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MODELING MATHEMATICAL COMPETENCE BACHELOR - FUTURE MATHEMATICS TEACHER

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Annotation
This article is about a bachelor model of mathematical competence - a future teacher of mathematics. Bachelor - future teacher of mathematics, goals of mathematical training, model of mathematical competence.

Keywords: mathematics, bachelor, mathematical competence, pedagogical education, subject, modernization, professional.

Inroduction

The main goal of vocational education is the preparation of a qualified employee of the appropriate level and profile, competitive in the labor market, competent, fluent in his profession, ready for continuous professional growth. This goal is defined in the main documents on the modernization of domestic education and specified in the new educational standards for each area of training for bachelors and masters. In the Federal State Educational Standard of Higher Professional Education (FSES HPE) in the direction of training "Pedagogical Education" (degree: bachelor), this goal is specified by the requirements for the results of mastering the basic educational programs (BEP) of the bachelor's degree, represented by general cultural and professional competencies [4, 2010]. An analysis of the composition of professional competencies of a bachelor in the field of pedagogical activity defined in the standard showed the absence of profile specifics in the description of these competencies. For a bachelor - a future subject teacher, this specificity is determined by the characteristics of the subject, its place and role in the modern education of schoolchildren. It is impossible to assess the professional competence of a subject teacher without characterizing his subject (profile) competence. In this regard, the study of the didactic and methodological aspects of the profile component of the professional competence of the future teacher is very relevant. To develop the profile component of the PEP (professional cycle, variable part) [4, 2010], it is necessary to have a scientifically based structural model of the subject competence of a bachelor-teacher as a component of his professional competence. The purpose of the article is to define the conceptual basis for modeling the subject competence of a future teacher and to develop a structural model of the mathematical competence of a bachelor - a future teacher of mathematics as a component of his professional competence.

To date, the mathematical competence of a future teacher has been studied to a greater extent from general psychological and pedagogical positions, on the basis of which its general structural components have been identified: cognitive, praxeological, motivational-value and reflective

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(Khutorskoy, Khodyreva; Stefanova, etc.), and almost the methodological aspects of its formation have not been studied. At the heart of solving the methodological problems of teaching are well-formulated goals as a necessary condition for a fairly accurate diagnosis of its results. In this regard, the goals of the mathematical training of the future teacher should be formulated in such a way that they can be transformed into a diagnostic structural model of the mathematical competence of the bachelor - the future teacher of mathematics.

Let us single out the basic principles for determining the goals of mathematical training for a bachelor - a future teacher of mathematics.

1. Compliance with the tasks of the bachelor's professional activity. Considering the mathematical competence of a bachelor as a component of his professional competence, it is logical in solving the issues of formulating the goals of their mathematical training to refer to the tasks of the bachelor's professional activity specified in the standard. Among the tasks in the field of pedagogical activity of a bachelor, the most relevant for the issue we are studying are: studying the opportunities, needs and achievements of students in the field of education and designing, based on the results obtained, individual routes of training, education, development; organization of training and education using technologies that reflect the specifics of the subject area; using the educational environment to ensure the quality of education, including the use of information technology [4, 2010]. These tasks of the professional activity of a bachelor indicate the need for a mathematics teacher to possess not only mathematical knowledge that allows organizing differentiated teaching of mathematics, but also special technologies for teaching mathematics, including informational ones. Such requirements should be appropriately reflected in the structure of the mathematical competence of a bachelor - a future teacher of mathematics.

2. Compliance with the requirements for the results of the general cultural preparation of the bachelor. The general cultural training of the future teacher is realized within the framework of a holistic educational environment, including in the process of his mathematical training. In the standard, the requirements for the general cultural preparation of a bachelor - a future teacher are represented by a complex of general cultural competencies. An analysis of their composition showed that the level of formation of most of them in a mathematics teacher will be largely determined by his mathematical competence. Therefore, for the purpose of mathematical training of a bachelor - a future teacher of mathematics, these requirements for general cultural training should be designed for the specifics of the subject of mathematics and appropriately reflected in the structural model of his mathematical competence.

3. Compliance with the requirements for the results of general professional training of a bachelor. Requirements for the results of general professional training of a bachelor are represented by a complex of his general professional competencies. Among them: owns the basics of speech professional culture; capable of preparing and editing texts of professional content, etc. For a mathematics teacher, mastering the basics of professional speech culture implies the obligatory knowledge of mathematical speech, and editing texts of professional content - editing mathematical texts. Already these competencies indicate the mediation of the goals of mathematical and general professional training of

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a bachelor, which are appropriately expressed in the content structure of the mathematical competence of the future teacher of mathematics.

4. Compliance with the state standard of school education. Currently, the general education school operates on the basis of the standards adopted in 2004. New standards for the general education school are under development, their phased introduction is planned to be implemented by 2020 [5, 2010]. The objective reality is that in the coming years a graduate of a pedagogical university should be ready to implement both standards. The current standards of a general education school define the requirements for students to master the following activities:

- General learning skills, skills and methods of activity (using elements of causal and structural-functional analysis; independent choice of criteria for comparison, comparison, evaluation and classification; participation in the organization and conduct of educational and research work; creation of own works, ideal and real objects, processes, phenomena, etc.);
- Information and communication activities (search and extraction of the necessary information from a source created in various sign systems; critical evaluation of the information received and its translation from one sign system to another; the ability to substantiate judgments in detail, give definitions, provide evidence, etc.);
– Reflexive activity (objective assessment of one's educational achievements; possession of the skills of organizing and participating in collective activities; making a conscious choice of ways to continue education or future professional activity, etc.) [Zimnyaya, 2004].

An analysis of the composition of the above actions and the features of the subject of the school mathematics course shows that these actions can be successfully mastered by students in the process of their mathematical preparation. A graduate of a pedagogical university should be aware of the need for purposeful formation of such groups of actions among students by means of mathematics and be ready for its implementation. This reveals the specifics of the mathematical competence of a mathematics teacher.

In addition to the requirements for the formation of general activities, the standard of a general education school presents standards for disciplines that define the goals of their study. In the standard of secondary general education in mathematics, the goals of its study are formulated as:

– Formation of ideas about mathematics as a universal language of science, a means of modeling phenomena and processes, about the ideas and methods of mathematics;
- Development of logical thinking, spatial imagination, algorithmic culture, critical thinking at the level necessary for future professional activity, as well as subsequent education in higher education;
- Mastering the mathematical knowledge and skills necessary in everyday life, for studying school natural science disciplines at a basic level, for obtaining education in areas that do not require in-depth mathematical training;
– Education by means of mathematics of personality culture, understanding of the importance of mathematics for scientific and technological progress, attitude to mathematics as a part of human culture through acquaintance with the history of the development of mathematics, the evolution of mathematical ideas [New..., 2004].

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To achieve these goals, a mathematics teacher must not only possess all the qualities that the above goals are aimed at, but also the ways in which students learn and develop them. The latter determines the specifics of the mathematical competence of a bachelor - a future teacher of mathematics, which indicates the need, when modeling the working (diagnostic) goals of the mathematical training of a bachelor, to project them both on the goals of studying mathematics and on the general requirements for the level of training of secondary school graduates.

Based on the formulated principles, we define the goals of mathematical training for a bachelor of pedagogy - a future teacher of mathematics:

1) the formation of a system of fundamental mathematical knowledge of the future teacher as the theoretical and methodological basis of the school mathematics course and readiness for the scientific substantiation of this course (concepts, their properties, methods) and its structure;

2) development of the future teacher's ideas about mathematics as a universal language of science, a means of modeling phenomena and processes, about the ideas and methods of mathematics and his ability to develop these qualities in students by means of a school mathematics course;

3) development of logical thinking, spatial imagination, algorithmic culture, critical thinking at the level necessary for future professional activity and the ability to develop these qualities in students by means of a school mathematics course;

4) the formation of students' readiness to solve various problems of applied, practical and social orientation on the basis of the compilation and analysis of the corresponding mathematical model and the development of their ability to teach this to schoolchildren;

5) education of students' culture by means of mathematics, understanding of the importance of mathematics for scientific and technological progress, attitude to mathematics as a part of human culture and development of the ability to educate such qualities of students by means of a school mathematics course;

6) development of research mathematical activity, creativity, creativity and the ability of the future teacher to develop these qualities in students by means of mathematics.

An analysis of the set of goals for the mathematical training of a bachelor - a future teacher of mathematics in the above formulation regarding the completeness of the representation of all general structural components of competence (cognitive, praxeological and axiological) and the specifics of the teacher's professional competence showed that the achievement of a set of these goals will provide a sufficient level of formation of the bachelor's mathematical competence at the present time.

The formulated goals of mathematical training of a bachelor - a future teacher of mathematics are diagnostic in nature, they quite accurately describe the requirements for the quality of mathematical training of students in the format of a competency-based approach to learning. Therefore, they can be transformed into a model of the mathematical competence of a bachelor - a future teacher of mathematics.

Let us define the main principles that must be followed in the development of a structural model of the mathematical competence of a bachelor - a future teacher of mathematics as a methodological product, on the basis of which all components of the educational and methodological complex of disciplines will

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be created: educational programs, educational modular programs, control and measuring materials, etc.

Table Structural model of the mathematical competence of the bachelor -future math teacher

Competency code	Characteristics of competencies
MC-1	Possesses basic mathematical knowledge, basic methods of proof and is able to teach this to students
MC-2	Owns methods for solving basic mathematical problems and knows how to use them in a typical situation
MC-3	Ready to solve interdisciplinary and practice-oriented problems based on the use of well-known basic mathematical knowledge and methods
MC-4	Knows the basic ways of mastering mathematical knowledge and is able to teach them to students
MC-5	Able to introduce and define a new mathematical concept in accordance with the basic requirements for their definition (completeness, consistency, etc.)
MC-6	Able to formulate a mathematical hypothesis in the context of the studied mathematical disciplines, confirm or refute it, and is able to teach this to students
MC-7	Able to build (construct) a mathematical object that satisfies the given conditions, and is able to teach this to students
MC-8	Able to solve research mathematical problems based on the construction of new or reconstruction of already known methods and techniques and is able to teach this to students
MC-9	Able to build a mathematical model of a non-mathematical problem, process, phenomenon
MC-10	Ready to use mathematical software packages to solve mathematical problems
MC-11	I am ready to give a reasonable assessment of the level of scientific character of the CCM, based on its presentation in school textbooks
C-12	Ready to analyze the history of the development of mathematical concepts of the CCM in the socio-economic context of the era and use it in professional activities
MC-13	Able to solve olympiad and competitive problems in mathematics for all age categories of students in the main and senior general education schools (basic level) and is able to teach this to students
MC-14	Able to develop the content of a mathematical circle, an elective course and an elective course for students of the main and senior general education schools (basic level)
MC-15	Able to set (formulate) a mathematical research problem based on the CCM for students of primary and senior secondary schools (basic level)
MC-16	Ready to use probabilistic-statistical methods to process the results of pedagogical research aimed at identifying the dynamics of development and education of students
MC-17	Ready to independently study scientific, educational and popular mathematical literature and is able to teach this to students
MC-18	Able to correctly present and correctly format a mathematical text, prepare a text for publication and is able to teach this to students
MC-19	Knows how to prepare an oral message and speak with it at a circle, seminar, conference and is able to teach this to students

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1. Compliance with the goals of mathematical training of the future teacher. The model of mathematical competence of a bachelor must fully reflect all the accepted goals of his mathematical training and maintain continuity in key terms.
2. Conciseness and unambiguity of the characteristics of the constituent competencies, so that one of them cannot be replaced by another competency. This is a very important requirement for the model on the basis of which the diagnostic device will be developed.
3. Compliance with the OOP standard. Considering the proposed model as a methodological product on the basis of which educational and methodological complexes will be developed, it is necessary to follow the approach adopted in the OOP for the pedagogical direction in the characteristics of competencies, namely, to characterize competencies in terms of “capable”, “ready”, “able”, “ owns." In the structure of the OOP of the bachelor's degree, each competence is assigned codes, so each component of the mathematical competence must have its own code.

The formulated principles formed the basis of the structural model of the mathematical competence of the bachelor, which is presented in the table. The used approach to modeling the mathematical competence of a bachelor - a future teacher of mathematics, based on a comprehensive analysis of the requirements of the standard of a secondary school for preparing students, the goals of teaching them mathematics, the prospects for the development of the school until 2020 and the Federal State Educational Standard of Higher Professional Education in the direction of "Pedagogical education", made it possible to formulate a complex actual goals of mathematical training of a bachelor and develop a structural model of his mathematical competence. The competencies presented in the model are a necessary specification of professional competencies in the field of pedagogical activity, defined in the standard, for a bachelor's degree in mathematics.

The created model is of great practical importance. On its basis, it is possible to develop educational programs in mathematical disciplines (mathematical profile) within the framework of the OOP structure.

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