



Modeling the Formation of Professional Competence of Future Programmers Through the Development of Fundamental Knowledge and Skills

**Khayitov Bakhodir
Yusufovich**

Teacher of the Karshi branch of the Tashkent University of Information Technologies, [tel:\(99\)8415091](tel:(99)8415091)

ABSTRACT

This article presents recommendations on the development of a model for the formation of professional competence of students in the "Computer Engineering" specialty by developing fundamental knowledge.

Keywords:

Modeling, graphic, heuristic, model, competent, Technological component, programming

Analysis of the state of theory and practice of higher education proved that it is possible to ensure the stability of the fundamental knowledge development process only through the construction and implementation of a special pedagogical model. This article presents recommendations on the development of a model for the formation of professional competence of students in the "Computer Engineering" specialty by developing fundamental knowledge.

Taking into account that the formation of professional competence in higher education students is a complex organized object, the analysis of cases on the problems of educational management made it possible to conclude on the feasibility of using a systematic approach. *Systemic approach* considers objects as systems and focuses on different types of relations in the object while revealing its integrity, principles of operation, internal connection. The systematic approach allows to reveal the structural structure of objects, the interrelationship between the components that make them up, the functions of the components, and their relationships. The systematic approach, which is a method of

knowledge, is focused on considering objects of knowledge, their components, structural relations as a whole.

Within the framework of our research, it is necessary to find new methods and tools to increase the quality and efficiency of higher education, in particular, the field of training competent programmers can be a clear evidence of this. The process of formation of professional competence in students is an open, controlled system. It is known that the tool of the systematic approach is systematic analysis, which includes a set of methods and tools for studying complex objects. This set includes modeling, graphical, heuristic and a number of other methods. Systematic structural analysis of pedagogical processes includes methodological justification of the modern educational process.

The *competent approach* in the content of our research reflects the orientation of the educational process to obtain results: acquisition of fundamental knowledge, acquisition of fundamental knowledge, skills and creative abilities necessary for the future programmer in the implementation of professional activities. In order to optimize the

development and testing of the model of formation of professional competence through the development of fundamental knowledge, we proposed an algorithm for building and testing this model.

We consider the developed cycle of fundamental sciences as a model of formation of professional competence of future programmers as an open system that is part of the pedagogical field of the higher education system.

The technological component includes the stages, forms, methods and means of formation of professional competence.

The stages of formation of professional competence of future programmers are as follows: motivational (introduction of students to economic problems); active (consolidation of fundamental knowledge, formation of skills); reflexive (appreciative attitude to fundamental knowledge and formation of skills to assess professional competence) (Table 1).

Table 1

Stages of formation of professional competence in higher education students

Stage	Forms, methods and means of education	Formed components of professional competence	Knowledge, skills and abilities acquired by the student
Motivated	- knowledge excursion, - selection situation, - problem seminar, - discussion, - conversations, - lecture, etc.	Fundamental characteristics of personality	Clarification of educational goals, understanding of the need for fundamental sciences in the professional activities of future programmers; Acquisition of fundamental knowledge.
Cognitive-reflexive	- problem lecture, - problem seminars, lecture-dialogue (on-line system), practical assignments: exercises, tests, assignments, etc.	core competencies	Consolidation of knowledge in fundamental sciences; Analyzing and synthesizing (summarizing) the received information.
activity	Business games, methods of creative solutions to professional problems, student scientific conferences, debates, students' independent work, etc.	Practical competencies	Ability to systematize and creatively apply fundamental knowledge and skills; assessment of formation of fundamental knowledge, professional competence, reflection of creative works.

Form of education: in the classroom (lecture, practical training, seminars, etc.) and outside the classroom (excursions, independent work of students), group, individual, collective. Thus, the assessment component allows to determine the level of formation of professional competence of future programmers as a result of development of fundamental knowledge.

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