ABSTRACT
for the dissertation work of Tursunkulova Elmira Abdullayevna for the degree of Doctor of Philosophy (PhD) in the educational program "8D01510 – Mathematics"

Research topic: Formation of methodological preparation of future mathematics teachers for teaching geometric construction problems

The purpose of the study: to determine the theoretical foundations and develop a teaching methodology for the formation of methodological training of future mathematics teachers to teach problems on geometric construction on a plane based on interactive methods and ICT tools.

Research objectives:

1. To determine the current state of teaching problems on geometric construction in mathematical education and the continuity of the content of knowledge.
2. Determination of the directions, meaning and content of the methodological training of future mathematics teachers.
3. Development of a methodology for the formation of methodological training of future mathematics teachers based on the use of interactive methods and ICT tools in the organization of the learning process for non-geometric construction tasks.
4. The introduction of the developed methodology into the educational process and conducting a pedagogical experiment to verify its effectiveness.

Research methods:

-theoretical (analysis of social, psychological, pedagogical and scientific-methodical literature, analytical review, generalization, comparison, etc. in order to determine the theoretical and methodological basis of the study);

- empirical (survey of teachers and students, conversation, pedagogical observation, analysis of normative documents, analysis of the results of a pedagogical experiment);

- statistical (analysis of the results of acquiring knowledge about the organization of educational activities of students, processing from a mathematical and statistical point of view).

Basic principles recommended for the thesis defense **(proven scientific hypotheses and other conclusions that are new knowledge)**

- theoretical foundations and directions of methodical preparation of students of mathematics for teaching geometric problems for construction;

- the meaning and content of the formation of methodological preparation of students of mathematics for teaching geometric problems to build;

- interactive ICT methods and tools for teaching mathematics students the subject "Geometric construction problems";

- the methodology of methodical preparation of students of mathematics for teaching geometric problems for construction on a plane and the result of a pedagogical experiment proving its effectiveness.

Description of the main results of the study

During the analysis of scientific, psychological, pedagogical and educational literature: the concept of methodological training of a future mathematics teacher is clarified, the definition of the concept of methodological training of a mathematics teacher is given, and the requirements for teaching students geometric problems to build (the fundamental nature of the acquired subject knowledge, the connection with the school mathematics course) are determined. The role of construction tasks in the school geometry course and the importance of teaching geometric construction tasks in the formation of methodological skills of future mathematics teachers (formation of spatial representations, development of logical and active thinking based on constructive skills, systematization of theoretical and didactic knowledge on geometric construction tasks), goals and objectives of the organization of the methodological educational process for future mathematics teachers are determined pedagogical universities, the current state is analyzed.

An analysis of the current state of teaching geometric construction tasks in schools and pedagogical universities has shown that:

- with the current academic freedom of universities, there is a gap between the methodological process of preparing bachelor of mathematics and teaching geometric construction problems in a school geometry course, that is, continuity between school and university is not taken into account;
- the content of most OP does not provide sufficient theoretical and methodological training for teaching problems of geometric construction to future mathematics teachers;
- lack of internal communication, continuity, consistency between the tasks of geometry subjects and subjects of the methodological cycle (subjects of students' choice) in higher educational institutions;
- that textbooks and teaching aids (especially in the state language) are not enough to form students' skills to solve geometric construction problems.

The role and importance of geometry construction tasks in the school course and the lack of theoretical and methodological justification for the methodical preparation of mathematics teachers for its teaching have revealed the relevance of research work.

In order to implement the continuity of the content of "Geometric construction problems" in school and university, a structure has been developed for linking the content of the subject, teaching and evaluation of geometric construction tasks in the "school-university continuity". The principles and main directions of methodological training of future mathematics teachers are defined: the system of pedagogical activity, personality-oriented learning, the implementation of intrasubject and interdisciplinary connections, the principles of the learning process are systematized, the stages of methodological training of future mathematics teachers are developed.

Requirements for the process of formation of methodological training of future teachers of mathematics: the fundamental nature of subject knowledge; the connection of geometric disciplines taught at the university and the school geometry course; the implementation of systematic control and correction of methodological training of future teachers of mathematics; taking as a basis the main didactic

functions of geometric tasks for construction; the principles of the process of formation of methodological training of future teachers of mathematics. The theoretical foundations of the formation of methodological preparation for teaching geometric construction tasks to future mathematics teachers are determined.

The theoretical and methodological structure is defined and the methodology of teaching "Geometric construction problems" is developed. During the implementation of methodological training on teaching geometric construction problems of future mathematics teachers, the purpose, tasks and content of the subject " Geometric construction problems" were selected in continuity with the school geometry course, focused on the methodological features of the future professional activity of mathematics teachers.

The basic principles of the organization of the educational process of the subject " Geometric construction problems" are revealed, such as orientation, scientific, systematic, visual, active learning, clarity, differentiation and individualization, problem-based learning, etc.

The methodology of preparing future mathematics teachers for effective teaching of geometric construction problems on a plane was considered in two directions: the method of teaching students to choose effective methods for solving geometric construction problems in accordance with the condition of the problem; the formation of students' methodological skills in organizing research activities in solving geometric construction problems.

The formation of the methodological training of future mathematics teachers was based on the use of "ready-made" proposed solutions to geometric construction problems (schemes) and the creation of similar problems.

Lexicographic methods, formulation of one task in several contents, assignment of different values to the parameter value of a given element or changing the value of a given number to another value were used to prepare students for composing tasks similar to a given geometric construction task..

Three components are identified that are necessary when performing the research period in geometric construction tasks*: determining the conditions for the existence of a solution to the basic construction tasks, determining the conditions for the existence of a solution to the problem due to the location of geometric shapes (point, line, circle), determining the features of the research period when solving geometric construction tasks in different ways.*

Interactive methods (brainstorming, reference notes, "think, parry, think" methods and level-based learning, problem-based learning technology) and computer learning tools ("GeoGebra", "1c":Mathematical constructor") were used to teach future mathematics teachers geometric construction tasks.

A method of teaching students to choose effective ways to solve geometric construction problems in accordance with the conditions of the problem is proposed.

In the process of teaching geometric construction tasks, the formation of practical skills of students, the methods of solving construction tasks and the methodological features of their use were determined.

Tasks were given on the system of tasks and methods of constructing tasks similar to geometric construction tasks to improve the methodological training of future mathematics teachers, their solutions and evaluation criteria were presented.

In higher educational institutions, which are experimental bases of research, the content of the subject "Geometric construction problems" and the methodology of its teaching were included in the educational process, and its effectiveness was confirmed by pedagogical experiments.

Novelty and significance of the results obtained**:**

1. The analysis of the current state of teaching geometric construction problems in mathematical education has been carried out and the structure of the implementation of the "school-university" continuity in the preparation of future mathematics teachers for teaching geometric construction problems has been developed;

2. The concept of "Methodological training of future mathematics teachers" has been clarified, the directions, meaning and content of its formation have been determined;

3. Based on the use of interactive methods and ICT tools in the organization of the learning process for geometric construction tasks, a methodology for the formation of methodological training of future mathematics teachers has been developed;

4. The subject "Geometric construction tasks" has been introduced into the educational process, and the effectiveness of the developed teaching methodology has been proven during a pedagogical experiment.

Compliance with the directions of scientific development or government programs:

The topic of the dissertation is described in accordance with the main directions specified in the Law of the Republic of Kazakhstan "On Education" and the Concept of Development of Higher Education and Science in the Republic of Kazakhstan for 2023-2029, as well as in the state mandatory standards of higher and postgraduate education.

The contribution of the doctoral student to the preparation of each publication (the contribution of the author of the dissertation is indicated, measured as a percentage of the total volume of the publication):

The main results of the research work, the content of theoretical and practical scientific results were published at international scientific and practical conferences, in scientific publications recommended by the Committee for Quality Assurance of Science and Higher Education of the Ministry of Science and Higher Education of Republic of Kazakhstan, in journals included in the Scopus database:

1. Applying Dynamic Geometry Environment Software as a Visualization Tool for Teaching Planimetry Construction Tasks // International Journal of Information and Education Technology. – 2023. - 13(12). -1950-1958 p. E-ISSN:2010-3689.(co-author: Madiyarov N.the proportion of doctoral students- 90%).

2. The Effect of Problem-Based Learning on Cognitive Skills in Solving Geometric Construction Problems: A Case Study in Kazakhstan // Frontiers in Education. Sec. STEM Education. – 2023. - 8(22). – 1-19 p. ISSN:2504-284X (co-

authors: Madiyarov N., Sultanbek T., Duysebayeva P.**the proportion of doctoral students**- 70%).

3. Салу есептерін шығаруда осьтік симметрия әдісін пайдалану// «Қазақстанның ғылымы мен өмірі атты Халықаралық ғылыми журналы. – 2020. - №5 (1). 413-416 б. ISSN 2073-333X.(co-author: Мадияров Н.К. the proportion of doctoral students - 90%).

4. Мектеп геометрия курсында салу есептерін оқытудың әдістемелік ерекшеліктері//Ясауи Университетінің хабаршысы ғылыми журналы. –2022. - №2 (124). – 276-288 б.(co-author: Пралиева Р.Е. the proportion of doctoral students- 90%).

5. Болашақ математика мұғалімдерін даярлау үдерісіндегі геометриялық салу есептерін оқытуды жетілдіру//Ясауи Университетінің хабаршысы ғылыми журналы. – 2023. №2 (128). – 251-266 б. (co-author: Мадияров Н.К. the proportion of doctoral students- 90%).