development and wide distribution of global computer network has identified the relevance and led to the need for the introduction of information and communication technologies in education.

The introduction of innovative approaches, information systems and technologies in the learning process is an important component for training cadets professionals, and teachers should also remember that they are called to bring to the students of the latest methods and forms of work that society dictates a new generation of professionals today in accordance with international accounting standards, rules and principles.

Information system should be viewed as a set of organizational and technical means for the further preservation and processing of information in order to ensure users' information needs.

Selection and systematization of information technology, suitable for teaching special subjects, a separate aspect in improving the quality of the acquisition of knowledge by students.

Of great importance for the teaching of playing the visual aids that enliven teaching, make it more understandable, interesting, educationally effective and allows for minimal time more clearly present the lecture material, to separate the

important from the secondary, to focus students' attention on the details that other conditions are not We would be assimilated and understandable.

The use of electronic textbooks will not only save time in the preparation of the teacher for classes, but also effectively influence the performance of students at the time of processing the theoretical material, case studies, work on auxiliary materials, the analysis of the self-knowledge, will help to achieve the expected learning outcomes. Visibility reflected in user-friendly form of initial and intermediate data processing ongoing and the final results, the mapping of the theoretical and practical material: video clips, tests, practical tasks for self-analysis and self-control, to further contribute to a constant dynamic updating of methods and forms of the electronic textbook in educational process.

In view of the development of modern computer technology, special attention should be paid to the study of the modern hardware of computer technology and computer networks, process the data in information systems, communication programs for faxing and Internet access, multimedia technologies, electronic document management technologies. It is important that the expert was informed as to the methods of document security on local networks and communication systems: centralized data management, data security during transmission via communication channels.

That is why the rapid introduction of modern information and computer technology in everyday life of society served as a catalyst for the development of innovative processes in education linked to the introduction of forms of distance learning. One of the conditions for the implementation of the tasks of qualitative training of future specialists of universities is the introduction and widespread use in the educational process of modern forms of distance learning.

Distance Learning - a technology based on the principles of open learning, is widely used for different purposes and computer training programs, and creates with the help of modern telecommunication information educational environment for the delivery of educational material and communication.

The basis of the educational process in distance learning is purposeful and controlled by intensive self-study student who can learn at your own place, on an individual schedule and the possibility of contact with the teacher. Each teacher uses their own, inherent technique, but experience shows that experts prepared using information technology in teaching, interactive methods and information technology training, become more confident and experienced accountants, do not hesitate, meeting with non-professional problems.

Current pedagogical innovations associated with the use of interactive teaching methods, that is interactive - can interact, dialogue. Interactive training - is a special form of organization of cognitive activity has a specific, intended purpose - to create a comfortable learning environment in which every student feels his success, intellectual consistency. The essence of the interactive technologies that learning occurs through the interaction of all students. This facilitation of learning, in which teacher and student are subjects. The teacher acts only as a training organizer, coordinator of work groups. Interactive learning technologies are most appropriate student-oriented approach in the educational process.

Educational work is carried out by combining the listening phase control system and module-rating technology of training is provided not only by the

direction of students to vocational and professional training, but also responds to the principles of the development of their creative abilities and formation skills.

Using situational approach will enable students to effectively learn the methodological and organizational approaches on accounting in the company and, most importantly, will allow to understand complex organizational approaches to the construction of the accounting process as a whole and to study the function of individual employees to ensure the performance of its functions. On the other hand, this will enable the student to assess the extent of their training and their own abilities.

Information model of teaching of special disciplines can be seen as an innovation system that helps to integrate the theoretical, methodological and practical bases of the pedagogical process. At the same time all the components of this process: objectives, content, activities of students and teachers, monitoring and evaluation of learning outcomes - undergo certain changes. The process of teaching of special disciplines, based on information technology, requires a clear statement of objectives and monitoring their implementation. In accordance with the computer programs, achieving the objective during teaching special subjects to be step-wise, considering hierarchical information means, methods, by which purpose and will be determined to be implemented at some point instruction and a certain date.

Today, an important issue is to familiarize students with the application software developments concerning the automation process of the enterprise.

In our opinion, better education of students to carry out the example of complex automation systems, such as medium-scale enterprises. These systems provide a universal study of information technologies, including the preparation of primary documents, perform functions, report generation. They are today the most common in enterprises and organizations.

The study of such products should be extended to students in terms of numbers, it is necessary to increase the range of software products for teaching special disciplines. Such an approach would not limit the horizons of future professionals learn functionally compare products, get acquainted with the possibilities of the existing and future software to determine the direction of their use in future activities.

The results of the performed studies (Gladkov, 2006; Vaganova, 2014; Gladkova and Gladkov, 2015; Dvoretsky et al., 1999; Shevchenko et al., 2014; Khizhnaya and Chervova, 2006; Ivanov, 1983; Vaganova and Khizhnaya, 2016) evidence that the use of 3D technology in education: increases the volume of memorized information and the rate of its processing; improves the quality and increases the level of the study process; allows to successfully digest a huge amount of sophisticated and abstract information in an easy and comprehensible form; increases the level of the interest to study and cognition and the training activeness of the trainees; promotes the growth of professional motivation (both in teachers and students).

Besides, applying 3D technology in the military engineer training of cadets has the following positive aspects:

- lectures become practice-oriented;
- at practical and laboratory classes, cadets can perform tasks using 3D technology (3D videos, 3D photos, 3D presentations, etc.);

- saving time for studying certain topics, which allows to use the saved time for in-depth study of materials;
- optimization of the classroom stock through decreasing the workload of specialized classrooms.

Conclusion

The polyfunctional, integrative, continuous, and multilevel nature of the professional military training of cadets requires applying innovative teaching methods. Contemporary professional military training is of problem-focused nature, and the implementation of information technology allows addressing teaching-process problems effectively.

Namely, the application of information technology in the system of military engineer training of cadets is, to our view, the formula for success of preparing highly skilled professionally mobile military engineers who would have the required set of competencies and meet the qualification requirements.

Thus, the introduction of new technologies in the educational process is an objective process, the vector is determined by the scientific and technical progress, the computerization and technologization of society, as well as the peculiarities of the various components of education systems. One of the most important forms of work with students of distance education today, which is based on independent student work online with specially designed training materials. All components and instructional techniques should be focused on is to make learning as easy as possible and effective. Thus, the use of information and computer technology in the teaching of special disciplines can significantly improve the learning level of students and thus raise the level of their knowledge and learning and the use of special software for the implementation of these processes is the key to the formation of a new type of workers that will provide worthy competition in the labor market and will be the ones who will create a new updated image of the institution, whose graduates they are.

Disclosure statement

No potential conflict of interest was reported by the authors.

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