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COMPUTER-ORIENTED TRAINING IN THE CONTEXT OF INFORMATIZATION OF HIGHER EDUCATION

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Abstract

The relevance of the problem of theoretical substantiation, development and implementation of a computer-oriented methodological training system is due to the contradictions between the high demands of society and the labor market for the level of IT training of specialists and the real level of formation of the corresponding competencies among students. It is due to the discrepancy between the current level of development of computer-oriented educational technologies and insufficient volume of their use in the learning process. In the course of the research, general theoretical pedagogical methods, as well as methods of modeling and analysis of pedagogical systems, were used. The article presents a model of a computer-oriented methodological system for teaching students of universities. Its theoretical and methodological foundations are characterized; the results of the development of each of its components are presented. External and internal goals are formulated, principles of selection and structuring of training content are determined, teaching methods and features of their application are analyzed, a comparative analysis of traditional and computer-oriented forms of organization of the educational process is carried out. The development and implementation of a computer-oriented methodological system will help to increase the levels of formation of students' IT competencies and enhance their cognitive activity.

Keywords: Computer-oriented methodical system, IT competencies, students

1. Introduction

One of the strategic directions of development, reforming and modernization of higher education in Russia is its informatization, which provides for the creation and implementation of computer-oriented techniques, methods, technologies, teaching aids in the educational process. This is due to both the rapid development of computer technology and the global informatization of education, science, production, business, and public life (Robert et al., 2017).

The informatization of society needs a labour market for specialists trained for the full-fledged professional use of the latest technologies. This can only be achieved by improving the system of higher education, aimed at improving its quality and competitiveness. Graduates of modern universities should be ready to work in an environment where information plays the role of one of the leading resources of production with high growth rates of its volumes (Platov et al., 2019).

Today, high-quality training of specialists in higher education institutions can be provided only if information and communication technologies (ICT) are introduced into the educational process. The use of ICT is already becoming the norm in the process of training specialists in various professional spheres, primarily engineering, mathematical, and economic. At the same time, the effectiveness and efficiency of the educational process itself depend on many components of the methodological training system: on the goals and content of educational materials, methods, means and forms of organizing the educational process. At the same time, none of the components can be considered separately, since the best result can be achieved only by creating an integral methodological training system, which will provide for a reasonable and systemic integration of ICT with each component and effective management of all its components (Robert, 2018).

Due to the existing contradictions between the high demands of society and the labour market for the IT-training level of specialists and the real formation level of the corresponding competencies in students, there is a discrepancy between the current level of development of computer-oriented technologies used in the educational and professional activities of future specialists. And there is insufficient volume or outdated content of their use in the learning process, the problem of theoretical substantiation, development and implementation of a computer-oriented methodological training system is urgent.

2. Problem Statement

The modern educational environment is characterized by a high level of informatization, taking place within the framework of general trends in the development of technologies, education and modern requirements for the formation of systemic integrated knowledge in future specialists and the willingness to use them in professional activities.

Despite significant advances in the development of computer-based learning methods, today there are contradictions between:

i. super-fast updating of computer-oriented technologies used in the educational and professional activities of future specialists and the insufficient volume or outdated content of their use in the learning process;

ii. professional requirements for the level of the future specialist formation, the ability to create and research computer models and the real level of forming the corresponding competencies in students.

However, these contradictions, as well as the urgent need for systemic integration of ICT into the educational process, lead to the need to create appropriate computer-oriented teaching methods for specific disciplines (Clarke, 2018). These contradictions determine the relevance of the research problem and the need for theoretical substantiation, development and implementation of computer-oriented teaching methods.

3. Research Questions

According to the purpose and subject of the research, the following main tasks of the research were solved:

i. studying the current state of education using modern ICT;

ii. determining the psychological and pedagogical prerequisites and methodological requirements for a computer-oriented teaching methodology;

iii. building a model of computer-oriented learning methods, defining its theoretical and methodological foundations and principles of construction, the role and place of computer-oriented methods, forms and teaching aids.

4. Purpose of the Study

The purpose of the study is to theoretically substantiate and develop a computer-oriented teaching methodology for students of universities specialising in the sphere of tourism and service.

5. Research Methods

When solving the tasks, the following research methods were used:

i. theoretical: analysis of scientific and scientific-methodical literature on research problems; analysis of educational programs, curricula, textbooks and teaching aids; generalization and systematization, comparative and systematic analysis of the results of scientific research and existing pedagogical experience; modeling of pedagogical processes;

ii. empirical: observation (analysis of training sessions, learning outcomes, comparison of various approaches to organizing training; diagnostic (questionnaires, testing, conversations, control tests of knowledge)).

The object of the research is the process of teaching students at universities specialising in the sphere of tourism and service.

The subject of the research is a computer-oriented teaching methodology for students of universities specialising in the sphere of tourism and service.

6. Findings

The use of a computer-oriented methodological training system provides a purposeful process of obtaining knowledge, acquiring skills and abilities, mastering the methods of cognitive activity by the subject of training and the development of one's creative abilities based on the widespread use of information and communication technologies (Hrybiuk, 2021). Traditionally, the methodological training system was a combination of five hierarchically related components: learning objectives, content, methods, means and organizational forms of learning, which form a single integral functional structure focused on achieving learning objectives. However, today the traditional model of the methodological system requires revision and development (Semerikov et al., 2021). In our opinion, the modern model of the methodological training system should comply with the following principles:

1. Substantiveness of the model. Models of teaching different subjects can include different sets of components, and these components can be in a relationship specific to a given subject. Consequently, it can be expected that structurally methodological systems of teaching various subjects will differ, that is, they will have certain features.

2. Locality of the model. Due to significant and increasingly growing differences in the goals and conditions of education in various educational institutions, it is no longer possible to talk about the methodological system of teaching the subject in general. The model must take into account not only the differences in teaching various subjects, but also the peculiarities in the study of the subject that have developed in a particular educational institution.

3. The dynamism of the model. The components of the methodological system, as a rule, are in rapid development; connections between these components are regularly rebuilt. In the methodological system as a teaching model, it is necessary to provide for the development of teaching practice, include components where the development of their content is expected and the restructuring of their structural links. The creation and updating of methodological systems for disciplines that are undergoing rapid changes are especially relevant. Their goals, content, methods and technologies are rapidly updated under the influence of the challenges of the modern world (Sánchez-Prieto et al., 2014).

When selecting and systematizing the content of educational materials in the context of the implementation of computer-oriented teaching methods, in our opinion, it is necessary to systematically introduce a complex of multi-level practical, professionally oriented tasks, including those imitating the professional activity of a specialist, the solution of which is carried out using various types of software tools. At the same time, when using software in teaching, it is necessary to differentiate them according to the automation degree of the solution process and the "threshold of entry" of the student, that is, the mastery level of knowledge and skills in computer science and programming, which allows using a certain software tool to solve problems.

When designing the content of theoretical training and the system of educational tasks, we relied on the clarified learning objectives, as well as on the following principles: consistency and continuity, interconnection and interdependence, a clear hierarchy between the components. On the basis of these

principles, the following requirements were formulated for the content of theoretical training and the system of tasks:

- subordination of all semantic units to the main goals of learning, which are formulated in the form of expected results (competencies);
- structuring and systematizing the content of theoretical education, taking into account modern requirements, the principle of scientific character, as well as the possibilities of intensifying the study of theoretical materials using ICT;
- typification of educational tasks by the features and role of using information and communication technologies in their solution;
- adherence to the sequence of presentation of theoretical materials and tasks of one group to the principles: from simple to complex, from standard to creative, from concrete to abstract;
- ensuring the relationship between fundamental and professional training.

The main means of implementing the principle of professional orientation of education is a system of professionally oriented tasks. Professional-oriented tasks are often understood as some abstract model in a real problematic situation of a practical nature in the professional sphere of activity, which is formulated in a verbal, symbolic or figurative-graphic form (Grizioti & Kynigos, 2020). Consequently, when creating and implementing a computer-oriented teaching method, it is necessary to use a system of sequential interconnected practical and professionally oriented tasks. Their solution involves the use of various types of software tools, which creates conditions for the formation of a foundation for students for their further vocational training and future professional activity.

Teaching methods are ways of implementing joint activities of a teacher and a student. They must be selected to encourage students in active mental activity and the desire to consciously assimilate the content of the subject that they are studying (Hudáková & Papcunová, 2020). The teaching method is a very complex, multidimensional pedagogical phenomenon, which reflects objective laws, principles, goals, content, means and forms of teaching. The most common methods in the professional training of future specialists are: verbal (story, conversation, discussion, lecture); visual (demonstration); practical (educational and practical work, work with a textbook, workshop); inductive and deductive; research; problem statement; a reproductive method of problem solving; active learning; control and self-control and many others.

In recent years, under the influence of the development of computer technologies and the informatization of the educational process, the methods of enhancing the educational and cognitive actions of students are increasingly widespread. Within the framework of new pedagogical technologies, the most effective methods of active learning, such as learning in collaboration, the project method, multilevel learning, are determined. In our opinion, the task of choosing and applying computer-oriented teaching methods should be carried out according to the following principle: in specific conditions, it is advisable to choose those methods, the use of which ensures high efficiency of teaching students according to the accepted criteria.

Table 1 examines the main groups of teaching methods, taking into account the specifics of their application in the context of the implementation of computer-oriented teaching methods (Table 1).

Table 1. Teaching methods in the context of the implementation of computer-oriented teaching methods

Method group name	The most common methods	Computer support of methods
Methods of organizing and implementing educational and cognitive activities		
According to the source of transmission of educational information		
Verbal methods	Explanation, conversation, lecture	Creation of multifunctional multimedia demonstration systems to accompany the presentation of educational material and demonstration of graphic, text or sound messages
Visual methods	Illustration, demonstration	
Practical methods	Experiments, exercises, educational practice	Implementation of practical professionally oriented tasks using modern software tools; use of basic knowledge and skills in programming to implement algorithms for solving problems
According to the logic of transmission and perception of educational information		
Inductive	Organization of the cognitive process starting with partial up to general	Formulation of algorithms for solving certain classes of problems and their subsequent software implementation contribute to the formation of both inductive and deductive thinking and the method of cognition in students
Deductive	Formation of new knowledge based on the transition from general to specific	
According to the degree of independent thinking of students in the process of mastering knowledge, the formation of skills and abilities		
Reproductive	Activity by sample	Use of e-learning materials, ready-made programmed forms for solving basic types of problems, built-in procedures and functions, and corresponding electronic reference material
Problem-search	Problem presentation, general teaching, heuristic presentation, programmable problem method	Use of integrated tasks, cases, a system of sequential programmable tasks, differentiated by the type of software and the level of their use in the process of solving
Creative	Research, creative learning	Implementation of practically oriented projects involving the independent implementation of all stages of research using IT
By the degree of leadership of educational work		
Educational work under the guidance of a teacher	Processing theoretical material in class, written independent work, individual assignments	Electronic teaching materials, automated control systems (testing) of knowledge, electronic means of communication and interaction between the teacher and students
Independent work of students outside the control of the teacher	Homework, computational work, independent study of theoretical material	Use of LMS platforms for e-learning, distance communication and online learning allows you to improve information support and organize feedback with the student
Methods of stimulating and motivating educational and cognitive activity		
Methods to stimulate interest in learning	Didactic games, educational discussions, analysis of life situations	Using online and distance learning tools to organize the interactive activities of students; use of practically oriented tasks using professional software tools
Methods for incentivizing responsibility	Clarification of the purpose of the subject, the requirements for the study of the subject, encouragement and punishment	Use of course management systems (virtual learning environments such as Moodle
Methods of control, self-control, mutual control, correction, self-correction and mutual correction		
Oral	Conversation, survey (individual and group), story, explanation	Use of online platforms, electronic testing systems, developed complexes of test tasks, complexes of tasks for laboratory and practical classes
Written	Test work, abstract	

Practical	Experiments	
Test	Performing standardized tasks	
Binary and integrated teaching methods		
Binary	Combination of two methods or a method and a form	Use of laboratory and practical exercises; a system of tasks that form knowledge and the ability to use certain types of software tools for performing individual stages of research or solving problems
Integrated	Combination of several methods into a single system	Execution of projects and individual tasks in a specific software environment

The use of creative, research, interdisciplinary and other projects in the process of studying disciplines develops the student's cognitive independence, forms the ability to predict the results and consequences of various options for solving problems, reveals cause-and-effect relationships, transforms one from a passive contemplator of educational materials into an active participant in a professionally oriented educational cognitive activity. The implementation of the project method also changes the position of the teacher, transforming one from a bearer of ready-made knowledge into an organizer-consultant for adjusting and coordinating students' work on a project. These include discussing the implementation of the project, adjusting joint and individual efforts, organizing the presentation of the results obtained and possible ways of their implementation into practice, external project assessment (Kurbonov, 2021).

Thus, the methodological conditions for the application of computer-oriented teaching methods, in our opinion, are:

i. free access of each student to computer-oriented discipline support;
ii. creation of multifunctional demonstration multimedia systems (computer, electronic board, multimedia projector, etc.) to accompany the presentation of educational material;
iii. development of practical professionally oriented tasks involving the use of modern software tools, basic knowledge and skills in computer science and programming for the implementation of methods and algorithms for solving;
iv. use of online and distance learning tools for organizing the interactive activities of students;
v. use of training course management systems (virtual learning environments such as Moodle), various types of applied software, electronic testing systems, LMS platforms for e-learning, distance communication and online learning, etc.;
vi. implementation of practical teaching methods in the form of laboratory-practical exercises, using a system of tasks developed for them, which form knowledge and the ability to use certain types of software tools for performing individual stages of statistical research or solving problems;
vii. use of integrated tasks, cases, a system of sequential programmable tasks differentiated by the type of software and the level of their use in the solution process;
viii. execution of projects and individual tasks, providing for their implementation in a specific software environment.

Obviously, the choice of teaching methods is mutually dependent on the choice of teaching aids and the forms of the educational process organization. Let us dwell in more detail on the main types of

classes in statistics and characterize their specificity in the context of the implementation of a computer-oriented methodological teaching system (Table 02).

Table 2. Comparison of traditional and computer-oriented forms of education

| Traditional methodical system	Computer-oriented methodological system
Lecture The main didactic goal: the formation of new knowledge (assimilation of theoretical material). Leading teaching methods: verbal and visual. The leading type of student activity: reproductive.	Computer-oriented lecture The main didactic goal: the formation of new knowledge and skills and their integration. Leading teaching methods: problematic. The leading type of student activity: partially search. Advantages: the level of visibility increases, saving of the study time at certain stages of the lesson, which makes it possible to enrich the content of the educational material and to integrate mathematical and computer-oriented knowledge, skills and abilities.
Practical lesson The main didactic goal: the formation of skills and abilities to apply theoretical information to problem solving. Leading teaching methods: verbal, visual, practical. The leading type of student activity: reproductive and partially exploratory. Advantages: the level of students' independence increases; it becomes possible to more widely introduce professionally-oriented applied tasks into the educational process, at the same time the formation of both mathematical and IT competencies of students takes place	Laboratory and practical lesson The main didactic goal: the formation of skills and abilities to solve a certain class of problems using IT technologies and software. Leading Teaching Methods: Practical. The leading type of student activity: partial search, search, research.
Control (test, exam) A form of organization of educational activities aimed at identifying and assessing the degree of mastering by students of knowledge, abilities and skills, controlling the level of mastering a certain amount of the educational material within a topic, section, module or academic disciplines.	Computer-oriented form of control The main feature is that the student uses a computer either to directly solve problems using a problem-oriented program and / or to pass computer-oriented control, such as computer testing. Advantages: saving time, the ability to automatically check the level of formation of basic knowledge, skills and abilities, to automate individual stages of solving and checking problems
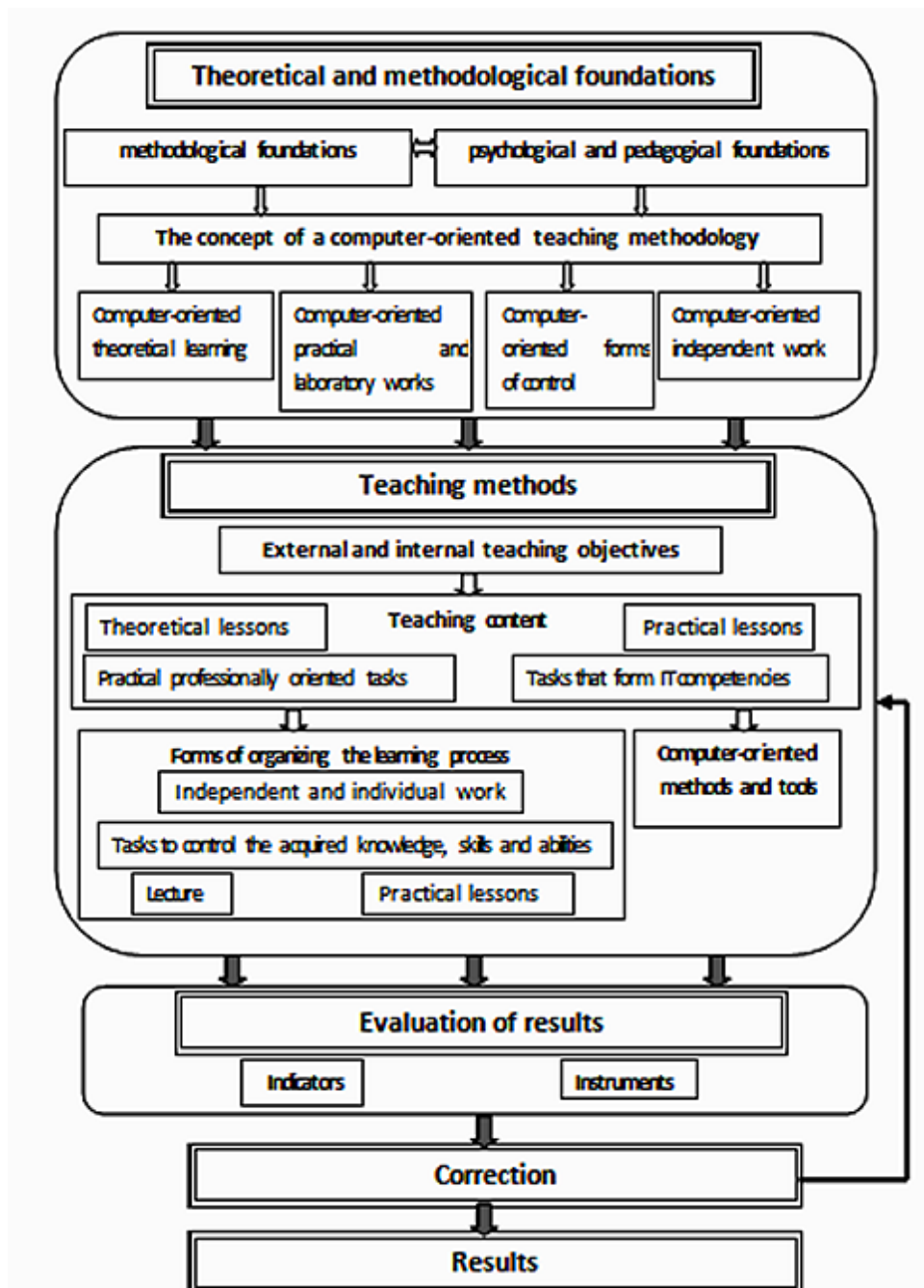
Figure 1. The model of the computer-oriented methodological training system

Based on the analysis and determination of the main components of the computer-oriented methodological training system, a model for its implementation was developed (Figure 01).

The expected result of the implementation is an increase in the levels of formation of students' IT competencies, the activation of their cognitive activity, improvement in the level of practical and professional training. Summing up, it can be stated that the developed model of a computer-oriented methodological system of education takes into account the goals, content and conditions for training students of the educational level "bachelor" in the training disciplines "Tourism" and "Hospitality". Taking into account the experience of implementing this model at Moscow State University of Sport and Tourism, we believe that it allows improving the quality of the formation of IT competencies of future

specialists. Further research, in our opinion, can be devoted to the analysis of implementation results and the development of performance indicators of the developed methodological system.

7. Conclusion

The results obtained allow us to draw the following general conclusions.

In order to systematically and purposefully form students' competencies associated with the readiness to use modern ICT to solve professional economic problems, it is advisable to introduce a computer-oriented methodological training system.

A computer-oriented methodical teaching system has fundamental differences from the traditional teaching methodology, which are manifested primarily in the organization of the educational process, the choice of teaching methods and means, the formulation of goals and expected learning outcomes. When developing a computer-oriented methodological system, it is necessary to take into account the basic principles and directions of informatization of the educational process, trends in the development of education and science in Russia and the world, the needs of applicants and the requests of employers.

The implementation of a computer-oriented methodological system creates the prerequisites for changing the structure of interaction between a teacher and a student, modernizing the content of education, updating the methods and forms of educational activity, which leads to a change in the educational environment as a whole and contributes to the activation of educational and cognitive activity of students. Positive motivation is formed, interest in learning, thinking and intellectual abilities are developing. This system facilitates preparation for practical and professional activities in the information society.

It is advisable to use computer-oriented methods, forms and methods of teaching in combination with traditional ones. At the same time, computer-oriented teaching aids should form a flexible and quickly system adaptable to educational needs, which includes methodological recommendations, electronic resources, learning platforms and environments, applied software, didactic materials, control and diagnostic tools.

The introduction of a theoretically grounded and experimentally tested effective computer-oriented methodological system focused on taking into account interdisciplinary relationships, the modern level of development of information technologies provides an increase in the level of professional training of students and allows solving a number of problems. In particular, these are the formation of students' complex interdisciplinary and professionally oriented competencies to implement the methods of problem-based and resource-oriented learning using modern creative technologies, to expand the range of applied and professionally oriented tasks, to intensify the cognitive activity of students.

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