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INCREASE STUDENTS COMPETENCE IN MODELING SOFTWARE PROCESSES THROUGH OBJECT-ORIENTED PROGRAMMING LANGUAGE

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Annotatsiya: Muhandislik ta'limini modernizatsiyalash tushunchasi mehnat bozori talablarini hisobga olgan holda ta'lim tizimining barcha bo'g'inlarida o'qitishda kompetentli yondashuvni joriy etish asosida mutaxassis tayyorlash sifatini oshirish vazifasini qo'yadi. Shuning uchun ham ushbu tadqiqotda obyektga yo'naltirilgan dasturlash kursini o'rganishda texnika oliy ta'lim muassasalari talabalarida kompetensiyalarni shakllantirish jihatlarini ko'rib chiqishdan iborat. Tadqiqotning maqsadi kadrlar tayyorlash mazmuni, usullari, shakl va vositalariga fundamental va kasbiy yo'naltirilganlikni singdirishni hisobga olgan holda kasbiy tayyorgarlikni kompetentli yondashuv doirasida isloh qilish va kompetensiyalarni aniq mazmun bilan to'ldirishdan iborat.

Kalit so'zlar: kompetentlik, masalalar yechish, masalalar yechish usullari, dasturiy jarayonlarni modellashtirish, masalalarni algoritmnlarni yechishga o'rgatish usullari.

Abstract: The concept of modernization of engineering education aims to improve the quality of training based on the introduction of a competent approach to teaching at all levels of the education system, taking into account the requirements of the labor market. Therefore, in this study, the study of object-oriented programming course is to consider aspects of the formation of competencies in students of technical higher education institutions. The aim of the study is to reform vocational training in the context of a competent approach, taking into account the inclusion of fundamental and professional orientation in the content, methods, forms and tools of training and to fill the competencies with specific content.

Key words: competence, problem solving, problem solving methods, modeling of software processes, methods of teaching problem solving algorithms.

Аннотация: Концепция модернизации инженерного образования направлена на повышение качества обучения на основе внедрения грамотного подхода к обучению на всех уровнях системы образования с учетом требований рынка труда. Поэтому в данном исследовании изучение курса объектно-ориентированного программирования заключается в рассмотрении аспектов формирования компетенций у студентов технических вузов. Целью исследования является реформирование профессионального образования в рамках компетентного подхода и наполнение компетенций конкретным содержанием с учетом включения фундаментальной и профессиональной ориентации в содержание, методы, формы и инструменты обучения.

Ключевые слова: компетенция, решение проблем, методы решения проблем, моделирование программных процессов, методы обучения



алгоритмам решения проблем.

Introduction. The main quality of a qualified specialist is the ability to solve professional tasks competently and in a timely manner. Only with this quality can an engineer be at the center of the scientific and technical process. One of the priorities of public education policy today is the transition from a knowledge-based paradigm to a competency-based approach. According to the concept of modernization of education, the goal of modern higher education is to train highly qualified, competitive professionals who are able to carry out a high level of professional activity.

Literature review. Object-oriented programming is a natural science in technical higher education institutions. The knowledge acquired by students studying object-oriented programming is a fundamental basis for the study of specialties and special disciplines, the acquisition of new equipment and innovative technologies[1]. The teaching of object-oriented programming should be inextricably linked with the specialty and should be based on the consideration of specific processes and events related to the professional activity of the future specialist. However, the inclusion of the task of integrating programming competence into process modeling competencies in an object-oriented programming curriculum, the implementation of professional training by solving engineering problems is associated with objectively existing challenges[2].

Research Methodology. Any problem that can be solved using a computer requires the development of special software. The inefficiency of software development using old programming tools for pending computer problems and the complexity of the software development process create the need for new programming languages. This issue is handled by experienced programmers or programming teams. The main task of teachers of the basics of programming in educational institutions is to train such programmers, to effectively organize the process of teaching them the necessary information (programming basics, programming languages, information technology, etc.) to use them in their future careers.[2].

The content of the educational process in the formation of professional competence for students of technical educational institutions in the study of object-oriented programming courses - a set of knowledge, skills, abilities and personal qualities and attributes to be formed in students and methods, forms and means. Since the objectives of training are not only the formation of knowledge, but also the formation of certain types of activities, including process modeling competence, the content of training should include an integral part of the activity. Therefore, the didactic model of the topic should include two blocks: the main topic, which includes the content of the programming course in the first place, is included in the curriculum and provides the formation of a block of tools or a procedural block, knowledge acquisition, various skills, including skills related to professional activity. The main block for the science of object-oriented programming includes thematic knowledge and procedural complex auxiliary knowledge (logical, methodological, historical, interdisciplinary and evaluative)[3].



Analysis and results. One of the most important criteria for learning the subject of object-oriented programming is to solve engineering problems in programming, that is, to apply the acquired knowledge in engineering practice.

In order to successfully solve problems in programming, it is necessary to know the functional relationship between standard functions: be able to work with mathematical formulas; to be able to program processes starting with simple algorithms and ending with complex algorithms; ability to work in modern programming technologies; the ability of computers to read and create spreadsheets; be able to use modeling in the development of programs to solve specialization problems[4].

An important goal of object-oriented programming training is to master the methods of solving practical engineering problems on the one hand, and to achieve all the goals of programming training on the other hand can only be achieved by teaching problem-solving programming system.

Solving programming problems Performs tasks such as programming language operators, modeling problems in engineering.

The main tasks of problem solving: input-motivational; cognitive; developer; educator; application of the studied processes in mathematical modeling; formation of students' programming skills and competencies; formation of general skills and abilities of students; analysis and evaluation of program results.

Basic rules of teaching methods for constructing problem programming in the development of object-oriented programming competence: to develop a general approach to the logical search for solutions of algorithms of any engineering problem; to form a general approach, students should have a clear understanding of the process and features described in the problem to solve problems from programming; Problem solving from programming is a complex activity consisting of a series of actions, which in turn can be a number of processes (orientation, planning, execution, control); to perform complex activities from programming, students must have strong skills to perform individual actions and the processes that are part of it; express programming issues through engineering problems and develop programming competence; the structure of the activities carried out in the development of programming competence[5].

In the development of students' programming competence, the implementation of the goal consists of goal-oriented actions, each action is carried out as a separate set of processes.

Problem solving begins with the analysis of the text of the problem, the purpose of which is to create a model solution model of the problem. Through the first action, the perception of a particular task situation occurs. The choice of the elementary conditions, requirements and objects, features and objects of the problem and the relationship between them allows to present it in the form of an ideal software problem, to build a model of its software solution. The next step is to make a plan to solve the problem, to determine the goal and the desired task. Once you have created a task plan, you can begin to implement the task solution. The final action is to check the accepted solution, the purpose of which is to check the correct solution of the



problem, to evaluate the reliability of the result and to formulate the answer to the problem.

Let's take a closer look at what technologies we used in the field of object-oriented programming. Practical lessons used teaching methods such as project method, discussion, business games, role-playing games, debates and similar communicative pedagogical technologies. Students should work on these methods in monologue, dialogue, public speaking, presentation, report, pair and group. The structure of teamwork competence:

Motivational competence — Presence of internal motivations for teamwork, strong desire to develop personal skills, interest in teamwork, understanding of its importance for personal and professional growth;

Individual competence — Presence of character traits such as balance, openness, tolerance, self-control, flexibility of thinking, stress-stability, initiative, tolerance, ability to work, dedication, social activism;

Cognitive competence — Set a goal for your activity, analyze the data, summarize, implement the activity and predict its outcome;

Communicative competence — Algorithm properties and methods of description from programming, types of algorithms, programming of various structural algorithms, development of oral and written speech, adherence to communication etiquette, ability to communicate, negotiate and speak in a multicultural society;

Activity competence — Ability to work in a team, know how to work together, be able to play their role in the team, be able to perform their duties successfully and on time.

The following operations should be performed as part of all efforts included in the engineering competencies to program engineering issues: routing, planning, execution, and control.

In the study of object-oriented programming courses for the formation of students' programming competencies, students go through the following stages, gaining basic general knowledge:

The first - to study the structure of the given problem from programming (to illuminate the basic condition, object and requirements of the problem), to study the basic concepts for logical understanding of the problem (to get acquainted with the problem - to direct and execute).

The second — create the simplest algorithm in which the relationship between the demand and the condition of the problem is clear (familiarization-orientation and execution of the problem).

Third — algorithm mastering certain methods of solving problems, choosing the ideal algorithm for the problem. Requirements and conditions Solve problems related to management with a single unknown or simple conclusion (task familiarization-planning) (task implementation - planning).

Fourth — “to get acquainted with the condition of the engineering matter” and “implementation of engineering problem solving algorithm” (acquaintance with task control) assimilate control over the execution of actions (control over the implementation of decision tasks)



Fifth — study engineering issues to verify the results obtained from the program (verification of the obtained result and its analysis-directing and execution).

Sixth — “create an algorithm plan to solve the engineering problem” (problem-solving algorithm plan development-orientation and execution) mastering the operations of the implementation of the movement.

Seventh — control procedures “planning” master the process (problem-solving algorithm plan-planning) (check the result and analyze it - control).

Eighth — mastering the control operations of control operations and the complete structure of the activity on the algorithm for solving engineering problems (problem-solving algorithm plan development-control) (check the result and analyze it - control).

Ninth — apply the learned structure of activities to the development of a program of issues on new topics and sections, to participate in a more generalized form of the structure of activities formed by students.

Conclusion. In conclusion, the conceptual basis of object-oriented programming is the connection between programming and engineering, which is the most important in the formation of professional competencies of students of technical higher education institutions. The development of program competence is the basis for education focused on engineering paradigms, the formation of knowledge, skills, abilities and personal qualities and attributes in the student, as well as the interaction of natural sciences, specialties and special disciplines and integration in education.

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