THE ROLE AND IMPORTANCE OF DISCRETE MATHEMATICS IN THE FORMATION OF INTELLECTUAL COMPETENCIES OF STUDENTS OF IT SPECIALTIES

Shoira Urazmetova
Tashkent University of Information Technology,Urgen branch
Urgench, **UZBEKISTAN**

ABSTRACT

The most important goal of the mathematical training of future engineers is to teach such mathematical methods, which form the basis of special disciplines, to form the ability to apply these methods in the study of specific technical processes. Studying discrete mathematics should help students develop skills in the development and implementation of algorithms for solving problems, bringing research to the final result. In "continuous" mathematics, as a rule, there are quite understandable answers to the question of why certain concepts are needed (areas and volumes are calculated, systems of equations are solved, etc.). In discrete mathematics, there is a different level of abstraction, and in many cases there is no reliance on familiar intuitive images. Thus, the task arises of creating among students a sense of "usefulness" of the subject. The article discusses the role and importance of discrete mathematics in the formation of intellectual competencies of students of engineering specialties.

Keywords: Discrete mathematics, intellectual competence, intellectually developing learning.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

A high professional level of a modern specialist requires a solid knowledge of mathematical methods and skills for their use. In the process of studying mathematics, such qualities of a graduate are formed as logical harmony and rigor of conclusions, spatial imagination, the ability to provide convincing and reasoned evidence, to see problems in general and in detail, the ability to analyze the situation and find innovative solutions. Mathematics lays the theoretical basis for the study of special disciplines and forms the basis of general scientific training of a specialist.

The main tasks of vocational education are reduced to the formation of a system of professional knowledge and skills and the creation of a positive emotional attitude towards the chosen profession. Work aimed at solving these problems should be carried out throughout the entire training course. The reality is that a professionally oriented educational process affects only special disciplines. The problem of the professional orientation of training in the disciplines of the remaining cycles, which are the foundation for the training of a specialist, is not given due attention. In practice, when studying general educational disciplines in general and mathematics in particular, the absence of connections with the disciplines of the specialty is clearly traced.

The globalization of education is manifested in an increase in academic mobility, the priority of international research and joint scientific and educational projects, the expansion of international contacts and forms of exchange of pedagogical experience, and the use of modern information technologies. Global education is aimed at solving those problems and issues that

go beyond national borders, reveals the interconnection of various systems: cultural, environmental, economic, political and technological. The goal of global education is to develop individual strategies for self-development and self-education; the formation of the creative personality of future specialists who are able to make informed decisions, anticipate their possible consequences, and feel responsible for the present and future of the world. The basic (key, portable, universal) competencies are the main sense-forming component of the competency-based approach, the development of which forms the foundation of the specialist's professional competence. Intellectual competence, as a set of competencies, is not just the possession of extensive knowledge, skills, abilities, but rather the willingness to effectively use them in the process of solving educational, cognitive, and then professional tasks [1,2]. In psychological research, intellectual competence is defined as meta-quality, providing the willingness in various situations to mobilize their intellectual competencies to solve educational, professional problems based on actualization of individual mental experience [2,3,5,6]. Such readiness activates a number of cognitive processes: perception, attention, memory, thinking, imagination, as well as self-regulation processes, which include the following important skills: setting goals, planning, reflection, evaluating the results of one's activities. The structure of intellectual competence includes the following components: cognitive, metacognitive, communicative, self-educational and research. Consider the content of all components [4].

The cognitive component includes the following cognitive competencies: the ability to select and transform information; the ability to use a variety of techniques for coding information; mastery of effective perception techniques; the ability to use different types of cognitive patterns and models of mental activity in order to analyze, structure, generalize information, transfer knowledge to new situations; the ability to mentally see a phenomenon or concept in the context of its connections with many other phenomena and concepts; ability to flexibility and multivariance of judgments and assessments of what is happening; mastery of techniques for understanding complex texts. The communicative component contains the following competencies: the ability to align their positions with the interests of other people; the desire to understand other people, their opinions and views; ability to listen, conduct dialogue, correctly formulate questions; the ability to clearly state their point of view, the skills of public speaking; willingness to explain the goals and results of their work and the work of other people, the ability to argue and defend their position, the ability to work in a team, to participate in joint problem solving. The self-educational component contains competencies that determine the willingness to independently search for new information on their own initiative; the desire, on the basis of the education received, to master new areas of knowledge and technology in accordance with the individual educational trajectory; willingness to master new techniques of intellectual activity, means of Internet technologies in order to satisfy personal cognitive needs; desire to meet the logical and informational requirements for oral and written speech. The metacognitive component contains competencies that promote intellectual self-regulation. These include: the ability to set goals, carry out planning, choose strategies for achieving goals; the ability to control the course of solving the problem, organize feedback, evaluate their own activities, identify their mistakes, find out their causes. Metacognitive competencies require an understanding of the processes of one's own thinking; knowledge of problem solving strategies and the ability to predict the results of decisions made; the ability to reflect on individual experience to improve self-educational activities and self-development; the degree of readiness for an adequate perception of the changes taking place in the world, the desire to analyze information from various positions and in different contexts.

The research component contains competencies that provide readiness for different types and forms of research work. These include the ability to independently identify problems, formulate research goals and objectives, search for the necessary information, analyze literature in this area, draw up plans for the implementation of the tasks; develop evaluation criteria and performance indicators; own techniques for presenting information in different forms (compressed, expanded); the ability to format research results in the form of scientific articles, abstracts, annotations, reviews, presentations; Proficiency in the preparation of reports for conferences at various levels, the skills of presentations with reports.

According to V.G. Plakhova, the mathematical competence of students of technical universities is the ability of students to apply a system of acquired mathematical knowledge, skills in the study of mathematical models of professional problems, including the ability to think logically, evaluate, select and use information, make decisions independently [4, p. 8].

The section "Discrete Mathematics", studied by students, allows you to form the following general scientific and applied mathematical competencies:

- Demonstrates knowledge of the fundamentals of mathematics (formulates the definition of basic concepts, reproduces basic mathematical facts, laws, principles, recognizes mathematical objects, understands the connections between various mathematical concepts and has an idea of various mathematical structures);
- speaks the language of the subject area of mathematics, knows how to correctly express and reasonedly justify the provisions of the subject area of mathematics (correctly uses the basic mathematical concepts, facts, symbols, demonstrates the proof of theorems and explains their course, owns the terminology of the subject area of knowledge);
-applies mathematical knowledge to solve problems (applies theoretical facts in solving typical problems, owns the basic methods of solving problems, represents the relationship between physical and mathematical disciplines, represents the relationship of mathematics with other sciences).

Thus, the above reasoning allows us to determine the mathematical competence of students - future engineers as:

-the willingness to apply mathematical knowledge in solving urgent professional problems;

-experience of applying mathematical knowledge in professional activities;

-confidence in their capabilities to successfully use mathematical methods in solving scientific problems in future professional activities;

The specifics of the concept of “intellectually developing learning” (IRO) is that it is a purposefully organized process of developing intellectual competencies that underlie continuous self-education and self-development. Its substantive and procedural structural components make it possible to determine the concept of IRO on the basis of specific criteria, to determine the relationship between goals, content, intellectually developing technologies and control and evaluation activities. The target component of the IRO model is disclosed in the description of the main lines of intellectual development and is represented by intellectual competencies that must be developed in the process of learning at a university. The educational result, expressed in terms of intellectual competencies, presupposes the presence of certain personality structures and has a multifaceted, multifaceted character. A feature of intellectually developing technologies is the creation of psychological and pedagogical conditions for enriching the intellectual sphere of students, starting from basic thinking techniques through integrated intellectual skills to the development of intellectual competencies that determine readiness for self-actualization and self-education [1,4].

Discrete mathematics is studied where the training of specialists in engineering specialties is carried out. Consider the study of discrete mathematics by students of engineering specialties on the example of TUIT UV

The course "Discrete mathematics" refers to the basic part of the professional cycle. At the moment, the course of discrete mathematics TUIT UV is divided into parts: "discrete mathematics" and "mathematical logic and theory of algorithms." The division can be considered quite arbitrary, and it is mainly associated with formal requirements for the organization of the educational process of the University. Teaching is conducted in the first year, so the material presented does not rely on the concepts of classical higher mathematics courses, with the exception of the simplest concepts of algebra, complex numbers, etc. Each of the courses consists of lecture and practical classes. The courses deal with a small number of theorems (understandable for first-year students), but the proof of each of them is quite rigorous. In most cases, this evidence is constructive in nature, which makes it possible not only to substantiate the relevant facts, but also to build discrete objects with specified properties in practice. It is this approach that makes it possible to bring theory closer to practice and to develop an algorithmic thinking culture in students. At the same time, such a small number of theorems being proved allows us not to overload the course with overly theorized material. Most of the problems and algorithms considered as part of the courses have long had their own software implementation in various programming languages and are among various software systems,

Conclusions: Discrete mathematics is an exciting and appropriate tool to achieve and achieve the goal of educating informed citizens who are better able to function in our increasingly technological society; have the best ability to reason and solve problems; We recognize the importance of mathematics in our society; and ready for a future career that will require new and more complex analytical and technical tools. This is a great tool for improving reasoning and problem solving skills.

The implementation of technologies for the development of intellectual competencies in the educational space contributes to the creation of an intellectually favorable learning environment; ensures the actualization of students' needs in the formation of professional mobility and intellectual culture; It provides conditions for the construction of individual self-educational trajectories of students, which create the possibility of independent acquisition of new knowledge, technologies in the field of cognitive and professional activities.

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