

## ANNOTATION

**to the thesis of Duyseev Gulfariza Omarkhanovna on the topic “Methods of teaching school mathematics using mobile technology”, prepared for obtaining the degree of Doctor of Philosophy (PhD) in the specialty 6D010900 - “Mathematics”**

### **The topicality of research**

Currently, on the way to strengthening the independence of the country, the importance of education is highly valued and universal support is being provided. The Law of the Republic of Kazakhstan “On Education” says: “The main task of the education system is to create the necessary conditions for the formation and development of an individual based on national and universal values, achievements of science and practice, the introduction of new learning technologies, access to international global communication networks in education” and targets for the further development of the education system. To solve these problems, it becomes necessary to switch to a new practice, a new relationship through the daily search for each teacher and school team.

Thus, this society requires from a modern teacher, in addition to a deep knowledge of his subject, from a theoretical and methodological, regulatory, didactic, methodical point of view, to be an information literate specialist, with well-established information and communication competences who have diversified the capabilities of ICT.

President Nursultan Nazarbayev in the Address “New Development Opportunities in the Fourth Industrial Revolution” of 2018 set the main ten tasks, among which he highlighted the seventh objective - “Human capital is the basis of modernization”, adding that “it is necessary to strengthen the quality teaching math and science at all levels of education. This is an important condition for preparing young people for a new technological structure. Substantive training should be harmoniously complemented by modern technical support. It is important to continue the work on developing digital educational resources, connecting to the broadband Internet and equipping our schools with video equipment”. UNESCO, together with the Institute for Teaching Information Technologies, in the program document Mobile Learning for Quality Education and Social Inclusion, published in 2010, examined ways to rationalize mobile tools in the education system that are in demand among modern teachers and students.

In recent years, in the field of world education, the pace of application of information and communication technologies has accelerated: distance learning, various trainings in the virtual space, online courses, electronic textbooks, video tutorials, mobile learning, electronic and digital education resources, etc. Among the above opportunities, the opportunities of mobile learning are increasing every day, its funds provide for sufficient training to meet the demand of modern education. Currently, strategies and methods, forms of education training aimed at the introduction of mobile learning. For this reason, demanding the study of mobile learning from a theoretical, methodical and organizational point of view, we should consider a systematic solution to the issue of introducing mobile learning into the education system of our country. This, of course, is seen as a continuation, the next

generation of informing the education system. There are a number of works published in the field of methods of teaching mathematics and computer science in the conditions of informatization and automation of the educational system. In these works were comprehensively reviewed: E.I. Bidaybekov improving at universities the methodological system of teaching informatics of specialized specialists in combination with informatics, S. Kariev improving the teaching of mathematics and informatics in general secondary schools, B. Bekzatov improving the system of integrated training in mathematics and informatics in schools and universities, V.V. Grinshkun organization of computerized learning based on hierarchical information structures, D.M. Dzhusubalieva pedagogical issues of preparing electronic textbooks in the conditions of knowledge informatization (G.K. Nurgaliyeva, shaping the information culture of students in conditions of distance education) B. Baymukhanov, K.S. Abdiev, R.A. Ilyasova, general problems of informatization of the education system, Sh.H. Kurmaline methodological and technological problems of drawing up an electronic methodic system in the conditions of informatization of the education system.

Along with the above works, there are also works that emphasize the problem of computer learning. For example, J.A. Karaev considered the enhancement of cognitive activity of students in the conditions of using computer technology of learning, A.A. Sharipbaev considered the argumentation of the correctness of software and information tools of a computer, S.M. Kenesbayev problems of using new information technologies by future teachers, M.F. Baymukhamedov - models of compiling the profile technology of computer training, problems of compiling methods and tools, J.J. Zhanabaev improving engineering and graphic training of specialists in the conditions of the development of information technologies Berkimbaev pedagogical system of the learning process of the informatics discipline, R.I. Kadirbaeva examined the problems of information and communicative subject environment in the informatization of the education system.

In recent years, with the rapid acceleration of changing types and capabilities of computer tools. For the same reason, problems regarding their use in the learning process remain relevant. Currently, the most widely used types of computer tools are mobile devices. Due to their ability to perform various functions in daily human activities, they are their own means. For this reason, defining the possibilities of using mobile devices in the learning process, problems of mobile learning appeared in pedagogy. As evidence, we can mention the works of foreign and Russian scientists M.Sharples, D.Keegan, C.Quin, V.Ya.Tsvetkova, M.A. Grigorieva, E.Yu.Rudova, S.V.Titovoi, A.P. Avramenko, K.V. Kapranchikova and others, who considered the theoretical and practical problems of mobile learning, the problems of its implementation and development in the educational process.

Studying these works, it can be noted that mobile computer systems are mobile means, mobile communication technologies and a set of mobile services, and as their example, we can call the services of communicators and smartphones, mobile and handheld computers. Also, "mobile learning" means learning using mobile computer systems and mobile applications.

To put it more precisely, it is very difficult to choose the methods of mobile

learning in individual subjects; this is a complex didactic problem. For example, the subject of mathematics is the main link that forms and develops the mental activity of students. It has an impact on the development of intelligence, logical thinking and the creative abilities of students, a complete understanding of natural patterns. If so, such questions arise spontaneously, how from which side the use of mobile technologies in teaching mathematics separates, to what achievements this may lead.

However, in scientific research works it is not clear and the methods and techniques of using mobile technology are not sufficiently analyzed in detail. Research work on the use of mobile technology in teaching mathematics is almost absent.

Currently, the strategies, methods and forms of educational organization aimed at introducing mobile learning, the possibility of using mobile technology in general secondary schools are not well defined and the methodology for using the didactic potential of mobile technology in teaching school mathematics has not been compiled.

Thus, there is an obvious contradiction between the need to use mobile technology in the teaching of school mathematics and the uncertainty of the possibility of its use.

The search for solutions to these contradictions became the basis for determining the problem of research and choosing the topic of the thesis "Methods of teaching school mathematics using mobile technology".

#### **Aims and objectives of the research.**

Theoretical substantiation of learning using mobile technology and the development of a methodological system for its use in teaching school mathematics.

To achieve this goal and to test scientific assumptions, it is necessary to perform the following tasks:

- theoretical substantiation of mobile learning as a new form of development of information society;
- identification of potential opportunities for the use of mobile technology in training;
- determination of pedagogical conditions for teaching mathematics based on mobile technology;
- development of a methodical system for the use of mobile technology in teaching school mathematics;
- Conducting experimental work on teaching school mathematics using mobile technology.

#### **Scientific novelty of the research:**

- It is theoretically justified that mobile learning is a new form of development of information society;
- The analysis of the current state of the use of mobile technology in education has been carried out and the potential possibilities of their use have been determined.
- Defined pedagogical conditions for teaching mathematics based on mobile technology;

- Mobile applications “Mobile Algebra” and “Function” for use in the teaching of mathematics have been developed;
- A methodical system has been developed for the use of mobile technology in teaching school mathematics, the effectiveness of which has been proven experimentally by experiment.

**The theoretical significance of the research.**

A methodical system for teaching school mathematics using mobile technology in school mathematics has been developed, which allows students to develop mental activity through expressing interest in solving mathematical problems and ensuring the formation of applied knowledge, functional literacy, practical skills of students in accordance with the development of science and technology.

**The practical significance of the research.**

The theoretical principles defined in the thesis and the methodological system justified for the use of mobile technology in teaching mathematics, the functional course on the topic: “Using mobile computer tools in mathematics” and developed mobile applications can be used by school teachers and applicants to improve their knowledge, skills skills of students. The results of the research can be used in research works, when using teaching tools for compiling methods of using mobile technology in improving the methods of teaching mathematics in high school and teaching other subjects.

**Object of research.** The process of learning mathematics in high school.

**Research methods:** Study of the methodological foundations of teaching mathematics; study of philosophical, psychological and pedagogical literature; discussion of the content of publications related to the research problem; study of foreign educational practices on the use of mobile technologies; conducting a practical experiment, checking and analyzing the results of an experiment.

**Subject of research.** Improving the methods of teaching school mathematics using mobile technology.

**Scientific hypothesis research.** If theoretically justified the possibility of using mobile technology in the educational process and developed a methodological system in teaching mathematics, then the methods of teaching school mathematics are improved using mobile technology.

**The following provisions are to be defended:**

- Mobile learning is a new form of learning that characterizes a new cycle of the development of information society, the basic concepts, communications of computer and mobile technologies.

- Analysis of the current state of application of mobile technology in education determines the potential of their application.

- Determination of pedagogical conditions for teaching mathematics using mobile technology, such as: legal and normative grounds for organizing mathematics education using mobile technology, improving the information and educational environment and strengthening the material and technical base of the school, developing ICT competence of a mathematics teacher conducting mobile education technology and the development of a methodological system for teaching mathematics using mobile technology based th on student-activity

approach to effectively organize the educational process in the school to increase students' interest in solving problems.

- Mobile applications “Mobile algebra” and “Function”, designed to use the mobile technology of teaching school mathematics, increase interest, activity of students and independent search.

- Methodical system of teaching school mathematics using mobile technology contributes to the formation of applied knowledge, practical skills and functional literacy of students, improves the methods of teaching mathematics.

### **Theoretical and methodological foundations of the research.**

Philosophical ideas about the unity of theory and practice, general philosophical principles of personality development, principles of personality-activity relations in the study of social development phenomena, concepts of informatization of education, general education theory, the decisive role of actions in teaching, teaching methods of school mathematics, theory of teaching solving mathematical problems .

### **Information about the publications.**

According to the research of scientific work was published 16 scientific papers. Of these, in the editions approved by the order of the Committee for Control in the Field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan - 6 articles, in rating journals (included in the Scopus and Web of Science database) 1 article at the International Scientific and Practical Conferences of the Republic of Kazakhstan and abroad 6 articles, in foreign scientific journals 1 article, in the materials of the Republican August Pedagogical Council on the topic: “Knowledge is a fundamental factor of the future achievements of the country” of employees of specialized educational organizations (Thank you letter o) 1 article 1st mobile app “Mobile algebra” (certificate number 2676, 20/8/2018) a certificate issued on the state registration of rights to the object of copyright.

**The structure of the thesis.** The thesis work consists of introduction, two chapters, conclusion, list of used literature and notes.