

ANNOTATION

For the dissertation of Omarova Indira Musakhanovna on the theme
"Improving the project-research activities of future mathematics specialists in the process of studying the theory of limits" to obtain the degree of PhD in the specialty 6D010900 - Mathematics

Relevance of research.

The Message to the people of the President of the Republic of Kazakhstan Nursultan Nazarbayev "The third modernization of Kazakhstan: global competitiveness" from January 31, 2017 clearly states: "First of all, the role of the education system must change. Our task is to make education the central link of the new model of economic growth. Curricula should be aimed at developing critical thinking abilities and independent information retrieval skills".

The Law "On Education" of the Republic of Kazakhstan states: "The main task of the education system is to create the necessary conditions for education, aimed at the formation, development and professional formation of individuals on the basis of national and universal values, scientific achievements and practices, informatization of education, access to international global communication networks.

Therefore, at present, one of the main tasks of higher education institutions is to train future specialists to carry out search work, design and research work independently.

In this regard, improving the methods of teaching the discipline of mathematical analysis (the theory of limits, which is part of this discipline) in higher education institutions, the search for effective solutions to these problems is one of the pressing problems of the present time.

The level of research on the topic: In connection with the question of improving the design and research activities of students in the country recently, the following areas of research development can be seen:

- aspects of training of future teachers from the didactic and methodological, educational point of view (B.Baimukhanov, D.Rakhimbek, A.K.Kagazbaeva, E.U.Medeuov, A.U.Medeuov, etc.).Nugysova, K.B.Zharykbaev, S.Kaliev, K.J.Kozhakhmetova, S.A.Uzakbaeva, K.Boleev, U.M.Abdigapbarova, N.D.Khmel, B.K.Mominbaev, A.A.Kalybekova and others);

- -issues of teaching mathematical analysis and training of teachers (O.Satybaldiev, S.M.Seyitova, J.M.Nurmukhamedova, M.V.Vasilyeva, T.I.Chessatova, etc.) and others have been studied in the works of modern scientists, solutions to improve the quality of students' knowledge with the use of developing learning process have been proposed.

- - in the works the questions of activation of research activity of students in the process of training (A.E. Abylkasymova, T.S. Sabyrov, R.S. Omarovai, etc.) are considered.

- In the works of J.Dew, U.H.Kilpatrick, E.Collings, T.A.Novikova, V.I.Slobodchikova etc. are given philosophical and methodological bases of the organization of training using the design method.

In the works of M.A. Gavrilova, V.M. Monakhov, E.S. Polat, N.Y. Pakhomova and others the peculiarities of the design method are investigated.

The works of E.Yu. Barkova, M.G. LaPerdina, O.E. Lomakina, V.V. Nikolina, P.A. Petriakov, I.S. Sergeev, G.A. Fedorova, I.D. Chechel and others are devoted to the use of design method in training of different disciplines.

S.M.Bakhisheva considered the scientific and theoretical bases of designing in management of pedagogical systems in her works.

In the works of I.S.Tulokhonova, Yu.A.Sokolova, taking into account the peculiarities of academic disciplines, the tasks of forming the training of future teachers of mathematics through training design method.

Different points of view in understanding the basic concepts of design and research activities of future teachers of mathematics in teaching the discipline of mathematical analysis put organizations in the application of this design method in practice. Especially in the definition of concepts such as the activities, design and research of future mathematics teachers, there is haphazardness and some misunderstanding.

Such notions are often found in pedagogy: "activity", "teaching activity", "research activity", "teaching and research activity", "creative activity", "project activity", "project and research activity", etc.

Thus, it is noticeable that the meaning and content of the concept "design and research activity of students" has not been disclosed, the analysis of special aspects of this activity has not been studied.

In assimilation of information, depending on the approach of application, there are two types of educational and cognitive activity: reproductive activity (updated) and productive (creative) activity.

In connection with the creative individuality of students Yu.K. Babansky suggested dividing the organization and implementation of educational and cognitive activities into two types: reproductive activities and activities of problem search.

According to A.E.Abilkasymova, in educational activity educational tasks are solved through motive, cognitive activity, starting from the perception of information, ending with the formation of creative activity.

As a result of creative activity only creative abilities are developed. So, the most important goal of pedagogical creative search of a teacher is the development of cognitive thinking activity of a student, as well as the improvement of design and research activity through the mastering of creative search skills by students.

Although the psychological, pedagogical and methodical research work of the above scientists is extensive, the conditions and methods for improving the design and research activities of future mathematics teachers in teaching limit theory in higher education institutions have not eliminated their relevance.

Based on the research results, there is a need to improve the design and research activities of future teachers of mathematics.

Improvement of project and research activities of future teachers of mathematics is understood to mean the assimilation of knowledge through the inculcation of flexibility, modernization, search-and-engineering and creativity in them. The basic designations for the development of design and research activities of future mathematics teachers (flexibility, modernization, search-and-engineering and creativity) have so far found sufficient solutions and result in contradictions.

The availability and implementation of opportunities to improve the design and research activities of future mathematics teachers on the methodological side has not found a sufficient solution.

Still, on our research topic, we can see contradictions between the possibilities of improvement in the process of studying the improvement of design and research activities of future teachers of mathematics, the theory of limits and the need for their application and the lack of methodological support. This:

- Failure to consider the level of content of the theory of limits topics corresponding to the various design and research activities of future mathematics teachers;

- the need for a teacher-researcher to improve the design and research activities of future mathematics teachers and the lack of pedagogical, psychological and methodological support.

The search for the right solutions to the above mentioned contradictions, the definition of the problem and requirements of the modern educational system for the improvement of design and research activities of future mathematics teachers showed the relevance of our research work and became the basis for our choice of the topic: **«Improving the project-research activities of future mathematics specialists in the process of studying the theory of limits».**

Research objectives. Theoretical justification and formulation of methods for improving design and research activities in the process of teaching the theory of the limits of future mathematics teachers.

Object of research. Process of improvement of design and research activities of future teachers of mathematics.

Subject of research. Project research activities in teaching the theory of the limits of future mathematics teachers.

Scientific hypothesis of research. If the improvement of design and research activities in the process of teaching the theory of the limits of future teachers of mathematics is justified from the theoretical point of view, identified content and structure features and developed methods to improve design and research activities, then it is possible to prepare educated and competent, all internationally developed future teachers of mathematics, ready for scientific work.

The leading idea of the research: the improvement of design and research activities of future mathematicians in the process of learning the theory of limits from the theoretical and methodological point of view affects the improvement of their knowledge quality.

Research Objectives:

- To reveal the meaning of the concept of "design and research activities", to define the psychological and pedagogical basis for the improvement of design and research activities of future mathematics teachers;
- To identify approaches that improve project and research activities in the process of teaching the theory of the limits of future mathematics teachers;
- Creation of content and structure features and methods for improving design and research activities in the process of teaching the theory of the limits of future teachers of mathematics in higher education institutions;
- To test the effectiveness of the approaches for improving design and research activities in the process of teaching the theory of the limits of future teachers of mathematics in higher education institutions through practical experiments.

Research methods: the following methods have been used to solve these problems:

- Analysis of psychological, pedagogical, mathematical and methodical literature on the subject of the study;
- analysis of the results of assimilation of knowledge about design and research activities of future mathematics teachers on the research problem;
- conducting questionnaires and interviews, monitoring work with teachers and students, analysis of the results;
- analysis of university documentation and familiarization with the practice of teachers;
- organization, conduct of practical experiments and results management.

Methodological and theoretical foundations of the research: makes up a theory of action, a unified pedagogical process, inter-subject communication and theory of educational content, the concept of personally-oriented learning, the theory of developing learning and theories related to the content and methods of teaching mathematics in higher education, concepts of informatization of education, educational standards and other documents related to the field of education, pedagogical, psychological, methodological prerequisites for training of mathematics teachers in higher education.

Sources of research: works in the field of mathematics, pedagogy, psychology, philosophy on research issues; official materials of the Government of the Republic of Kazakhstan; normative documents of the Republic of Kazakhstan; President's Message "Strategy "Kazakhstan-2050": new policy course of the established state"; normative documents and teaching-methodical complexes (curricula, textbooks, teaching aids, etc.) related to education issues; scientific works in the field of scientific achievements and advanced experience of teachers.

Scientific novelty of research and theoretical significance:

- The importance of the concept of "research and development" and the role and significance of improving the research and development activities of future mathematicians are defined;
- Defines the goals and the need to improve the design and research activities of future mathematics teachers in the process of learning the theory of limits;

- Identifies effective methods to improve project and research activities in the process of teaching the theory of limits to future teachers of mathematics in higher education institutions;

- The necessity of teaching the theory of limits to strengthen professional pedagogical training in improving design and research activities of future teachers of mathematics and humanization of its pedagogical skills was established, effective ways of its application were proposed.

Practical importance of research.

- The methods proposed in the research work will have a good impact on improving the design and research activities of future mathematics teachers and on the quality of mathematical knowledge acquisition.

The results of the research to improve the design and research activities of future teachers of mathematics, increase cognitive activity, improve the quality of learning process can be used in institutes for improving the professional knowledge of teachers of mathematics, secondary schools, colleges.

Argumentativeness and validity of research results:

- Versatile analysis carried out on psychological, pedagogical, educational and methodical literature and teaching aids on the topic of the study and based on them in the process of research; logical application of methods with proof from the theoretical, methodological and practical point of view in accordance with the goals and objectives, objects, theoretical concepts, subject matter, experimental experiment; provided by the effectiveness of the theoretical concept, the use of methods corresponding to experimental results in the higher education institution to perfect the results of the study.

Basic principles proposed for protection

- The quality of improvement of design and research activities of future mathematics teachers in the process of learning the theory of limits is influenced by the levels of knowledge formation of flexibility, modernization, search and creativity.

- In the study of the theory of limits using the design method are related: the principles of choice of teaching materials, types of project work and conditions of their levels, the rules for determining the level of knowledge acquired individually by future teachers of mathematics, and, accordingly, proposed methods for improving design and research activities by levels.

- - The technique of perfection of design and research activity of the future teachers of mathematics in the course of training of the theory of limits will be developed and checked on the basis of pedagogical experimental works.

- Base of research: work on carrying out of researches, tests and its introduction into practice has been carried out among teachers of professors and students on a speciality 5B010900 - Mathematics, 5B060100 - Mathematics at faculty of Natural History of the International Kazakh-Turkish University named after KA.Yassawi and Regional Social Innovative Universities.

The main periods of research:

At the first stage (2016-2017) - theoretical analysis of philosophical, pedagogical, psychological, scientific and methodical literature on the research issues

was conducted. The scientific and conceptual apparatus of the research was prepared. The corresponding questions for the decision were defined, on their basis the primary level and directions are designated. The situation of the issue under study has been analysed in the practice of higher education institutions and a clarifying experiment has been carried out.

In the second phase (2017-2018) the analysis of curricula, programs, textbooks, teaching aids and the process of teaching the discipline of mathematical analysis was carried out. Pedagogical possibilities of improving the design and research activities of future teachers of mathematics in the process of teaching the theory of limits of the future teachers of mathematics of first year of university were studied; content and structure features and methods were prepared; practical and experimental work was carried out to establish the pedagogical conditions for improving the design and research activities of future teachers of mathematics of first year.

At the third stage (2018-2019) the results of practical experimental works were analyzed, the theoretical concepts were clarified, the dissertation was formalized, methodological recommendations were prepared to ensure the introduction into the practice of higher education institutions of the main results obtained on the establishment of didactic conditions for improvement of design and research activities of future teachers of mathematics in the process of teaching the theory of limits;

In the practical experiment, the activities of teachers aimed at improving the design and research activities of future mathematics teachers and the design and research activities of students were obtained as objects of control.

Discussion and implementation of the study results. 18 materials were published in accordance with the theme of the research work. From them: in editions of base Web of Science, Scopus - 1 scientific articles, in the editions offered by Ministry of Education RK- 8; also at the international scientific-practical conferences - 3 publications; at the foreign international scientific-practical conferences - 3 articles and in the scientific magazine of researchers 2 articles have been published. 1 educational and methodical manual was published. In the journal "Opcion" No. 88 (2019): 346-363 ISSN 1012-1587 / ISSN: 2477-9385 (Venezuela 2019); "Messenger" of the Kazakh National Pedagogical University named after Abai, series "Pedagogy", Almaty, 2017, № 3 (55); Toraigyrov "Pedagogy" series, Pavlodar, 2017, No. 3; Bulletin of West Kazakhstan State University named after S. Toraigyrov, Almaty, 2017, No. 3. M. Utemisov West Kazakhstan State University, Uralsk, 2017, No. 3 (67); Herald of the S. Toraigyrov West Kazakhstan State University, Pavlodar. M. Utemisov West Kazakhstan State University, Uralsk, 2018. № 2; in the scientific journal "Herald of the Khoja Ahmet Yasawi University", series "Pedagogy", Turkestan, 2019; in the journal "Science and Life of Kazakhstan", series "Pedagogy", Nur-Sultan, 2019, № 8/2. In the journal "Science and Life of Kazakhstan" series "Pedagogy", Nur-Sultan, 2020, №1; Proceeding of the V Congress of the Turkic World Math. "Issyk-Kul Aurora", 2014; Proceedings of the International Scientific Conference "Theoretical and Applied Problems of Mathematics, Mechanics and Informatics", Karaganda, 2014; Proceedings of the International Scientific

Conference "Modern Problems of Mathematics, Mechanics and Informatics" dedicated to the 25th Anniversary of Independence of the Republic of Kazakhstan, Karaganda, 2016; International Scientific Journal Science, Business. Society, Sofia, Issue 3/2017; International Scientific Conference "Problems of Modern Continuing Education: Innovation and Prospects", Tashkent, 2018; Proceedings of the International Scientific Conference "Problems of Differential Equations, Analysis and Algebra", Aktobe, 2018; Journal "Herald of the Khoja Ahmet Yasawi University", Turkestan, 2017; International Scientific Journal Science, Business. M. Auezov SKSU, Shymkent, 2019; Textbook "Theory of Limits and Asymptotic Decomposition". -Turkestan "Alem" 2017.

The results of the research work, according to the plan, were presented and at scientific-practical seminars at the Department of Mathematics, Faculty of Natural History of the International Kazakh-Turkish University named after K.A.Yassawi, the analysis of the work was carried out.

Structure of the thesis: the dissertation work consists of normative references, references, introduction, two chapters and conclusion, list of used literature and appendix.

The introduction is based on the topicality of the research topic, determines the research objectives, determines its object, hypothesis and objectives, describes research methods, scientific novelty and practical significance, sets out the proposed principles for protection, also sets out information on the verification and introduction of the results achieved, a summary of the thesis.

The first chapter 1) analyzes the state of improvement of design and research activities of future teachers of mathematics in higher education institutions: here it is stated that the formation of knowledge on improvement of design and research activities of future teachers of mathematics has not yet found a sufficient solution.

2) It is established that the quality of improvement of design and research activities of future teachers of mathematics in the process of teaching the theory of limits in higher education institutions is influenced by the level of formation of their knowledge of flexibility, modernization, search-and-execution and creative activity.

The second part 1) Formulates the main features of knowledge to improve the design and research activities of future teachers of mathematics in the process of learning the theory of limits.

2) Teaching the theory of limits is associated with the use of the design method: respectively, the principles of choice of teaching material, types of design works and their level conditions, rules for determining the degree of knowledge acquired by future teachers of mathematics, and, accordingly, methods for improving the level of design and research activities.

3) During the research work, experimental works were carried out to establish the signs of formation and determination of the level of knowledge to improve the design and research activity of future mathematics teachers in the process of studying the theory of limits.

In conclusion, the results of the work carried out to establish the impact of knowledge on improving the design and research activities of future teachers of

mathematics in the study of the theory of limits and specific proposals, conclusions on the application of the search work carried out further on the topic of research.

The appendix contains the acts of implementation of the results of the research works.