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IMPROVING STUDENTS' COGNITIVE COMPETENCE IN APPLIED MATHEMATICS EDUCATION AS A METHODOLOGICAL PROBLEM

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Abstract

This article provides a scientific and theoretical analysis of the issues related to the development and improvement of cognitive competence among students studying in the field of applied mathematics education, considering it as a methodological problem. In the modern educational process, developing students' independent thinking, analytical reasoning, problem-solving abilities, and mathematical modeling skills is regarded as an important pedagogical task. The article analyzes the essence of the concept of cognitive competence, its structural components, its role in applied mathematics education, and methodological approaches aimed at developing this competence.

Keywords

Cognitive competence, applied mathematics education, methodological problem, innovative pedagogy, mathematical modeling, analytical thinking, competence-based approach.

Introduction. The development of modern society is characterized by the rapid growth of knowledge and technologies. Under such conditions, one of the main tasks of the higher education system is to prepare highly qualified specialists who are capable of independent thinking and solving complex problems on a scientific basis.

In particular, the professional training of students studying in the field of applied mathematics requires not only the acquisition of theoretical knowledge but also the ability to apply this knowledge in solving practical problems.

In recent years, the competence-based approach has become widely used in the education system. According to this approach, the main goal of education is not only to provide knowledge but also to form specific competencies in students. In this process, cognitive competence plays a special role because it reflects a student's ability to understand, analyze, generalize, and apply knowledge in new situations.

One of the important tasks of modern education is the development of students' cognitive competence, which includes the ability to comprehend knowledge, analyze it, generalize it, and apply it in practical activities. In the context of globalization, the development of society largely depends on the intellectual potential of young people, their ability to think independently and critically, and their capacity to effectively apply knowledge.

As emphasized by the President of the Republic of Uzbekistan, Shavkat Mirziyoyev, the state and society will mobilize all their resources to ensure that young people grow up as individuals who think independently, possess high intellectual and spiritual potential, and are able to compete with their peers worldwide in all fields.

Eastern scholars also paid special attention to the development of human thinking in the educational process. Such prominent thinkers as Abu Rayhan Beruni, Avicenna, Al-Farabi, and Muhammad al-Khwarizmi emphasized the importance of developing thinking skills, deeply understanding knowledge, and applying it in practical activities during the learning process.

Their pedagogical ideas highlight that the cognitive activity and intellectual development of learners are key factors determining the effectiveness of education.

From this perspective, developing students' cognitive competence, activating their cognitive activity, and fostering their ability to understand knowledge deeply and apply it in practice are among the most important pedagogical tasks of modern education. In applied mathematics education, the development of cognitive competence is particularly relevant. This is because mathematical disciplines require complex analytical thinking, abstract reasoning, and the ability to model problem situations.

Therefore, the development of students' cognitive activity is considered one of the significant scientific problems facing modern pedagogy and methodology.

Theoretical Foundations of the Concept of Cognitive Competence

The term "cognitive" originates from the Latin word cognitio, meaning knowledge or understanding. In pedagogy and psychology, cognitive activity is interpreted as the process related to acquiring, processing, analyzing, and generating new knowledge.

Cognitive competence refers to an individual's ability to effectively organize cognitive processes. It includes the following components:

- the ability to acquire and understand knowledge;
- skills of analysis and generalization;
- the ability to solve problem situations;
- independent thinking and decision-making skills;
- the ability to apply knowledge in new situations.

From a pedagogical perspective, cognitive competence reflects not merely the mechanical memorization of knowledge but the ability to deeply understand, analyze, and apply it in practical activities.

In applied mathematics education, this competence is especially important because mathematical knowledge often has an abstract nature, and understanding and applying it require a high level of analytical thinking.

Methodological Problems in Developing Cognitive Competence in Applied Mathematics Education

1. Dominance of Theoretical Knowledge

In many cases, the teaching of applied mathematics focuses primarily on the acquisition of theoretical knowledge, while its integration with practical activities is insufficiently implemented.

Educational curricula often prioritize the study of mathematical concepts, formulas, theorems, and algorithms. However, opportunities to apply this knowledge to real-life situations and practical problems remain limited.

As a result, although students may know the theoretical foundations of mathematics, they often experience difficulties applying them effectively to solve practical problems in various fields.

Such a situation negatively affects students' cognitive activity. Cognitive competence is determined not only by memorizing knowledge but also by analyzing, generalizing, applying knowledge in problem situations, and generating new knowledge.

Therefore, modern pedagogical approaches emphasize the integration of theoretical knowledge with practical tasks, mathematical modeling of real processes, and strengthening interdisciplinary connections.

2. Limited Use of Problem-Based Learning

Problem-based situations are one of the most effective methodological tools for developing cognitive competence. They increase students' interest in learning, encourage independent research, and develop analytical and critical thinking skills.

In such situations, students act not as passive recipients of ready-made knowledge but as active participants seeking solutions to problems.

However, in teaching applied mathematics, problem-based teaching methods are not always sufficiently applied. In many cases, lessons are limited to explaining ready formulas and algorithms and reinforcing them through standard exercises.

Therefore, it is necessary to incorporate problem-based tasks based on real-life situations, modeling problems, and research-oriented assignments into the educational process.

Conclusion

The analysis conducted in this study shows that developing students' cognitive competence is one of the key methodological issues in applied mathematics education. Cognitive competence enables students to deeply understand knowledge, think analytically, solve problem situations, and apply mathematical concepts in practical contexts.

However, several methodological challenges remain in the educational process, including the dominance of theoretical knowledge, the limited use of problem-based learning, and the insufficient integration of digital technologies. Addressing these issues requires the integration of theoretical and practical learning, the wider use of problem-based and research-oriented teaching methods, and the effective application of modern digital technologies in mathematics education. Such approaches contribute to the development of students' analytical thinking, independent learning skills, and the ability to solve real-world problems. Ultimately, improving cognitive competence in applied mathematics education will enhance the quality of professional training and prepare students to effectively address complex scientific and practical challenges.

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