MATHEMATICAL COMPETENCE AS THE BASIS FOR IMPROVING THE QUALITY OF STUDENTS' MATHEMATICAL EDUCATION

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ABSTRACT

The main goal of vocational education is to train a qualified worker of the appropriate level and profile, competitive in the labor market, competent, responsible, fluent in his profession and oriented in related fields of activity, capable of efficient work in his specialty at the level of world standards, ready for continuous professional growth, social and professional mobility, meeting the needs of the person in obtaining the appropriate education.

Keywords: Mathematical education, competence, student, education, quality improvement.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

A distinctive feature of the development of science of the XXI century. is the changing role of mathematical knowledge for specialists of different profiles and areas, especially for graduates of technical universities. Today, the mathematical apparatus and the underlying mathematical methods are increasingly penetrating into all spheres of human activity: research, organizational and production, inventive and constructive, psychological, pedagogical and other areas of modern human life.

O.S. Tamer believes: “Knowledge of mathematics ceases to serve only the purposes of the general development and acquisition of elementary calculation skills, and the mathematical method of thinking becomes mandatory for all areas of scientific and practical activity of specialists. The purpose of mathematical education is: “... to introduce students to the basics of the mathematical apparatus necessary to solve theoretical and practical problems, to instill the skills of independent study of literature on mathematics and its applications, the development of logical thinking, the development of mathematical research skills in applied, engineering - technical issues and the ability to translate a task with professional content into a mathematical language ”[152, p.23].

By G.D. Glaser [34], mathematical training at a university should be aimed at developing a future specialist's logical and spatial thinking. Consequently, the planned goals of mathematical training will be achieved if it is not confined to narrow, purely scientific goals, but is designed in such a way that, in an organic relationship, the specialist develops such properties of intelligence as intuition, spatial thinking, logical and algorithmic apparatuses of human consciousness.

In the research of Yu.M. Kolyagina, V.V. Kondratiev, G.L. Lukankin [69, 73, 91] has been convincingly proved that the mathematical training of a specialist is primarily associated with improving methods, methods and content of this discipline in a university.

- From the point of view of higher education pedagogy, mathematical preparation solves such problems as:
- development of skills to generalize and concretize;

- development of skills to justify the sequence of professional activities and any material, facts, phenomena of activity;
- the development of skills to highlight the main and secondary in any aspect of professional activity.
- Today, the problem of selecting the content of mathematical training of students remains relevant. We give a brief overview of the basic theoretical approaches to substantiating the content of education at a university.
- The content of education is defined as a combination of systematized knowledge and skills, attitudes and beliefs, as well as a certain level of development of cognitive forces and practical training achieved as a result of educational work.
- According to I.Ya. Lerner, M.N. Skatkina, under the content of education and cognitive activity understand:
- a system of general intellectual and practical skills, which are the basis of many specific activities.
- the experience of creative activity, its main features, which gradually were accumulated by mankind in the process of development of social and practical activities.
- a system of norms and attitudes towards the world, to each other, the experience of an emotional-volitional attitude, the assimilation of which is intended to ensure the formation of a diversified personality prepared for reproduction and development of the material and spiritual culture of society.

B.C. Lednev, defining the concept of the content of education as a process of progressive changes in personality traits, transfers the structure of personality experience to the structure of the content of education, highlighting the following components:
- personality traits that are invariant to the specific nature of activity (cognitive qualities, personality orientation, labor qualities, communicativeness, aesthetic, physical qualities);
- the experience of subject activity, differentiated by the degree of generality of its types (general and special education, as well as their intersection - polytechnical education);
- the experience of a personality differentiated by a creative principle (reproductive and creative activity);
- the experience of the individual, differentiated by the principle of "theory-practice" (knowledge and skills).

Thus, the concept of "content of education" is multicomponent in nature, does not have a single interpretation and, like any educational phenomenon, should be characterized by its goals and objectives.

According to L.D. Kudryavtseva, the overall goal of the content of all mathematical courses should be to acquire a certain mathematical preparation by graduates of universities, to use mathematical methods that have been studied, to develop mathematical intuition, and to foster mathematical culture. Specialists (graduates) should know the basics of the mathematical apparatus necessary to solve theoretical and practical problems, develop logical thinking and be able to translate the task from professional content into mathematical language. The common goal of all mathematical courses at the university is "to learn what is needed in a future profession, and what is difficult to learn by mastering labor activity on your own" [8, p. 141].

HELL. Myshkis emphasizes that the main purpose of studying mathematics at a university is to teach how to use it in professional activities. But, unfortunately, a common goal sometimes leads to excessive formalism..

A.M. Novikov notes: "When developing the content, the authors strive to reflect scientific (public) knowledge in it in the most modern and best systematized way - from the point of view of the structure of scientific knowledge itself, and not from the point of view of its possible

mastery by students, and most importantly, not from the point of view of the need for their further activities "[6, p.200].

Based on the analysis of N.I. Batkalova, R.A. Blokhina, R.A. Isaeva, R.P. Isakova, I.B. Larina, G.L. Lukankina, A.G. Mordkovich, S.A. Samsonova [8] can formulate the following requirements for the content of mathematical training at the university: give special attention to those sections of mathematics that serve the formation

- mathematical competence, taking into account the future profession of a graduate, to introduce elements of professional tasks requiring the use of a mathematical apparatus.
- In pedagogical science, a system of principles and criteria for the selection of educational content has been developed. In the work of V.A. Slastenin [4], the following principles were identified as the main principles for selecting the content of general education: the principle of humanization of the content of education, primarily associated with the creation of conditions for the active creative and practical development of trainees of universal culture; the principle of fundamentalization, based on the integration of humanitarian and science knowledge, establishing continuity and interdisciplinary relations.

B.T. Likhachev [8] in his work identifies the following principles: correlation of educational material with the level of development of science; polytechnic nature of the training material. G.V. Kovalenko [6] offers: the principle of the content of education in all its elements matching the level of modern science, production and the basic requirements of a developing humanistic democratic society; the principle of accounting for the substantive and procedural aspects of training in the formation and organization of educational material; principle of structural unity of the content of education at different levels of its assimilation. In his dissertation research A.A. Adannikov [1] offers a system of principles that form the basis for the formation of the content of physical and mathematical professional education: science, the connection between theory and practice, consistency, complex interdisciplinary connections, stages, continuity, integration and differentiation, goal setting.

- Among the basic principles of the formation of the content of mathematical education at a technical university, we consider the following:
- compliance of the content with the requirements of society, the level of development of science, technology, production (this principle states that the place, function and content of each academic subject is determined by a social order);
- taking into account the unity of the substantive and procedural aspects of training (the starting position is the position of practice);
- structural unity of the content of education.
- I.G. Mikhailova [4] defines the criteria for the variable component of the content of mathematical education. She offers the following criteria:
- compliance with the features of professional activity; correspondence of student psychology;
- accounting for the mathematical training of students; accounting for allotted time;
- logical and didactic criterion and expediency.

The most successful and reasonable in our opinion, is the system of criteria os. Tamer [152], designed for higher vocational education:

- the criterion of multiple applicability, which implies the inclusion in the content of fundamental mathematical theories that are significant for specialists of any profession;
- the criterion of intrasubject integrity, which consists in the fact that the content of mathematical courses cannot be determined from a purely pragmatic point of view, based only on the specifics of the future specialist, without taking into account the internal logic of mathematics itself, i.e. any topics should not be excluded from the course of mathematics, which will lead to a violation of the logic of the subject itself;
- the minimum criterion, which considers as perfect not the content of the academic subject to which there is nothing to add, but the one from which there is nothing to remove;

- a time criterion that takes into account the amount of hours allocated to this discipline;
- the criterion of psychological and motivational, requiring compliance with the psychological characteristics of students, their professional activities and taking into account the motivational and targeted orientation of the teaching material;
- the criterion of interdisciplinary support, requiring the presence of a mathematical apparatus, equivalent to the disciplines of all training cycles;
- The criterion of professional expediency, taking into account the use of mathematics in future professional activities.

When determining the content of mathematical education, one must focus on the tasks set by society before technical universities. The goals of mathematical education, on the one hand, are general educational, common to all engineering specialties, and on the other - special, inherent only to a certain profile of engineering activity. The selection of content should be based on both those and other goals.

The content of mathematical training should include specific mathematical knowledge and skills needed by a modern engineer and enshrined in the state educational standards of mathematical education of engineers. Here, some educational material of the mathematics course (concepts, their properties and the relationships between them) is stated, but such target settings for teaching mathematics are fixed in which the assimilation of concepts, facts and methods is characterized by the level of their application for solving various kinds of technical applied problems .

The science of mathematics should be taken into account as a factor in the formation of the content of mathematical education. Mathematics as a logical system of knowledge among other sciences is distinguished, firstly, by the fact that in the process of forming its concepts, multistage layers of abstractions, identification and idealization are involved, because of which, in the process of training, students can learn only some of them. That is, mathematics itself is an objective limiter of the depth and volume of the content of education selected from it. Secondly, the specifics of the logical structure of a particular branch of mathematics involves the introduction of a system of interrelated concepts into the content of a mathematical education. Intrasubject communications impose restrictions on the selection of a particular educational material, creating some difficulties in introducing individual concepts.

Considering the external factors that influence the formation of the content of mathematical education, one should take into account both internal factors, understanding them as elements of the learning process, and elements of the educational process that affect the design of educational content at the level of the subject.

Among them, the motivational factor comes first. In fact, the content of mathematical preparation is affected by the motives of learning as stable, that is, a quantity studied in its dominant characteristics. Next, you need to take into account the patterns of assimilation as a factor in the selection of mathematical education.

The assimilation of information as a complex cognitive activity is carried out through a number of mental processes - perception, memory, attention, thinking. When forming the content of education at the level of the subject, it is necessary to take into account the psychological laws of this activity.

The next internal factor in the formation of the content of mathematical education is the specificity of the engineer's training.

Mathematical training will most effectively contribute to the formation of future engineers of a certain system of professionally important qualities if its volume and content are adequate to future production activities, and it will form a system in unity with the content of general technical and special disciplines.

Thus, the foregoing allows us to assert that mathematical preparation at a technical university should be directed towards the formation of mathematical competence among students. From

quality mathematical training to a large extent depends on the level of professional competence of the future engineer.

Competence as a methodological category does not have a clear-cut definition. In modern pedagogical research, there are different approaches to the interpretation of the concept of competence. Common in all approaches to the definition of competencies is the idea that they are formed and manifested in practical activities. All researchers agree that the concept of competence is closer to the conceptual field "know how" than to the field "know what". Today, the term "competency" is often used to refer to a new learning outcome when discussing education quality issues.

We have conducted research on domestic and foreign authors who have developed various approaches to the definition of competencies. As a result, it was revealed that competency is the ability and readiness of an individual for activity, based on knowledge and experience acquired through training, focused on independent participation of the person in the educational process, as well as aimed at its successful inclusion in labor activity. Competence is an activity component of the education received, which helps to manifest (show up) knowledge, abilities, and skills in an unfamiliar situation.

In the study I.A. Winter [6], concerning the problems of the quality of education, three main groups of competencies are identified:

- competencies related to oneself as a person, as a subject of life;
- competencies related to human interaction with other people;
- competencies related to human activities appearing in all its types and forms.

In the literature you can find definitions of professional, general (key, basic, universal, portable, etc.), academic and other competencies.

IN AND. Baidenko [5] gives the following interpretations of professional competencies:

1. Mastering the knowledge, skills, abilities necessary to work in the specialty while at the same time autonomy and flexibility in terms of solving professional problems; developed cooperation with colleagues and a professional interpersonal environment.
2. Constructs of designing standards, which are "elementary competencies", which include:
- criteria of activity (quality measure);
- application area;
- required knowledge.
3. Effective use of abilities, allowing fruitfully to carry out professional activities according to the requirements of the workplace. In this sense, competencies go beyond the professional triad of "knowledge - skills - skills" and include informal and informal knowledge (behavior, analysis of facts, decision making, work with information, etc.).
4. An integrated combination of knowledge, abilities and attitudes, allowing a person to work in a modern work environment.

Thus, professional competencies are the willingness and ability to expediently act in accordance with the requirements of the case, methodically and independently solve problems, as well as self-evaluate the results of their activities [5]. Key (basic) competencies define attributes that can be part of or be common to any stage of higher education.

Social competencies are the willingness and ability to form and live in social interaction: to change and adapt, to develop the ability to rational and responsible discussion and achieve agreement with others.

Thus, we form in students' minds a reasonably well-understood need and need to study the foundations of integral calculus, to master the methods of applying mathematical methods to solving problems of a professionally oriented nature.

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