

# **THE ESSENTIAL AND CONTENT CHARACTERISTICS OF METHODICAL COMPETENCE OF THE FUTURE TEACHER OF MATHEMATICS**

**Guliya Nailevna Akhmetzyanova<sup>1</sup>, Angelina Olegovna Bagateeva<sup>2</sup>,  
Fannur Samatovich Sirazov<sup>3</sup>**

<sup>1</sup>*Naberezhnye Chelny Institute, Kazan Federal University*

<sup>2</sup>*Naberezhnye Chelny Institute, Kazan Federal University*

*e-mail: angel803@yandex.ru*

*Tel.: +79625761638*

<sup>3</sup>*Naberezhnye Chelny State Pedagogical University*

## **Abstract**

The article presents the results of the analysis of scientific, psychological and pedagogical sources devoted to the study of the problems of methodological competence formation. The problem of methodical competence formation of the future teacher of mathematics is particularly relevant in the context of the implementation of the competence approach. Nowadays when the models of methodical competence as a professional and personal quality of the future teacher and methods of its effective formation are not sufficiently developed, it becomes of vital importance to solve the problem of methodical competence formation. This is due to the requirements to improve the quality of mathematical training. The author's interpretation of the essence of the concept of "methodological competence of the teacher of mathematics" is given, as well as the structural components of the methodological competence of the future teacher of mathematics are defined. The analysis of the received results of experimental work are carried out.

**Key words:** *methodological competence, mathematics, teacher*

## **1 INTRODUCTION**

Over the past decade, the system of teachers training in our country has undergone significant changes. One of the priority directions, providing modernization of pedagogical education in higher school, is the improvement of the content and forms of teachers training using information and communication technologies in the educational process [1,2,10]. It is the teacher who becomes the central figure in the implementation of various innovations in the educational process, and thus he/she

must have the necessary level of professional competence. Professional competence of the teacher of mathematics is a complex phenomenon, including readiness for professional activity on the basis of the created knowledge, abilities and skills, as well as possession of a number of professionally important personal qualities. The methodical competence of the teacher has a special place in the professional competence, which is manifested in the methodical activity, considered as a separate type of independent professional activity. The problem of methodical competence formation of the future teacher of mathematics is particularly significant in the context of the competence-based approach, when models of methodical competence as a professional and personal quality of the future teacher and methods of its effective formation are not appropriately developed.

## **2 METHODS**

The following methods were used during the research:

- direct analysis and elementary-theoretical analysis, which showed that there is no unambiguous interpretation of the concept of "methodical competence of the future teacher", its essence and content that in pedagogical theory and practice;
- comparison, which allowed to establish similarities and differences in the interpretation of methodical competence, as well as to find common, which is inherent in several interpretations of this concept;
- synthesis – on the basis of which the author's interpretation of the essence of the concept "methodical competence of the teacher of mathematics" was made;
- induction, as a kind of inference from particular facts, provisions to general conclusions, which allowed us to identify the structural components of the methodological competence of the future teacher.

## **3 RESULTS AND DISCUSSION**

The authors interpret the concept of methodological competence in different ways, which leads to the conclusion about ambiguity in its definition and evaluation.

Researchers determine the methodical competence of a future teacher in the following ways:

- it is a system of knowledge on the construction of a discipline by a teacher: from the designing of curricula to different types of classroom and extracurricular activities [8];
- it is methodical knowledge, skills and professionally important personal qualities;
- it is a level education that allows to carry out pedagogical activities at different levels (theoretical, practical, creative) [14];
- it is a methodical education and mental outlook [12].

There is no unanimity in determining the structural components of the teacher's methodological competence. For example, it is believed that the main components of methodological competence are cognitive (as a system of methodological knowledge), praxiological (including methodological skills, axiological component as a set of values), motivational (involving motivational readiness to use methodological experience), reflexive (allowing analysis and self-analysis of activities), and personal (manifested in the self-realization of the teacher) components [13]. According to other researchers, the methodical competence of the teacher includes cognitive, activity and social-personal components [8]. Some researchers present methodological competence as a set of information, activity, communication and reflex-analytical substructures [5].

As shown by the analysis of various sources, the methodical competence of the teacher is a complex pedagogical category, considered in the systemic unity of its components. With all the variety of different points of view on the nature and structure of the methodical competence of a teacher, some common components can be identified: motivational, cognitive, evaluative-diagnostic and reflexive.

In our research methodical competence of a teacher of mathematics is considered as an integrative professional and personal characteristic reflecting the ability to professional pedagogical work and including the following components:

- the ability to identify methodological problems – the future teacher should know the teaching methods, clearly define their attitude to various methodological systems, have his own individual methodological style. Also, he should be able to detect and solve methodological problems in accordance with the achievements of modern science and practice;
- the knowledge of methodical literacy and thinking – the future teacher of mathematics should be able to carry out teaching activities in accordance with the scientific achievements of the methodology of teaching mathematics; the educational process should be considered by the teacher not only as a cognitive process, but also constructively transformative, when the teacher comprehends various educational situations, selects the most effective and implements its;
- the possession of modern pedagogical technologies is a component of methodical culture of the teacher and a guarantee of successful activity. A special place is given to information technology training – a powerful means of increasing productivity of mental labor, allowing to find fundamental solutions to urgent pedagogical problems and ensure optimal management of the educational process [4] .

On the basis of the structural components analysis of the methodical competence of the future teacher, we have identified the following structural components, which, in our opinion, most fully reflect the semantic characteristics of this concept:

- motivational and value component, involving a positive emotional attitude to teaching in general, a conscious need for it;
- gnostic component, considered as a system of knowledge, skills, the formation of the necessary qualities of a mathematics teacher for cognitive activity;
- operational-activity component, including forms, methods, techniques, learning technologies;
- reflective component, suggesting awareness of the meaning of the teacher's own teaching activities, the degree of its development, the need for constant self-development.

## **4 SUMMARY**

The levels of methodical competence of the teacher of mathematics are determined in different ways. For example, some researchers distinguish six levels: knowledge, comprehension, application in standard situations, analysis, synthesis, evaluation [7,8]. Others believe that there are three levels of methodological competence of the teacher of mathematics: the adaptation of knowledge and solutions to problems, which owns a mathematics teacher, in new pedagogical situations; search for new solutions in known situations; development and implementation of new solutions for a particular situation [9].

Levels of methodical competence of the teacher of mathematics in our study are as follows: the ability to identify methodological problems, methodical literacy and thinking, methodical skill and methodical creativity.

As shown by the analysis of various sources, the formation of methodical competence of the future teacher uses different approaches:

- cognitive approach – the educational process is based on a practical problem, then it is considered as a scientific study [3];
- system-activity approach – ensures the formation of the teacher's ability to organize the educational process through the transformative activities of students, to teach students to choose new ways of action and implement them in the course of project, research activities is considered as one of the most important components of its methodological competence [9, 12].
- block-modular approach – the methodical system based on this approach integrates disciplinary (subject) and object (modular) training [11];
- project approach – methodical competence of the future teacher is formed as a result of project activities using the capabilities of computer mathematical systems (computing and graphics capabilities, mathematical modeling).
- competency-based approach – methodical component of professional-pedagogical competence of a mathematics teacher is considered as one of the main, formed in the actual mathematical (mathematical analysis, geometry, algebra) and methodical

cycles (theory and methods of teaching mathematics, pedagogical practice, elective methodical courses) and is presented as a set of competencies that allow effective use of software at various stages of teaching mathematics [6, 11].

In our study, the formation of methodological competence of future teachers is based on the integration of several approaches:

- competence-based approach allows to determine the structural components of the methodological competence of the future teacher of mathematics, formed in the process of vocational education.
- personal-activity approach involves the choice of methods of management of the process of formation of methodical competence of the future teacher of mathematics, resulting in the formation of methodical literacy, methodological skills and the ability to methodical creativity.
- modular approach allows you to organize the entire educational process for the formation of methodical competence of the future teacher of mathematics on the basis of block-modular presentation of educational information;
- praxeological approach to the formation of methodological competence of the future teacher of mathematics involves the effective management of activities through its comprehensive self-analysis, self-esteem, conscious change of professional activity using various technologies;
- cybernetic approach ensures the optimization of the educational process, allows to find and use new forms and methods of training, effectively and efficiently absorb a large amount of information.

Despite the existence of various theoretical and practical developments devoted to the formation of methodological competence of future teachers, there is still a significant gap between the theory and practice of their implementation in the educational process of training future teachers in higher education. Therefore, further research task is to develop a model of methodical competence of the future teacher, the implementation of effective technologies of its formation in the system of higher education in the training of future teachers.

## **5 CONCLUSIONS**

Thus, methodological competence is an integral part of the professional competence of a teacher of mathematics. The author's interpretation of this concept, the identification of its structural elements will further develop a model of methodological competence of the future teacher, implement effective technology of its formation in the system of higher education in the training of future teachers.

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