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THE CONTENT AND METHODOLOGICAL FEATURES OF AN INTEGRATIVE APPROACH TO CAREER GUIDANCE OF STUDENTS

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Abstract – This article presents the results of research on the use of the integration of mathematics with general and specialized disciplines in the development of professional competence of students. In addition, the article explains in detail the relationship of mathematics to the general and special sciences through diagrams. As a result of the analysis, a structural-functional model of developing students' professional competence was developed.
Key words: integration, integration of sciences, practical assignment, professional competence**.**

I. INTRODUCTION

Today, the science of mathematics and the teaching of mathematics are different from other disciplines. Students’ knowledge of mathematics plays an important role in developing their professional skills. In order to create conditions for the formation of technical students in the future as mature engineers, the content of the course studied in mathematics should depend on the content of general and specialized disciplines, therefore, the materials used in the study of general and specialized sciences should be included in the basic knowledge. These relationships should not lead to a violation of the logical content of the sciences, but rather the implementation of the integration of the sciences should help to develop an integrated view of the educational process.

We have considered the necessary conditions for their implementation, taking into account the integration links in the various processes of teaching mathematics. We have identified a number of reasons that require teaching mathematics based on its integration with general and specialized disciplines:

1. The peculiarity of the logical structure of mathematical science is expressed as follows:

a) many mathematical concepts are defined by other concepts, ie mathematics is organically related to other sciences (derivative – calculates the velocity of a
moving body, exact integral - calculates the surface of a given shape, etc.);

b) the application of practical tasks is calculated using a mathematical model;

c) uses the same methods and techniques in solving many practical tasks as in solving other tasks;

d) solving practical problems increases students' interest in mathematics.

2. Information quality requirements. The content of the integration of mathematics with general and specialized sciences should be clear and concise.

3. It is explained by the fact that students make decisions in the process of solving the given tasks and their implementation depends on the knowledge they have acquired.

In order to determine the integration of mathematics with general and specialized disciplines, a system-objective analysis was conducted, structural diagrams were drawn up, topics and basic concepts were separated and further developed in the courses of general and specialized disciplines. The integration of mathematics with general and special sciences is given in the example of “Automotive and tractor engineering” sciences (see Figure 1). An analysis of the structure diagram of Figure 1 reveals that almost all sections of the mathematics course are in many cases closely related to the general and specialization sciences. This can also be seen in the study of the relationship between mathematical concepts and the sciences of “Fundamentals of Testing Automobiles and Tractors” or “Fundamentals of Theory of Internal Combustion Engines”.

According to the curriculum, the subject "Fundamentals of the theory of internal combustion engines" is studied by students of the 3rd stage. The analysis carried out in the course of teaching the subject "Fundamentals of the theory of internal combustion engines" once again confirmed the interdependence of mathematics and general and special sciences (see Figure 2). As mentioned above, one of the main criteria that make up the professional competence of future engineers is knowledge, skills and abilities. Analyzes show that in order to motivate learning in technical higher education institutions, it is necessary to show that professional activity depends on the study of mathematics (see Table 1). There is only a need for a system of methodological guidelines for the introduction of a curriculum to intensively improve the quality of the learning process in mathematics, this requires not only the development of career-oriented mathematical knowledge, but also the formation of the thinking, scientific outlook and ability to apply mathematical knowledge in practice of future professionals.

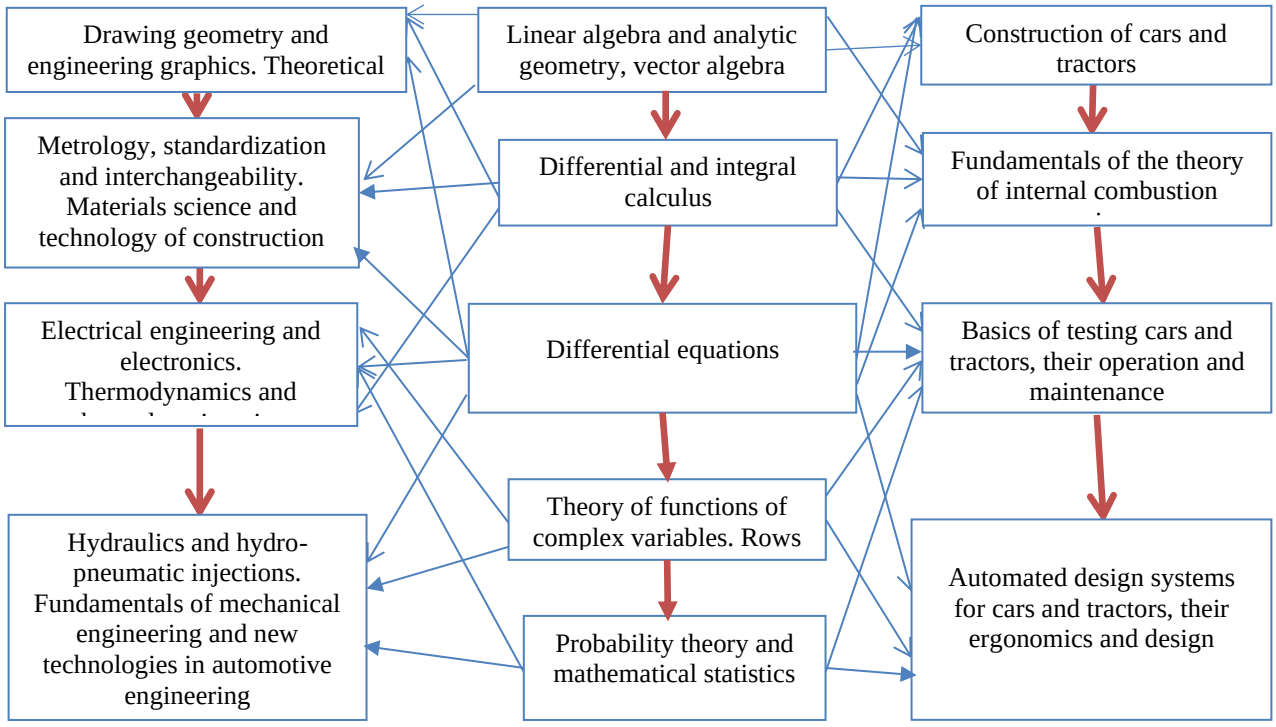

Figure 1. **The connection of mathematics with general and specialized disciplines of the specialty**

"Automotive and tractor engineering".

Table 1.

The role of mathematics in the development of professional competence

№	Basic knowledge, skills and competencies formed in the process of teaching mathematics	Basic knowledge, skills and competencies formed in the process of vocational training
1.	Students know the connections and structures between mathematical concepts and properties, principles, methods, basic mathematical models, generalized teaching methods	The engineer must know the theoretical (mathematical and physical) models of the main processes and systems of the object, methods and means of technical preparation
2.	The student reconstructs models that he understands and finds new ways to solve mathematical problems, brings results, identifies ways of thinking, converts oral	The engineer must develop overall solutions to the problems, analyze and restructure them, and predict the consequences, must be

	and graphic materials into mathematical expressions	able to work freely with a variety of information
3.	Students use mathematics literature, computer programs, and additional information in problem solving independently, builds mathematical models of simple technical objects and processes, performs calculations within the built model and evaluates the accuracy of calculations, solves practical tasks	Engineers need to search and analyze data presented in various forms, work with special literature, create mathematical models, process research results using mathematical methods, look for compromise solutions in uncertainty.

The successful use of interactions in the learning process depends on the curriculum, which has a significant impact on the regular, consistent learning and assimilation of material. The program is the main document that organizes the learning process, it reflects the goals and objectives of the study of the object, its construction logic, regulates the continuity of its individual parts, and so on. Textbooks from many disciplines are currently being reworked due to the changing part of the program and suggestions. It is necessary to develop didactic materials on the implementation of the integration of disciplines in order to systematically identify and use integration links in the educational process. To this end, problem solving is the most important type of educational activity in the acquisition of mathematical knowledge, skills and competencies. The development of the professional competence of future engineers requires the development of a methodology that ensures that they acquire knowledge and acquire practical skills.

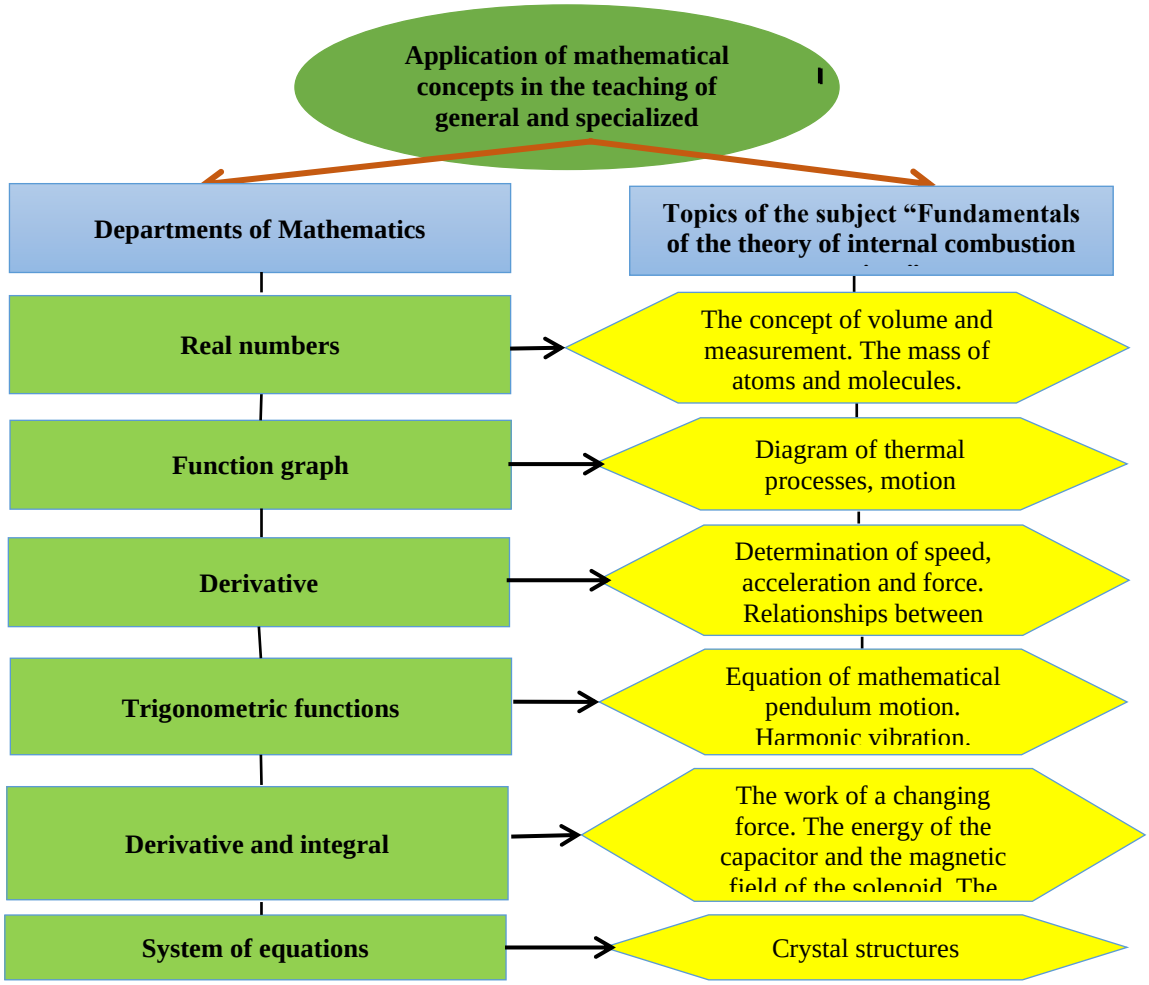

Figure 2. Relation of mathematics with themes of the subject "Fundamentals of the theory of internal combustion engines".

Successful formation of professional knowledge on the basis of integration of mathematics with general and special sciences is carried out in the following conditions:

1. Coordinating the teaching of mathematics and general and specialized sciences.
2. Coordinating the unity of concepts, laws and theoretical concepts.
3. Explain to students the relationship between disciplines.
4. Creating conditions for the use of integrated communication in the teaching of various sciences.
5. Develop a set of tasks that require a comprehensive application of knowledge on different topics.
6. Development of training forms that successfully solve the problem of generalization of knowledge from different disciplines.

Components of the structural-functional model (target, information, process, assessment), database levels (conceptual, logical, physical, object) require the development of students' professional competence based on the integration of mathematics and general and specialized sciences. Based on the analysis, a systematic functional model for the development of professional competence based on the integration of mathematics with general and specialized disciplines in technical higher education institutions has been developed. The proposed model reflects the key components of this process as targeted, reasonable, process-based, evaluation effectiveness. Functionally, all components are interconnected (see Figure 3).

To identify the named components, it is necessary to describe the individual blocks of the resulting model. The first component is targeting. This is represented by blocks that represent professional competence in the context of our study. The components of the construction process are determined by the rules of teaching mathematics on the basis of integration with general and special sciences. In the presented model, this component reflected the interconnected blocks, which in turn reflects the fact that the development of professional competence depends on the integration of disciplines, levels of teaching mathematics are determined on the basis of integration with general and special sciences.

Model of development of professional competence of students on the basis of integration of mathematics with general and specialized disciplines in higher education institutions

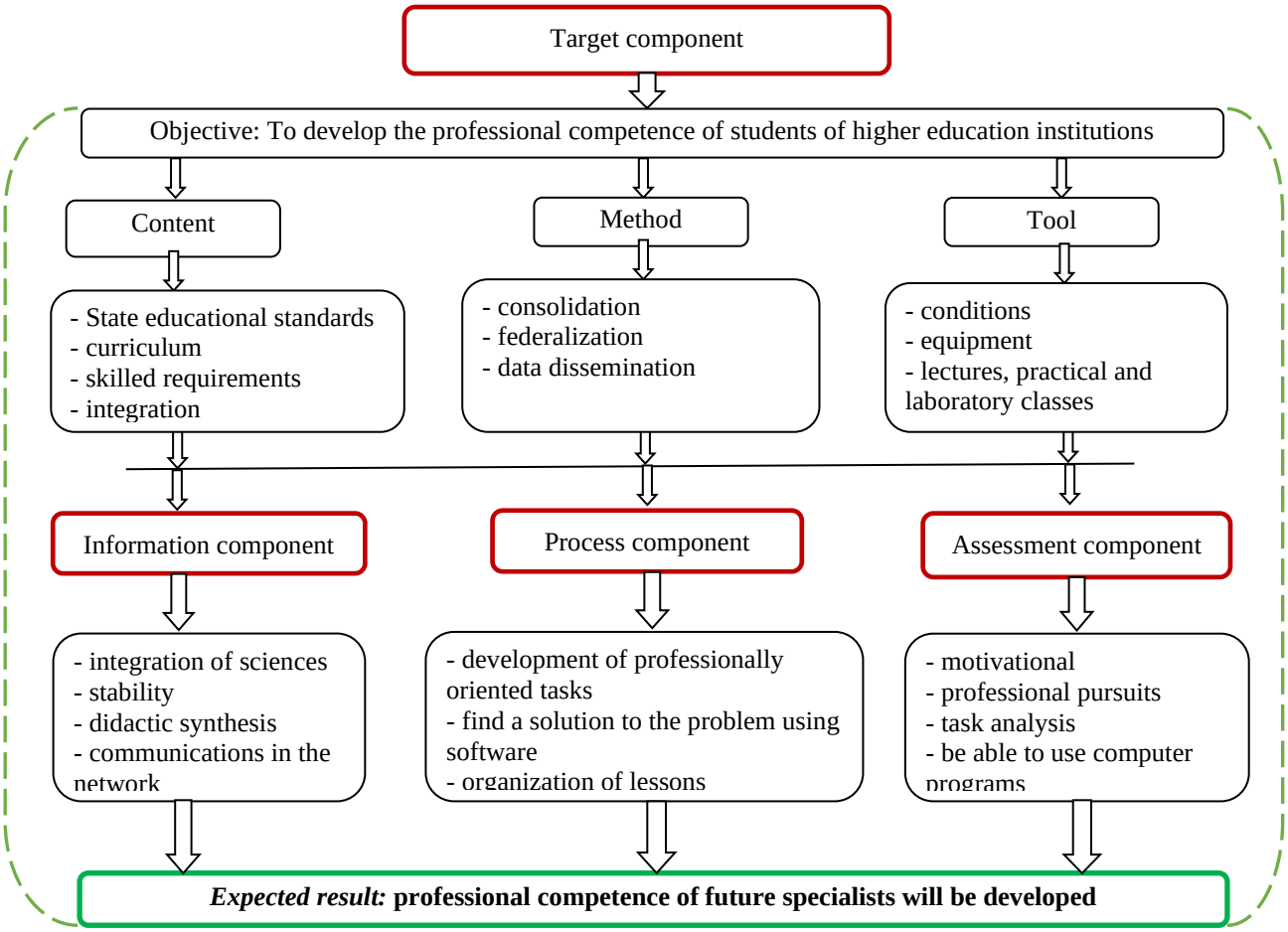

Figure 3. **Structural-functional model of developing students' professional competence**

The model is characterized by a process component. To explain the essence of this component, it is necessary to identify areas of teaching mathematics on the basis of integration with general and special sciences. The main goal is to develop a set of professionally oriented tasks. There is an opportunity to use computer programs to find solutions to professionally oriented practical tasks.

When talking about the peculiarities of the implementation of the structural-functional model of the process of developing professional competence in mathematics, first of all, there are two main directions of the organization of this activity:

1) a set of professionally oriented tasks that meet certain requirements;
2) forms of research organization.

As mentioned above, one of the practical directions in the development of mathematical training of future engineers is the use of career-oriented tasks in the process of teaching mathematics. A set of career-oriented tasks will be developed to develop the professional competence of future engineers in the teaching of mathematics on the basis of integration with general and special sciences.

In conclusion, professional competence is an important characteristic of professionalism. The work of a future specialist in any field is important. The interrelation of mathematics and general and special sciences helps to develop professional competence and provides quality training for future professionals.

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