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FACTORS FOR FORMING LOGICAL LITERACY IN MATHEMATICS TEACHERS

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ABSTRACT

This article presents the components of logical literacy and their definitions for developing logical literacy in future mathematics teachers. The article reveals the importance of the formation of the logical culture of future mathematics teachers, examines the main approaches to defining the concept of "logical culture", and shows the theoretical, methodological and applied aspects of the problem of logical science in the professional activity of a teacher. The author focuses on the search for effective conditions and effective psychological and pedagogical technologies, logical techniques, tasks and tasks that contribute to the formation of logical culture among future mathematics teachers in the process of professional training.

Keywords: Logical literacy, linguistic (logical-linguistic literacy), deductive (logical-deductive literacy), methodological (logical and methodological literacy).

Mathematics is one of the oldest and most developed subjects. Mathematics is the basis of knowledge of the world, and it is of great importance in revealing the specific laws of the events around us. We all know that the science of mathematics develops a person's worldview, expands his thinking, teaches him to think correctly, draw correct conclusions, trains the mind, develops attention, educates perseverance and will.

Logical literacy occupies a very important place in the process of training future mathematics teachers. A number of great scientists in the study of problems of a logical nature that arise in the teaching of mathematics at school and higher education institutions: VGBoltyansky, AV, Gladkiy, BV Gnedenko, GV, Dorofeyev, LA Kalujnin, AN Kolmogorov, LD Kudryavsev, VL Matrosov, AI Markushevich, F Contributed by Klein, D. Poya, H. Freudenthal, AY Hinchin, and others.

If we clarify the concept of logical literacy of future mathematics teachers, the term literacy is understood in three senses:

As a specific stock of knowledge acquired during training; such as acquiring certain knowledge necessary for an activity; transfer necessary knowledge to someone for some reason; train someone for a specific activity; such as training in a field of knowledge.

Accordingly, the logical literacy of future mathematics teachers (students of the mathematics faculty of pedagogical HEIs) means the formation of a set of knowledge and skills of students, which includes knowing the basics of modern mathematical logic and creating a scientific basis for the logical component of the school mathematics course. We understand the purposeful, pedagogically organized and professionally oriented process;

Reading and future mathematics includes skills (logical-linguistic and logical-deductive methods) of practical importance for teacher's work.

The logical development of students can occur as follows:

a) spontaneously, that is, in the process of learning various mathematical subjects without a special plan or system;

b) controlled, specially organized, appropriate - within the framework of appropriate courses that involve the study of mathematical logic.

In the process of studying mathematics, students develop certain logical knowledge and skills to one degree or another. A logical component is also present in mathematical language and in mathematical proofs: mathematical discourse necessarily uses logical conjunctions and quantifiers, and the sentences that make up the proofs are inevitably logically related. However, the formation of logical knowledge and skills is spontaneous, that is, it is not specially organized and planned, but occurs due to the internal reasons of teaching science.

At the same time, the future mathematics teacher training system includes a number of courses that directly provide the study of mathematical logic: an introductory course in mathematics, a course in mathematical logic, special courses in mathematical logic, methodical courses in logical content. Within the framework of these courses, special exercises on mathematical logic, that is, organized, goal-oriented, planned and systematic formation of logical knowledge and knowledge of students are carried out. It is this kind of teaching that is considered as a logical preparation of future mathematics teachers in pedagogic HEIs.

Accordingly, we can define the following three components of logical literacy of students of educational higher education institutions:

1) linguistic (logical - linguistic literacy); 2) deductive (logical-deductive literacy); 3) methodological (logical and methodological literacy).

The main goals of logical-linguistic literacy:

– mastering a complex of knowledge and skills related to the logical component of mathematical language and formal logical languages;

– the ability to develop logical-linguistic reflection, logical-linguistic intuition and other qualities of thinking related to the logical component of linguistic activity in the process of teaching mathematics;

– to develop the logical culture of oral and written mathematical discourse to the extent necessary in educational and future pedagogical activities;

After logical-linguistic preparation, the student should know the following:

– to know tautology (in three ways), to implement equally strong transformations of formulas of the logic of reasoning;

– checking and comparing the simple formulas of the language of predicate logic to their common value, implementing equally powerful transformations of the formulas of the language of predicate logic;

– write meaningful mathematical sentences in the language of predicate logic and explain the formulas of the language of predicate logic, analyze the logical structure of mathematical sentences and definitions, turn the negative of mathematical sentences into a positive form.

Logical-deductive training of future mathematics teachers means teaching students knowledge and skills related to the deductive nature of mathematics, logical and logical-mathematical calculations (logical-deductive knowledge and skills). The main goals of logical-deductive literacy: acquisition of a complex of knowledge and understanding related to the deductive structure of mathematical theories, logical and logical-mathematical calculations; development of deductive thinking, in particular deductive reflection, deductive intuition, deductive heuristic skills.

To educate the logical culture of thinking and deductive activity at the necessary level in educational and future pedagogical activities; deductive character of mathematics, the essence of the axiomatic method, the essence of mathematical proofs, the formation of ideas about the role of the formalization method in clarifying and learning the concepts of mathematical proof and axiomatic theory.

As a result of logical-deductive preparation, students' knowledge: drawing up the simplest conclusions in the calculations of considerations and predicates (Hensen's type) and proving assertions about conclusions in logical calculations (Gilbert's type);

– determining the inferred scheme, i.e. formalizing the conclusion; to understand simple correct and incorrect conclusions and judgments using the tools of predicate logic, to identify and reveal the nature of logical errors in judgments;

– identify and analyze the logical structure of simple proofs; use of logical heuristic tools of search and construction of proofs;

– to distinguish effective and ineffective proofs of existence theorems; rules of proof from the reverse.

By logical-methodological training of future teachers, we mean teaching a set of knowledge related to the methodological character of mathematical antiquity. The main goals of logical-methodological literacy: acquisition of a set of knowledge related to learning the problems of the foundations of mathematics and the role of mathematical logic in solving them.

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