

**FORMATION OF MATHEMATICAL COMPETENCE OF STUDENTS IN  
THE PROCESS OF TEACHING ALGEBRA, GEOMETRY AND THE  
BASICS OF MATHEMATICAL ANALYSIS**

*Latipov A*

*Teacher of mathematics, specialized school of exact and natural sciences at*

*KEEI*

*Muhammadiev J*

*Teachers of mathematics, specialized school of exact and natural sciences at*

*KEEI*

*Kholiyarov N*

*Teacher of mathematics, specialized school of exact and natural sciences at*

*KEEI*

**Annotation:** *The article is devoted to the formation of mathematical competencies by teaching schoolchildren the basics of mathematics (algebra, geometry and analysis). Information is also provided on the various views of educators-scientists, ways to implement them, including the formation and development of competencies through the solution of contextual problems.*

**Keywords:** *competence; mathematical competence; standard and non-standard situations; professionalism; Acme (gr.-top) - tops of knowledge; contextual tasks; reproductive activities; applications of problem solving in a different way.*

**Аннотация:** *Статья посвящена формированию математических компетенций путем обучения школьников основам математики (алгебре, геометрии и анализу). Также представлена информация о различных взглядах педагогов-ученых, способах их реализации, в том числе о*

*формировании и развитии компетенций через решение контекстуальных задач.*

**Ключевые слова:** *компетентность; математическая компетентность; стандартные и нестандартные ситуации; профессионализм; Акме (вершина)-вершины знания; контекстный задачи; репродуктивной деятельность; применение решение задачи различным способ.*

Changes in society, the acceleration of the pace of development of society and the processes of informatization, have a great impact on the situation in the field of education. The children, who are studying at school today, will continue their work activity for many years. It is difficult to imagine what the world will be like in the middle of the 21<sup>st</sup> century. Therefore, the school must prepare its pupils for change; develop the ability and readiness to work in standard and non-standard situations, using theoretical knowledge and practical skills.

The 21<sup>st</sup> century is characterized by a reorientation of the assessment of the result of education from the concepts of “readiness” and “education” to the concepts of “competence” and “competence” of pupils.

The main methodological approach in education is becoming a competent approach, and the problem of achieving the required quality of education is closely related to the quality of all components of the education system: programs, content, teaching methods and techniques, qualifications of teaching staff. Today, a competent approach is one of the directions for updating education in the strategy for modernizing the content of general education in the Republic of Uzbekistan. It is assumed that, the basis of the updated content of general education will be the formation and development of key and subject competencies of pupils.

Why did competence issues become of paramount importance in economic policy on a global scale in the first quarter of the 21<sup>st</sup> century? This question should involuntarily arise for every researcher who addresses this topic. Wasn't competence as a professional quality of a person important in previous years? I

dare to suggest that professionalism was highly valued and was in demand at all times and in all countries, in particular in the era of the ancient Roman dictator Julius Caesar (100-44 BC), and in the era of Emir Timur (1336-1405), and in the era of the first Russian Emperor Peter I (1662-1725). Yu. S.

Kostrova, analyzing the origins of the concept of “competence” and “competence”, indicates, referring to the Merriam Webster dictionary, that the first mention of the term “competence” dates back to the beginning of the 17th century, more precisely, to 1605. There are attempts to find the origins of competence in the works of the philosophers of Ancient Greece, in particular, Aristotle and the works of Central Asian scientists such as Muhammad al Khorezmi (787-850), al-Farabi (873-950), Abu Raykhan Beruni (973-1043), Ulugbek (1394-1449 ) but, regarding this version, it is probably more correct to say, the desire to reach the akme (gr. peak) - the peak of knowledge.

For any job, for any position, people who possessed the knowledge, skills and abilities necessary for this have always been selected and appointed. And this was an axiomatic requirement that was presented to any candidate for a particular job or position (we do not touch on those cases where this requirement was not observed). So why are the requirements for the competence of employees updated at the present time?

If we turn to the publications of recent years, then almost all authors are unanimous in understanding the objective nature of the reasons for increasing the competence of workers, pointing to global changes in the economic, technological and social spheres of society, and differ only in the fact that some associate an increased interest in competence issues with social -economic processes of development of post-industrial society, and others of the information society. And this means that a graduate of our school should be able to make independent decisions, work in a team, be proactive, capable of innovation, ready for overload, stressful situations, be able to get out of them. All these qualities can be formed using a competent approach in teaching any subject, including mathematics.

In addition to key competencies that are common to all subject areas, subject competencies are also distinguished - specific abilities, including highly specialized knowledge, a special kind of subject skills, skills, and ways of thinking. In particular, mathematical competence is the ability to structure a situation, isolate mathematical relationships, create a mathematical model of a situation, analyze and transform it, and interpret the results obtained. In other words, the mathematical competence of the student contributes to the adequate application of mathematics to solve problems that arise in everyday life.

Mathematics does not act on any one human ability and strength, whether it be emotion or intellect, but on the person as a whole. Mathematics forms the very system of intellectual, moral attitudes, the effect of which will manifest it sooner or later.

There are different points of view in the definition of mathematical competence. B.V. Gnedenko, L.D. Kudryavtsev, N.G. Khodyreva in the definition of mathematical competence, in fact, describes the result of mathematical training, the purpose of which is to develop the ability to see, understand and evaluate various problems, solve them constructively in accordance with one's value orientations, and consider any difficulty as an incentive for further development.

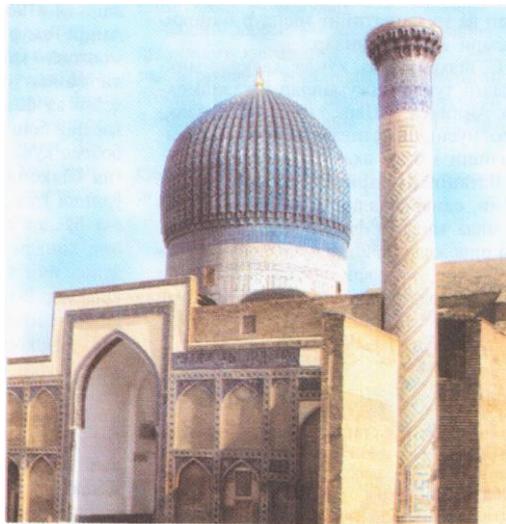
In the works of researchers, it is customary to distinguish three levels of mathematical competence: the level of reproduction, the level of establishing connections, the level of reasoning. Mathematics has the opportunity at every step to teach students logic in practice. Studying mathematics, students acquire the ability to analyze the issue under consideration, generalize, identify necessary and sufficient conditions, define concepts, and find ways to solve the problem. All this forms the thinking of students and contributes to the development of their speech, especially such qualities of expression of thought as order, accuracy, clarity, brevity, validity.

The central point in the organization of education in the spirit of the competence-based approach is the search for and development of such forms of

education, in which the emphasis is placed on the independent learning activities of the students themselves. One of these forms is the compilation and solution of a contextual problem.

Consider the following geometric problem.

In the city of Samarkand, there is a world-famous architectural monument of the Gur-Emir mausoleum. The octagonal building of the mausoleum carries a cylindrical drum, the height of which is equal to its diameter. Each wall of the octahedron is a square with a side of 10 m. The drum is crowned with a



bright blue dome, the base diameter of which is 15 m, and the height is 12.5 m. The walls of the octahedron and the surface of the drum are covered with blue, light blue and white ceramic tiles.

**Task 1.** Determine the total area of the walls of the octahedron, decorated with ceramics.

**Task 2.** Determine the surface area of the drum carrying the dome.

**Task 3.** Determine the total surface area of the mausoleum, decorated with ceramics.

This task is close to the context one: the description of the object with some numerical characteristics is given. However, the level of complexity of the task is minimal, the student is required to perform reproductive activities - calculations using simple known formulas.

Each of the components specified in these paragraphs must be present in the content and title of the competence you allocate.

- ✓ In order to develop this type of competence, the teacher applies problem solving in various ways.

- ✓ In order to form this competence, the teacher suggests that the students make up the test themselves, finding options for erroneous and correct answers.

In conclusion, I would like to cite a vivid statement by the famous Dutch mathematician G. Freudenthal regarding the teaching of mathematics in schools: "... it is important that the mathematics studied be closely connected with reality. This is the only way to ensure the long-term influence of mathematics on the student.

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