

on the dissertation work for degree of Doctor of Philosophy (PhD) in specialty 6D010900 – Mathematics Yerlan Seilkhanovich Khaimuldanov on the theme «Methods of organizing students ' educational activities using tests when teaching mathematics»

ANNOTATION

Relevance of the study.

Modern society needs educated, moral, enterprising specialists who make decisions independently in difficult life situations, are able to work in a team, have mobility, constructiveness and are ready to constantly develop their professional qualities. In the context of integration of public, educational processes and access to information, competitive specialists have become in demand in the world.

K. K. Tokayev touched upon the issue of science development and held "here we need a fresh look, new approaches, reliance on the international version" " Significant socio-economic and political transformations that have emerged in the last decade in the Republic of Kazakhstan have received for their need to review the whole task of preparing future specialists for professional activity in his Address to the people of Kazakhstan dated September 1, 2020, the President of the countries. In the context of modernizing and reforming the system of high education, an integral indicator of the quality of a future specialist's subgroup should be professional competence, which more fully reflects the full range of requirements that society and the state have for a specialist of the XXI century. In this regard, one of the priority tasks of higher education is to train a qualitatively new, competitive, competent, highly qualified specialist with broad fundamental knowledge, initiative, able to independently and creatively approach professional tasks, able to quickly adapt to the constantly changing requirements of the labor market.

The Law of the Republic of Kazakhstan "On education" States that "one of the main tasks of the education system is to create conditions for the development of educational programs." One of these conditions is the didactic provision of the educational process.

At the same time, due to the needs of modern society, new values are introduced into the education system and a national model of education is being formed. In this regard, it is necessary to review the content of high-quality education and upbringing aimed at developing a talented person who is ready to interact in the world. And raising it to a new quality becomes a public problem.

The "Education development Program for 2011-2020" says that " the Main goal of today's education is not only a system of knowledge, skills and abilities, but also the ability to apply this knowledge in life, self-education, and the ability to live and work effectively in a changing world."

Mathematics plays an important role in the formation of General and particular personal qualities. Mathematics teaches students to optimize their

actions, make decisions and check actions, correct mistakes, and distinguish between reasoned and unproven conclusions.

Such scientists and methodologists as V. V. Davydov, Yu. K. Babansky, G. I. Sarantsev, V. A. Gusev, O. P. Lapchik, V. A. Dalinger, and others, as well as Kazakh scientists A. E. Abylkasymova, A. K. Kagazbayeva, E. Y. Bidaybekov, T. O. Balykbayev, S. K. Kenesbayev, A. N. Nugysova, A. K. Rakhymbek, O. Satybaldiev, B. D. Sydykov, and S. E. Chaklikova were engaged in research of educational organization student activities.

Methodological basis of the research work were discussed in the works of such scientists as E. S. Bidaibekova, B. R. Kaskataeva, K. Arykbaeva, B. K. Kenzhebekova, R. O. Scientists, Kozhabayev K. G., N. D. Hops and others.

Theoretical and practical aspects of the organization of students' educational activities in teaching mathematics in our country and the professional qualities of teachers have been studied by such scientists as B. R. Kaskataev (formation of the competence of future mathematics teachers), B. K. Kenzhebekov (professional competence of future specialists in the higher education system), S. I. Ferkho (competence of teachers to use electronic textbooks in the educational process), K. G. Kozhabaev (use of educational and developmental opportunities of the mathematics course at school in training future teachers), etc.

The following scientists as T. S. Sadykov, A. E. Abylkasymova in the work "Modern didactics" believe that the student's activity in the educational process is cognitive in nature, and the effectiveness of training, in General, is related to the corresponding abilities of the teacher to organize the educational process based on the basic laws of the student's cognitive activity.

Significant conditions for organizing the development of students' learning are shown in the works of famous psychologists such as D. N. Bogoyavlensky, L. S. Vygotsky, L. V. Zankov, S. L. Rubinstein, D. B. Elkonin, and others, since it is necessary to know the psychological patterns of students' mental development.

In their works, Kazakh scientists were engaged in methods of evaluating and controlling students' knowledge (A. E. abylkasymova), introducing new effective methods and teaching tools into school practice (B. B. Baimukhanov), monitoring and accounting for University results (L. T. Iskakova), developing theoretical models of teaching and learning mathematics (K. G. Kozhabaev), forming logical thinking of students by solving problems (S. M. Seitova), developing methods of mathematical thinking of students in secondary schools (E. Zh. Smagulov).

Indicators of quality of teacher test items considered in the work, leading scientist in education: B. C. Avanesov, A. N. Mayorova, Yu. M. Neumann, A. I. Smilovskeho, V. A. Khlebnikov, B. M. Chelyshkov, Smagulov E. Zh. E. V. Solonin considered testing as a tool to control the process of formation of system of quality education of students in mathematics, T. Y. Novichkova studied the theory and methodology of using tests in teaching mathematics to schoolchildren.

The dissertation work is devoted to the methodological features of assessing the quality of students' knowledge in mathematics using test tasks.

Important components of the organization of students' learning activities through testing in the learning process have been studied separately, but they are not reflected in important didactic categories, and the system and methods of forming students' thinking have not been transformed. The question of the role of the task of forming and developing students' thinking, the possibility of effective influence on the depth, breadth, rationality, uniqueness of thinking through the use of test tasks at different stages of training, etc. has not yet been sufficiently studied.

Thus, insufficient knowledge of the methodological foundations of the organization of students' education through testing in mathematics hinders the development of a unified theory of teaching and learning mathematics, which significantly affects the practical work of schools in our country and the quality of knowledge, skills and abilities.

The introduction of new technologies for teaching and evaluating knowledge increases the interest of teachers in testing. The testing system, which is one of the many pedagogical innovations, allows you to objectively assess the level of knowledge, skills and abilities of students, check the compliance of training requirements with these standards, and identify complex issues in the training of students.

The process of organizing students' learning activities through tests when teaching mathematics requires that each high school and College graduate be more purposeful, methodologically and methodologically sound for optimal adaptation to modern industrial and social processes.

In this regard, there is a **contradiction** between the need to prepare an educated, qualified, intellectual generation that thinks creatively, and the lack of knowledge of the methodological foundations of the organization of the educational process of students through testing in mathematics. The revealed contradictions created the task of our research to substantiate the methodology of organizing students' educational activities through tests in the process of teaching mathematics.

In the context of the transition to the updated content of school education in our country, the research topic "**Methods of organizing students' educational activities in teaching mathematics through testing**", dedicated to the study of the theoretical and pedagogical significance of methods of organizing students' educational activities in the process of studying mathematics through testing, is reasonably chosen and relevant.

The aim of the research is to develop a methodology that determines the features of the organization of students' educational activities in the process of teaching mathematics through testing.

The object of the study is the process of teaching mathematics in high school.

The subject of the research is the method of using test tasks in the organization of students' educational activities.

Scientific hypothesis of the research: if we theoretically substantiate the features of the organization of students' educational activities when teaching mathematics and develop a systematic scientific methodology, the quality of students' knowledge will increase.

In accordance with the **purpose** of the study based on the research hypothesis the following tasks were defined:

1. psychological and pedagogical justification of the organization of educational activities of students;
2. identify the features of creating test tasks when teaching mathematics;
3. Development of a systematic approach to the organization of educational activities when teaching mathematics using tests.

Method of research:

- analysis of psychological and pedagogical literature in order to determine the theoretical and methodological basis of the study;
- monitoring the results of obtaining knowledge about the organization of students' educational activities using tests;
- questionnaires and interviews with students and teachers, control tests, analysis of results;
- organization, conduct and processing of experimental results.

The methodological and theoretical foundations of the research are knowledge, effective methods of organizing the individual and its activities, psychological and pedagogical theories and concepts, theory and methodology of teaching mathematics, research on the use of information technologies in the educational process, and pedagogical, psychological, and methodological basis for organizing students' educational activities through tests to improve the quality of knowledge.

Sources of research: The Law of the Republic of Kazakhstan "on education", state mandatory standards of General secondary education of the Republic of Kazakhstan, the program for the development of education of the Republic of Kazakhstan, the President's Message to the people, documents on education, fundamental works of methodologists and teachers.

Scientific novelty and theoretical significance of the study:

- the meaning of the concept of educational activity and its components, the organization of educational activities of students are justified from a psychological and pedagogical point of view;
- the features of creating test tasks when teaching mathematics are revealed;
- a systematic method of organizing educational activities in teaching mathematics using tests has been developed and ways of its effective application have been proposed.

Practical significance of the research: the method of organizing students' educational activities in the process of teaching mathematics, proposed in the research work, contributes to the qualitative assimilation of knowledge. In order to increase students' cognitive activity and improve the quality of the educational process, the collected test variants can be used by high school math teachers and students.

The reasonableness and validity of the research results is due to the correspondence of the scientific apparatus of the research to the goals and objectives, forms, subject of research, a comprehensive analysis of the research progress on the research topic in mathematical, psychological, pedagogical, educational literature and textbooks; logical application of methods in accordance with experimental results, processing of practice results by mathematical statistical methods.

Recommended principles for the protection of:

1. the organization of educational activities of students is psychologically and pedagogically justified;

2. the features of creating test tasks for teaching mathematics are identified and presented;

3. developed and tested on the basis of experimental work, a systematic methodology for organizing educational activities in teaching mathematics through testing.

Research base: research and testing, as well as implementation in practice of the results of research work carried out in secondary schools: Aksu district: municipal state establishment "Secondary school-gymnasium named after K. I. Satpayev", municipal state establishment "Secondary school named after Zh. Sydykov with preschool mini center"; Karatal district: municipal state establishment "secondary school named after A. S. Pushkin preschool mini-center"; Eskeldi district: municipal state establishment "Secondary school of a name of Titov with preschool mini center"; Taldykorgan city: municipal state establishment "secondary school № 4", municipal state establishment "secondary school №16".

Main stages of the research:

- the first stage (2017-2018) in connection with the problem, the analysis of psychological, pedagogical, mathematical literature was carried out, the accumulated material was systematized; the scientific apparatus of the research was determined; a defining experiment in mathematics was conducted to clarify the knowledge and skills of students using tests.

- the second stage (2018-2019), taking into account the requirements put forward by the society, test tasks were developed based on the features of building tests in teaching mathematics and methodological issues of organizing educational activities, a search experiment was conducted; a methodology for organizing students' educational activities through tests in teaching mathematics based on an

experiment was developed and adjusted; materials for the teaching manual "Mathematics tester" were summarized.

-the third stage (2019-2020) was conducted experiential learning, clarifying theoretical problems of scientific research; test tasks were tested in the experiment; the obtained results are analyzed; conclusions and concepts of the research results; the work completed; Published a textbook on research topic, embedded in the learning process of the experimental schools.

Approval and execution of work. The principles and results of research work were discussed at the enlarged meeting of the Department "Mathematics and Informatics" of the faculty "natural Science" "Zhetysu University named after Ilyas Zhansugurov", the results of the study were introduced in educational process the following schools: Aksu district: municipal state establishment "Secondary school-gymnasium named after K. I. Satpayev", municipal state establishment "Secondary school named after Zh. Sydykov with preschool mini center"; Karatal district: municipal state establishment "secondary school named after A. S. Pushkin preschool mini-center"; Eskeldi district: municipal state establishment "Secondary school of a name of Titov with preschool mini center"; Taldykorgan city: municipal state establishment "secondary school № 4", municipal state establishment "secondary school №16".

Publications. The main contents of the thesis together with domestic and foreign scientific consultants described in the journals of the Committee for quality assurance in the field of education and science of RK and international scientific conferences, discussed at scientific seminars of the faculty of the Department. 11 scientific papers were published on the main content of the dissertation. Of these, 1-in the publication included in the Scopus database (percentile -58 and quartile-Q1), 5-in the publications recommended by the Committee for quality assurance in education and science of the Republic of Kazakhstan, 4-in the materials of the international scientific and practical conference. In addition, in 2020, the textbook "Collection of tests in mathematics" was published.

Structure and content of the dissertation: the dissertation consists of normative references, definitions, abbreviations, introduction, two parts, conclusion, list of references and appendices.

The introduction substantiates the relevance of the research topic, defines the purpose of the research work, its object and subject, hypothesis and tasks, sets out the methodological and theoretical foundations, research methods, its stages, scientific significance, theoretical and practical significance, principles to be defended, reasonability and validity of the research results.

In the first section " theoretical foundations of the test organization of educational activities of students»: 1) the analysis of educational activity and its major components; 2) the psychological and pedagogical aspects of organizing learning activities of students; 3) identify the types and characteristics of

mathematical tasks test; 4) the place of information technologies in the educational activities of students.

In the second part, " methods of organizing the process of teaching mathematics using tests»: 1) the features of constructing test variants in teaching mathematics are formulated; 2) the method of organizing educational activities using tests in teaching mathematics is developed; 3) the results and conclusions of the pedagogical experiment are processed.

In conclusion, the main results of the research work are presented, i.e., variants of tests used in the process of teaching mathematics, and methodological recommendations for its application.

The Appendix contains materials used in the course of the research, and acts of implementation of the results of research work.