MATHEMATICAL MODELING IN THE SYSTEM OF VOCATIONAL TRAINING OF STUDENTS

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ABSTRACT

Theoretical studies of the role of the model method as a general scientific method of cognition consider it as a combination of the following general techniques: mapping the original in the language of a theory; creation (selection) of a model; her research; transfer of knowledge obtained as a result of research of the model to the original. By forming students' modeling skills, we thereby contribute to the development of such general intellectual devices as comparison, generalization, analysis, abstraction; professional skills such as research, design, performing. It is shown that a mathematics course in higher than educational institutions contains great opportunities for learning the method of mathematical modeling. The main directions of teaching students the method of mathematical modeling are: a model way of introducing a new concept; learning algorithms when considering math questions; learning the general algorithm of the modeling method.

Keywords: Mathematical modeling, training, students, educational, process, activity, understanding of the model.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

An important component of mathematical education is teaching students basic concepts and ideas related to mathematical modeling, since it is mathematical modeling that uncovers the connections between abstract mathematical concepts and reality, which contributes to the creation in the human mind of an adequate, relevant reality, picture of the state and development of mathematics.

An analysis of the existing practice of teaching mathematical modeling at a university shows that the activity of mathematical modeling organized in the educational process in its content and orientation allows the student to only use ready-made data on the qualitative characteristics of the original and a ready-made (proposed to him) mathematical app rat for his "simulation". On the whole, the student does not have a theoretical understanding of the model, does not learn the method of mathematical modeling, has no idea of his heuristic function. A future specialist is unable to independently study the original and to build its mathematical model, to experiment with the model, and, therefore, to obtain information that he should be guided in solving a number of professional problems.

1. The following serious shortcomings in teaching the stages of mathematical modeling are noted [2, p.46]:
2. Trainees deal with ready-made mathematical models.
3. The study of the obtained solution is reduced to the substitution of the found solution in the studied model, or consists in repeating all the arguments for the found solution.
4. The reference to the initial parameters, if it occurs, is only at the stage of interpretation.

Having mastered the method of mathematical modeling, the student can apply it in many cases, since the idea of the model is used in the most diverse sections of mathematics.

Traditionally, the methodology considers two aspects of applied problems: the task plot and the mathematical model of the problem. A. D. Myshkis, M. M. Shamsutdinov [3, p. 12] note that "one should not spare time for an informal discussion of the conditions of the original problem, an understanding of the meaning of the quantities involved, the choice and motivation of hypotheses, the adequacy of the mathematical model, and the discussion of conclusions from its study. These moments cause the greatest difficulties, and it is their possession (and by no means the ability to solve artificial mathematical problems) that determines the ability to apply mathematics beyond its boundaries.

The method of mathematical modeling is effective in solving applied problems with a professional orientation. The use of the idea of mathematical modeling provides reinforcement of interdisciplinary connections. The interpenetration of various sciences is a necessary theoretical foundation for the implementation of interdisciplinary communications of academic disciplines. Scientific relations and their didactic equivalents in academic disciplines have not only similarities, but also differences, determined primarily by the fact that the academic subject, reflecting the foundations of science, does not repeat its contents completely, which means that science and the corresponding academic subject have different structure.

There are nine aspects of using the concept of modeling in pedagogical science [1, p. 37-39]:

1. Modeling as a principle of learning. Since the main content of the mathematics course is a different kind of relationship, the main thing for this course is not the principle of visualization, but the principle of modeling.
2. Modeling as a learning tool. Modeling capabilities are used as a means of isolating and fixing directly unobservable, internal relationships.
3. Modeling as a learning method. Since the method of mathematical modeling provides the assimilation of knowledge and skills conducive to the development of thinking and cognitive abilities of the student and student, it can be used in class and in homework.
4. Modeling as a heuristic method of educational knowledge. Regarding students, modeling can act as: a form of cognitive activity; One of the ways to search for a solution; means of forming new knowledge; a way to visually embody acquired knowledge.
5. Modeling as a teaching method. The teacher uses modeling as: receiving an explanation of the material; means of forming knowledge, skills, their generalization and systematization; a way of leadership by developing theoretical thinking and providing cognitive activity; tool for control and correction of knowledge among students.
6. Modeling as a learning goal and an effective means of implementing a number of pedagogical tasks.
7. Modeling as a means of enhancing cognitive activity in the educational process.
8. Modeling as one of the methods for solving problems.

Modeling as a method of research activity, the teaching of which contributes to the implementation of the didactic principle of science.

In pedagogical research: 1) the necessity is proved and the possibility of teaching pupils and students the concepts of "model", "mathematical modeling" is proved; 2) the main components of the method of mathematical modeling are identified; 3) the main ways of using the concept of mathematical modeling are highlighted: when studying new mathematical concepts and when solving applied problems; 4) the content of the material is determined on which it is advisable to teach schoolchildren and students to build mathematical models; 5) it is proved that the use of ideas about mathematical modeling contributes to the solution of such important pedagogical tasks as the formation of dialectical materialistic thinking, the upbringing of creative abilities, the strengthening of interdisciplinary connections and the connection of

learning with practice; 6) found specific methodological ways of teaching students the skills to build mathematical models [5,6].

The analysis of the methodological literature contributed to the allocation of the following functions of the method of mathematical modeling that are adequate to the functions of teaching mathematics:

1) Educational (students' mastery of the system of mathematical knowledge that gives an idea of the subject, methods and applications of mathematics; its interconnections with other sciences, the formation of a certain system of views of the world around students, the ability to solve problems with an applied orientation, i.e. development students 'worldview" which is an alloy of knowledge, skills and beliefs" [4, p. 32], acquaintance of students with the methodology of scientific research, methods of cognition).

2.Educational (the formation of ideas about mathematics as part of a universal human culture, understanding the nature of reflection of the environment by mathematics, the formation of interest in the study of mathematics, the development of sustainable motivation for learning activities);

3. Developing (the formation of logical methods of mental activity: analysis, synthesis, generalization, abstraction; general educational methods, that is, the assimilation of a system of scientific knowledge and ways to obtain them);

4.Heuristic (the development of heuristic mental activity - activities associated with a sudden solution to a problem, mastering methods of knowledge and mastering the skills to apply them in various specific situations);

5. Prognostic (the inclusion of students in the process of discovering facts, their justification, analysis of various methods of argumentation; the formation of students' ability to detect unresolved problems, put forward hypotheses, the ability to see an alternative solution to problems);

6. Aesthetic (generalization and abstraction, focus on visualization of analytical objects, the desire to unify or refract certain mathematical factors and patterns in other mathematical sections and disciplines, the tendency to the minimum possible subjective complexity required to achieve a particular result, the need for a complete logical validity, "... it is the aesthetic factor that guides the researcher to the choice of the most optimal path from countless alternative areas of science search" [4, p.35];

7) Practical (development of skills for solving problems with practical content, the formation of the ability to mathematically investigate the phenomena of the real world);

8) Information (familiarity with various applications of mathematics);

9) Integrating (the formation of a system of knowledge, understanding the relationship between the studied concepts, methods of activity, methods, hierarchy between different types of knowledge; the ability to use various methods in solving problems, highlight interdisciplinary communications; understanding the role of mathematics in science , technology and life of society);

10) Humanistic (the turn of learning to a person, to his diverse relationships with others, helps students become familiar with mathematics as a certain method of understanding the world, form ideas about mathematics as part of universal human culture, and strengthen practical and applied aspects in its teaching;

11) Management of the activities of trainees (helps to facilitate indicative control and communication actions).

Thus, teaching mathematical modeling meets the basic principles of teaching mathematics: scientific, bringing students' knowledge in line with the level of modern science; the formation of a scientific worldview, creating in students true ideas about the mathematical method of cognition of reality; applied orientation, showing the role and importance of the application of

mathematical methods in solving a variety of practical problems.

The use of ideas about mathematical modeling in the process of teaching mathematics avoids a formal approach to learning, implements interdisciplinary communications, and forms professional skills among students.

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