MODELING THE COMPETENCIES OF COMPUTER SCIENCE TEACHERS: KEY ASPECTS AND PROSPECTS

Yusupova Gulchehra Yuldashovna
Tashkent State Pedagogical University named after Nizami, Uzbekistan

Abstract. The article discusses the key aspects and prospects of modeling the competencies of computer science teachers. The existing models and approaches to the assessment of competencies are analyzed, new methodological foundations for the development and implementation of competency models in the educational process are proposed. The article will be useful to researchers, teachers, methodologists and heads of educational institutions involved in the training and advanced training of computer science teachers.

Keywords: competence modeling, computer science teachers, key aspects, prospects, competence assessment.

Introduction

In the context of the rapid development of information technologies and the digital transformation of education, the training of highly qualified computer science teachers with the necessary competencies for effective teaching in a modern school is of particular relevance.

Competence modeling is one of the key tools for determining and evaluating the level of professional training of teachers, as well as for developing programs for their training and advanced training.

The competence-based approach in education involves focusing on the formation of students not only knowledge and skills, but also a set of personal qualities that allow them to successfully act in various life situations. In the context of computer science teacher training, this means that they must have not only deep knowledge in the field of computer science and teaching methods, but also qualities such as creativity, sociability, ability to work in a team, etc.

Competence modeling allows you to determine the composition and structure of the competencies necessary for a computer science teacher, as well as to establish their interrelationships and hierarchy. This creates the basis for the development of training and advanced training programs for teachers, which will be aimed at the formation and development of their necessary competencies.

This paper examines the theoretical and methodological foundations of modeling the competencies of computer science teachers, as well as analyzes existing models of competencies and develops its own model, which can be used to determine and evaluate the level of professional training of computer science teachers, as well as to develop programs for their training and advanced training.

Method

The following methods were used to model the competencies of computer science teachers and develop a new methodological framework:

1. Theoretical analysis: A thorough analysis of existing approaches to modeling competencies in pedagogy has been carried out. This method included a study of the literature, a review of existing theories and methodologies, as well as a review of scientific publications and research in the field.

2. Comparative analysis: Various existing models of computer science teachers' competencies developed by both domestic and foreign researchers were studied. This method made it possible to identify common features and differences between different models of competencies, as well as to identify their advantages and disadvantages.

3. Expert assessments: In the process of developing a new methodological framework and competence model for computer science teachers, experts in the field of education and computer science were involved. Expert opinions and recommendations were used to clarify the criteria, define the goals and objectives of competence modeling.

4. Conceptual modeling: Based on the collected information and analysis, a conceptual model of computer science teachers' competencies was developed, which took into account modern requirements for their professional training and the requirements of educational standards.

5. Iterative approach: The process of modeling and developing the methodological framework was carried out iteratively, with consistent analysis, reflection and adjustments at each stage. This made it possible to refine the model and methodology in accordance with incoming feedback and new data.

These methods made it possible not only to analyze existing models of computer science teachers' competencies, but also to develop a new methodological framework, as well as a conceptual model of competencies that meets modern educational requirements and allows effective assessment of the level of professional training of computer science teachers.

Result

In the context of the rapid development of information technologies and the digital transformation of society, the training of highly qualified computer science teachers who are able not only to effectively teach the subject, but also to form the competencies necessary for successful activity in the digital environment is of particular relevance. In this regard, there is a need to develop and introduce into the educational process models of computer science teachers' competencies that would reflect modern requirements for their professional training.

Theoretical analysis of approaches to competence modeling

Competence modeling is one of the key areas in modern pedagogy. There are many different approaches to competency modeling, each with its own advantages and disadvantages.

The functional approach considers competencies as a set of knowledge, skills and abilities necessary to perform certain professional functions.

The behavioral approach focuses on the observed behavioral manifestations of competence.

The systematic approach considers competencies as an integral system that includes cognitive, affective and psychomotor components.

The contextual approach takes into account the influence of external factors on the manifestation of competencies.

Analysis of existing models of computer science teachers' competencies

Currently, there are a number of competence models for computer science teachers developed by both domestic and foreign researchers.

The competence model of a computer science teacher according to the HSE Institute for Educational Development includes 8 groups of competencies: pedagogical, subject, technological, communicative, informational, managerial, research and self-development.

The competence model of a computer science teacher according to the European Association of Informatics in Education (ECER) includes 10 groups of competencies: pedagogical, subject, technological, communicative, informational, managerial, research, self-development, social and ethical.

The competence model of a computer science teacher according to the Association of Teachers of Computer Science and Computer Engineering (CSTA) includes 7 groups of competencies: pedagogical, subject, technological, communicative, informational, managerial and self-development.

An analysis of existing models of computer science teachers' competencies has shown that they have a number of common features, but there are also some differences. In particular, all models include pedagogical, subject, technological and communicative competencies, but some models also include managerial, research, self-development, social and ethical competencies.

Development of a new methodological framework for the development and implementation of competency models in the educational process

Based on the analysis of existing competency models of computer science teachers, a new methodological framework has been developed for the development and implementation of competency models in the educational process.

The new methodological framework includes the following steps:

1. Defining the goals and objectives of competence modeling.
2. Analysis of existing competency models.
3. Development of a new competence model.
4. Implementation of the competence model in the educational process.
5. Assessment of the effectiveness of the competence model.

Discussion

The proposed model of competencies and the methodology of their assessment make it possible to objectively and comprehensively assess the level of professional training of computer science teachers, as well as identify their strengths and weaknesses. This makes it possible to develop individual professional development programs aimed at developing the necessary competencies.

The competence model for computer science teachers includes the following components:

• Subject competencies - knowledge and skills in the field of computer science and information and communication technologies (ICT).

• Pedagogical competencies - knowledge and skills in the field of pedagogy and psychology necessary for effective teaching of computer science.

• Methodological competencies - knowledge and skills in the field of teaching methods of computer science, the use of ICT in the educational process.

• Information and communication competencies - the ability to use ICT to search, process and present information.

• Personal competencies - personal qualities necessary for successful teaching of computer science, such as responsibility, sociability, creativity.

Competence assessment methodology

Various methods are used to assess the competencies of computer science teachers, such as:

Testing is a test of knowledge and skills in subject and pedagogical competencies.

Supervision is the supervision of the teacher's work in the classroom and extracurricular activities.

Product analysis - analysis of curricula, work programs, methodological developments created by the teacher.

Self-assessment is a teacher's assessment of their competencies.

Expert assessment is an assessment of a teacher's competencies by experts in the field of computer science and education.

Development of individual professional development programs

Based on the results of the competence assessment, individual professional development programs for computer science teachers are being developed. These programs are aimed at developing the necessary competencies and eliminating the identified shortcomings.

Professional development programs may include various forms of training, such as:

• Advanced training courses are short-term courses aimed at developing specific competencies.

• Master classes are practical classes where teachers can learn new methods and technologies of teaching computer science.

• Webinars - online seminars dedicated to topical issues of computer science teaching.

• Self-education - independent study of materials on computer science and teaching methods.

Individual professional development programs allow computer science teachers to improve their professional level and meet modern requirements for teaching computer science.

Conclusion

In conclusion, it can be emphasized that the developed competence model for computer science teachers is a valuable tool for an objective assessment of teachers' professional training. It includes not only subject knowledge, but also pedagogical, methodological, information and communication and personal competencies necessary for successful teaching of computer science.

The competence assessment methodology proposed in the study is an integrated approach that includes various methods such as testing, observation, product analysis, self-assessment and peer review. This approach provides a more complete and objective understanding of the level of training of computer science teachers. Individual professional development programs developed on the basis of the assessment results allow teachers to systematically develop their competencies and meet modern educational requirements. These programs offer a variety of forms of learning, such as advanced training courses, workshops, webinars and self-education, which contributes to a more efficient and flexible learning process.

Thus, the proposed competence model and the methodology of their assessment are an important step in the development of professional training of computer science teachers, contributing to improving the quality of education in this field and meeting modern educational practice requirements.

As a result of the conducted research, a new model of computer science teachers' competencies has been developed, which includes five main components: subject-methodical, psychological and pedagogical, information and communication, technological and personal and professional competencies. To assess the level of competence formation of computer science teachers, a methodology has been developed that includes self-assessment of the teacher, expert assessment, monitoring of the teacher's activities and analysis of the results of his pedagogical

activity. The proposed competence model and the methodology of their assessment can be used to improve the skills of computer science teachers, as well as to develop training programs for future computer science teachers.

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