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***INTERSUBJECT CONNECTIONS OF COURSE OF MATHEMATICAL LOGIC
AND OTHER MATHEMATICAL COURSES AT PREPARATION OF FUTURE
TEACHER OF MATHEMATICS***

Sinko Yu.I.

Kherson State University

In this article the interconnections of course of mathematical logic with other mathematical courses – geometry, algebra and theory of numbers, mathematical analysis, and also with the courses of mathematics teaching methodology, history of mathematics in the system of preparation of teachers of mathematics in pedagogical Institute of higher education are analyzed. The presence of connections between the elements of the system and their quality is the important description of the pedagogical system.

Keywords: *system of preparation of teachers of mathematics, mathematical courses of pedagogical Institute of higher education, logic, mathematical logic, methodical system.*

Actuality

The course of mathematical logic and theory of algorithms of pedagogical Institute of higher education is the centre of logical preparation of future teachers of mathematics and should put the fundamental bases of logical culture of future teacher of mathematics. For this purpose it should be in the framework of general educational process in Institute of higher education and teach a student to be the teacher of mathematics and effectively to use the logic as didactic instrument in the process of teaching of mathematics.

Raising of problem

The course of mathematical logic and theory of algorithms is in the most tearing away from the real necessities of future teacher of mathematics, it is the least directed on his future pedagogical activity. It is torn off not only from the school course of mathematics but also is isolated from other pedagogical mathematical courses. There is contradiction between the content of course of mathematical logic of pedagogical Institute of higher education and its weak use in other mathematical and pedagogical courses of Institute of higher education. Exactly herein we see the main reason of inferiority of logical preparation of future teachers of mathematics, but as consequence there is a weak development of thinking and logical culture at their future students.

Analysis of researches

The main terms of professionally-pedagogical orientation of teaching in pedagogical Institute of higher education are described in works [1] [2] [3] [6]. Among them we select such: a) implementation of idea of connection of concrete mathematical course of pedagogical Institute of higher education with the proper school objects. In the work [5] the role of mathematical logic in the professionally-pedagogical orientation of preparation of future teachers of mathematics is described. There is marked that the course of mathematical logic should not be locked in the circle of abstract concepts, and should have a maximal output on school mathematics, expose to the analysis and comprehension of concept of this course, methods of reasoning and proof, expose to the detailed logic analysis the school courses of mathematics and informatics.

Description of basic material

In the work [2] V.I. Igoshin pays attention to such side professionally-pedagogical orientation of process of logical preparation of future teachers of mathematics as penetration of ideas and methods of logic in all mathematical and pedagogical courses of Institute of higher education. From the fundamental course of mathematical logic and theory of algorithms it is

necessary to build the logical branches in all of these courses, accenting attention of students in them on those questions which have a deep Boolean value. In each of these courses from positions of mathematical logic the proper axiomatic theories, lying in foundation of the proper mathematical discipline, should be considered. Such considerations will be the natural continuation of section the “Axiomatic theories” of course of mathematical logic and theory of algorithms. These mathematical grounds in natural way will extend in the grounds of the proper school educational mathematical discipline. Thus it is exceptionally important to analyze all of school course of mathematics from logical positions, both in the global aspect and in its separate particulars and details.

Exactly at such approach to the questions of logic students most distinctly and visibly will feel pervasive influence of logic on mathematics and the logical knowledge’s will be put up in foundation of scientifically-pedagogical world-view of future teacher of mathematics. Such approach to logical preparation, certainly, requires high professional readiness of teachers of pedagogical Institutes of higher education, considerable efforts from their side and co-ordination of their actions, but these efforts will result to the improvement of quality of preparation of specialists.

We turn the special attention on that at the study of course of mathematical logic, it is necessary to see the distinct connection of the studied concepts and methods with school mathematics, with the pedagogical activity of teacher of mathematics. The all-embracing, universal role of mathematical logic must be realized in the questions of explanation of mathematics in general and school course of mathematics in particular case.

Mathematical logic and geometry

Geometry – the unique section of course in pedagogical university and section of school courses of mathematics, in which the logic of mathematical science shows up most clearly. The concepts “theorem” and its “proof” are present on every page of textbook of geometry. And wherein there are mathematical assertions and reasoning, directed on its justification, there inevitably must be present the logic.

The section of course of geometry in pedagogical university, is called “Bases of geometry”, is fully devoted to the questions of axiomatic construction of geometry on the basis of the different systems of primary concepts and axioms. This section is also studied by students before the study of basic course of mathematical logic. Therefore in the course of geometry there is a lot of attention attend to the logical side of ground of geometry: to tell about essence of axiomatic method, about principles of choice of primary concepts and axioms, about properties of axiomatic theories, about independence of the system of axioms, about the models of the system of axioms and proof of independence with the help of models [2, p.234].

Mathematical logic and algebra

The school courses of algebra and beginnings of analysis, unlike the course of geometry, are logically organized not so strictly. The word “axiom” absents completely in them. The word “theorem” meets extremely rarely, about the logical structure of course doesn’t mentioned. The students, and quite often and their teachers have the impression, that algebra is not based on axioms, that in algebra we in general prove nothing, and we solve equalizations, inequalities and their system. Apparently, that axiomatic approach is not looked over in the school course of algebra, guilt of this course is not present. Possibly, it would be enough difficultly for a schoolboy. But, nevertheless, the teacher, teaching algebra at school, must have the distinct understanding that algebra is axiomatic theory, know, what axioms it is based on, have a clear picture of logical structure and this school course [2, p.265].

The course of algebra and theory of numbers, which is given in pedagogical Institute of higher education from the first semester of the first course, is begun with a theme, devoted to the mathematical logic and the set theory. Thus, the acquaintance of future teachers with the concepts of logic happens from the first days of their studies in Institute of higher education. In this course the followings questions, related to mathematical logic: utterances and Boolean operations above them; laws of logic (on the examples of laws of contraposition, eliminated third, contradiction and others); mutually reverse and mutually opposite theorems; proof from opposite; predicates and quantifier are examined.

In a modern school educational process the courses of both traditional and mathematical logic are still absent. The initial elements of mathematical logic are already included in the course of informatics. Nevertheless, for majority of students-freshmen the acquaintance with the elements of mathematical logic from the first lectures of course of algebra and theory of numbers is invention. Therefore the including of elements of mathematical logic in beginning of course of algebra and theory of numbers from point of the system of preparation of future teacher of mathematics should be considered as propaedeutic element before the study of basic course of mathematical logic and theory of algorithms on the third or fourth course of pedagogical Institute of higher education. Thus, at our view, the teaching of this section should as possible longer to remain at as possible more evident level. In the description of row of questions the preference should give up intuitional and evident presentations and moments, than to groundless formalization. A lot of attention and time should be attended to the logic analysis of expressive possibilities of human language, the transition from intuition to formalization appeared as possible more smooth, reasonably and rationally combining human and logical-mathematical languages. The mechanism of symbolic logic should be entered as a mean step-by-step, strengthening the logical intuition. As examples for the logic analysis the material of school course of mathematics and the current material of institute of higher education should be widely used. The creation of primary pre-conditions for forming of the logically prepared teacher of mathematics should become the primary purpose of this propaedeutic theme. The basic work in this direction will be continued in the basic course of mathematical logic and theory of algorithms [2, p.267].

Mathematical logic and mathematical analysis

In the course of a mathematical analysis logical-mathematical symbolism is extraordinarily widely and successfully utilized for the records of formulations of determinations and theorems, especially in the initial sections of analysis, devoted properties of sequences, limits of sequences and functions, continuity and other properties of functions et cetera [4]. Here logical symbolism helps to understand rather well mutual relations between numerous concepts. Thus, mathematical logic is included in a mathematical analysis, as symbolic language, operating formulations of this mathematical discipline.

Mathematical logic and mathematics teaching methods

Effective co-operation of these two disciplines is exceptional important for high-quality preparation of mathematics teachers. In the course of mathematics methodology landmarks, showing that there is logic in teaching of mathematics and in learning to discuss and think, must be distinctly and obviously placed. For this purpose the enough time is taken in this course to find out mathematical concept and how it is formed, what is mathematical assertion (axiom or theorem), how assertions are arranged and what are their types, what is deduction and proof, the methods of proof of theorems, what is a general logical structure of mathematical science. Finally, what is the teaching method of all these questions in the process of learning of mathematics. It is possible to say without an overstatement that these questions are most important in a general mathematics methodology. The essence of mathematical science is concentrated in them. A teacher, who is not armed by these fundamental bases, is helpless and unconvinced; he can not be the teacher of mathematics. A task of method in these questions is – to build a bridge from logic to mathematics and to watch after that it constantly is in the in good condition state, that logic become for the teacher of mathematics a major working instrument, promoting efficiency of his work, influencing on mental development of student [2, p.288].

Mathematical logic and history of mathematics

In the last course the role of logical constituent is exceptionally great. History of the most fundamental axiomatic method of organization of mathematical science, history of justification of mathematics on the different stages of its development are filled with logic and its problems, both internal and in connection with mathematics.

Conclusions

For the pedagogical system, at first, intersubject connections are instrumental in more complete opening of processes of origin and development of concepts, scientific theories, and also

methodical and historical aspects of this discipline, because many fundamental concepts and positions developed in the different areas of science or on the joint of sciences. Therefore illumination of intersubject connections conduces increase of scientific level in teaching. Secondly, intersubject connections are instrumental in perfection of teaching process in the sense of increase of its availability, activation of cognitive activity of students, development of interest to mathematics, overcoming of break between the institute of higher and school courses of mathematics.

The methodical system of teaching mathematical logic and theory of algorithms will be most effective if:

- 1) ideas and methods of mathematical logic will be distinctly selected and presented in all of mathematical courses of pedagogical Institute of higher education;
- 2) the logical grounds of the proper section of school course of mathematics will be analyzed in every mathematical course of pedagogical Institute;
- 3) in the course of the mathematics teaching method the logical-didactics aspects of teaching of schoolboys will be distinctly shown.

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