PEDAGOGICAL CONDITIONS OF SUCCESSFUL PROFESSIONALLY DESIGNED MATHEMATICAL EDUCATION IN THE TECHNICAL UNIVERSITIES

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ABSTRACT

In view of the objective of teaching mathematics in technical universities method of mathematical modeling should be integrated in the process of learning, based on building speculative models that simulate the real object using abstractions, created by the diversion of some of the properties of the object to the sides and features that are most important to the study. To successfully accomplish this task, technical universities should be concerned about the solution to the problem of teacher training, capable of realizing the modern demands of society in the skilled professionals of engineering profile. Our observations show that the Faculty of math departments were not always familiar with the educational and scientific literature of departments of engineering profile, plus very few profession- oriented literature that has a negative impact on issues related to the teaching of mathematics and mathematical education. And here in the first place, it is about creating a pedagogic environment. It can be argued that the conditions are in line with the teaching objectives. Such a purpose in the mathematical education of students of technical universities is the delivery of volume and quality of the mathematical knowledge that best meets the needs of the future speciality.

Keywords: Professional, direction, engineering, education, specialist.

INTRODUCTION AND LITERATURE REVIEW

Today, in the face of the rapid obsolescence of knowledge and profound changes in technology, there is an urgent need for the training of students of technical universities-future engineers with deep professional knowledge, capacity for analysis and synthesis, able to quickly understand the situation, formulate the problem, select from the available amount of information necessary for the task. It is the foremost task of technical colleges to provide professional orientation of engineering education based on a particular specialization, i.e. the preparation of such a specialist who will be able to find an unconventional solution in standard situations and not taken aback in non-standard situations, i.e., able to select from an arsenal of knowledge, skills and abilities required in this particular situation. This means that technical higher education institutions receive a social order and must adequately respond by preparing competent cadre in all respects.

However, the technical colleges often receive students with low levels of training, so the early lessons in mathematics their level of knowledge and level of motivation for teaching need to be checked. Then the level of achievements should be continuously monitored through constant test of the semester and annual knowledge of future specialists.

Numerous studies, monitoring and learning show that students are not always able to use the acquired mathematical knowledge in the production situation. This, in our view, due to the fact that the formation of mathematical knowledge is insufficiently focused on their further use in the study of subjects of special cycles, and most importantly in the future professional

activity of a specialist. However, the assimilation of mathematics affects the level of development of technical thinking of future engineers.

Therefore, in the development of various regulations on education, programs on subject matters of mathematical cycle and special education technical colleges need specific direction of interdisciplinary learning through linkages with relevant special mathematical disciplines. In order to create programmes drawn up in accordance with the needs of each service line training specialist, we specially-designed cards carried out an analysis of the basic course of mathematics in terms of its use in professional and specialized disciplines. The results showed that, for example, in the programme for the automation of production processes, "it is desirable to introduce topics: Operational calculus", "elements of the theory of fields and vector analysis", "theory of functions of complex variable" required when studying natural-science, professional and special disciplines of this direction, in the specialty of Economics and management of enterprises, "" the Elements of matrix analysis ", with its application to economic challenges, for example, in a model of international trade, etc., in the light of the level of study of each subject in accordance with the General educational and professional component and the number of allocated to study hours.

Inter subject links of mathematics with other disciplines is one of the basic conditions for successful mastering of program material. So, "the geometric and mechanical relationship between the lines of the second order" should be considered with the theme of "Automation and control" and "machinery and equipment in the oil and gas business"; "The use of complex variable function" with the "Calculation of the electrical motor variable power", "machinery" with "Calculation pressure" forces, etc.

In addition to the main course of mathematics is good to use elective courses, such as: "special sections of mathematics" and "discrete mathematics"-for "manufacturing processes automation", "operations research", "mathematical methods and models" for specialty "management".

At the same time, the compliance requirements of the profession for the future engineer and mathematical education must be followed. For example, for specialties "Economics and management of enterprises and management", in which we not only analyzed the economic profession on the main grounds, but also took into account the particular economic specialties: Economist, Manager, accountant plus psychological characteristics of personality characterize the economic way of thinking, the ability to make choices and implement a targeted selection of the best of them; the ability to predict consequences of decisions.

The options include the professional orientation of the education of future specialists, which allows you to use different approaches to mathematical education. Respectively were selected exercises, in which special attention was paid to the selection of data necessary for solving: ability to choose the accuracy of calculations; the method of investigation, the professional orientation; modeling tasks corresponding to the real needs of the specialty; development of analytical abilities to compare and apply knowledge from various disciplines, ability to find reliable options parameters values, formulas, and asymptotic estimates for professional tasks, as well as the ability to use reference books, tables, computer and control methods that solve the problem.

Such approach to learning allows you to select the best option. The goal of training in technical universities requires a multi-tiered continuing professional education, "finding

innovative educational technologies, designing effective means of quality control, and importantly impact education" [1,p.12]. In line with this standard in the Organization of training engineering students of specialties in technical universities, in our view, must be supported by the following pedagogic conditions: positive attitudes of students, based on the presentation of the material, with new, necessary, focusing on practical significance for ensuring the professional interest and the free choice of assignments and feedback.

And here, particular importance attaches to an integrated approach to training future engineers using traditional and active forms of learning (lectures integrated character, press conferences, seminars, discussions, role-playing, etc.) [2, p.16].

In practice, the traditional implementation of inter subject links many of the achievements of science remain unanswered. In such circumstances we offer mathematical modeling and building courses on a modular principle, according to which the core system consists of modules, some of which is determined by the basic course and the other has a variety of options presented by the development of mathematical science.

Another option would introduce students with up-to-date knowledge in the field of mathematics is the Organization of scientific conferences and seminars, which are related to the departments with an invitation to engineers and scientists, as well as joint scientific-research works conducted by special departments under the auspices of the Department of Mathematics with the involvement of branch enterprises.

You should stop and the Organization of independent work of students under the guidance of the teacher as students themselves poor command of the skills of independent work. Autonomy in the acquisition of knowledge to a great extent contributes to the adaptation of the students (if it is a first rate), as well as continuing training and after graduation. There is no doubt that this work can be effective if the student will be provided with: the teaching manuals, directories, dictionaries, and other training materials necessary for gaining knowledge, scientific advice on issues under study with the regular monitoring of the quality of the work performed by the student, the modern training equipment, including electronic, and well-functioning system for students to obtain a final grade on the studying discipline. The need to individualize the educational process, a variety of educational programmes, taking into account the interests and abilities of the future specialist.

This approach to mathematics education based on the diversity of options classes, namely, special courses, optional courses, lectures, workshops and self study, seminars, etc. allows you to individualize the students, calling them an interest in mathematical knowledge, develop cognitive abilities, and against this backdrop, strengthen incentives for learning, based on the individual characteristics of each student, the best possible conditions for the transition to a new stage of education, improve the quality of teaching of mathematics and the level of knowledge of students of technical universities.

The absence of the missing mathematical knowledge to some extent can be solved by separating the course of mathematics so that during the first semester of analytic geometry and linear algebra taught concurrently with mathematical analysis, i.e. adjust the programme. This should focus on the characteristics of thinking students of technical universities, different sets of thinking [1,p.82], characterized by a consistent way to manage information, corresponding to logical thinking, and it means that one of the important components of the mathematics of future engineers must be the active use of graphics, drawings, diagrams,

tables, the ability to carry out systematic research, classifying, allocating a significant part, summary of the common schemes and algorithms, as well as the development of abstract-logical, temporal pattern thinking, with a clear view of the assessment of mathematics presented in this specialty, mathematical modeling, adapted to their chosen profession, and in accordance with the available time to study of the stated objective and professional necessity in these mathematical knowledge. We do not do the opening, saying that various technical specialties teachers of special disciplines are based on different mathematical material, use different mathematical tool for solving professional tasks, although many researchers do not consider separately the rate used for the specialty, and talk about the technical college at all.

In our view, this approach is not entirely correct, because Let's say such disciplines as: theoretical mechanics, strength of materials, hydraulics, electrical, electronics, or metrology will vary, so you should know that the student will need a specific degree in the future, and to pay more attention.

In our case, in the course of higher mathematics, particular attention should be given to the section differential equations, because it not only allows you to give certain knowledge, but also works as a development aspect, as is the material, which can solve applied problems, develop general technical and professional Outlook on mathematics as a tool for solving professional tasks. This section is especially useful in studying of mathematical modeling, the purpose of which is to "teach the student to explore the method of mathematical modeling of processes" [4, p.77]. It is difficult to imagine the hydrodynamics, the study of the movement of liquids and gases in pipes and apparatuses, gaseous or liquid medium, through the porous layer processes of absorption (absorption gas fluid), the optimization problem of catalytic processes without the use of a specially developed algorithms, especially differential equations with separable variables, linear differential equations of the first and higher orders, systems of linear differential equations. This, in our view, particularly important is the disclosure of the role of numerical and approximate methods of solution of differential equations that must be explored through mathematical programs. By entering the numerical methods: method of exclusion, integrated combinations, dot-matrix method (Eyler method) in the course of differential equations in trial implementation we are expanding the representation of students on the methods of solution of differential equations, in particular when dealing with a major.

With the purpose to resolve professional tasks in mathematics course, we must, first of all, to have the choice of methods of the decision. Pedagogy here prefers the practical approach to learning, including: needs and motivation to perform the action.

Motive (the need for) leads to the formulation of the problem, to clarify the objectives, which requires specific actions to achieve the purpose. The need is an indispensable component of revitalizing student activity, not necessarily motivated based on his attitude, the inner attitude to this activity. Thus, the main task of the teacher is to form the motivation for learning, acquisition of knowledge, for which it is necessary to use special forms of teaching to produce the most effective results. To do this, first of all, develop students ' persistent motives, goals and means of implementation, which means that we must teach the ability to correctly interpret the information, analyze it (identification of characteristic signs, realize them, convert the information), remember me (an image), rate.

Many researchers (I. Lerner[1], Makhmutov, M.I. [5]) consider the problem as a situation difficult, others (M.n. Skatkin [6]) are at the Centre of controversy in the problem situation

learning has value only occurs when a student wondering when he feels that the problem in General, he can, but he lacked the necessary knowledge. M.I. Makhmutov points out several ways you can create problematic situations, such as when studying the facts that require theoretical explanations of the practical work in formulating hypotheses, if necessary, analyze, compare, collate, synthesize new facts, the research tasks. All these problems are solvable, in our opinion, when using inductive methods, gradually preparing to use the deductive approach [5, p.32].

If study of the material starts with specific examples, then it must follow the abstracted synthesis and, therefore, all the abstract should be confirmed by specific examples, i.e., if the lecture begins with the tasks that have to be offered the General methods of solving them, if a method for solving various equations, there should be a sufficient number of concrete examples.

In view of the objective of teaching mathematics in technical universities should be in the process of learning method of mathematical modeling, based on building speculative models that simulate the real object using abstractions, created by the diversion of some of the properties of the object to the sides and features that are most important to the study. Education of mental physical model can be used to build a mathematical model. It can be: a feature matrix, geometry, the equation or system that identifies, defines, and that allows them to be used as a powerful tool of professional orientation of mathematics in technical universities.

To successfully accomplish this task in technical universities the concern should be about the solution to the problem of teacher training, capable of realizing the modern demands of society in the literacy skills of engineering profile. Our observations show that the Faculty of math departments were not always familiar with the educational and scientific literature departments of engineering profile, plus-very few professionally designed literature that has a negative impact on issues related to the teaching of mathematics and mathematical education. And here in the first place, it is about creating a pedagogic environment. Agree with the definition of Postaluk N.Yu., that "educational condition is related factors, educational circumstances that encourage or discourage the manifestation of pedagogical patterns induced factor" [3, p.37], that is, following this definition, it can be argued that the conditions are in line with the teaching objectives. Such a purpose in the mathematical education of students of technical universities is the students the message volume and quality of the mathematical knowledge that best meet the needs of the future speciality. Such conditions are:

1) selection of mathematical material, largely corresponding to the chosen specialty;
2) establishing interdisciplinary connections of mathematics and other sciences;
3) introduction of innovative learning technologies.

The indispensable companions of these challenges is the independent work of students and customize training based on the pedagogic requirements as: appropriateness of the chosen method of studying a particular topic and its compliance with the existing normative documents; complete lectures or practical exercises; psychological support for students; the use of innovative teaching technologies, taking into account the requirements of the diversification of education.

In teaching mathematics a special attention should be paid to mathematics education for each specialty, adjusting it in the light of recent advances in science, the social order of society on

the basis of mathematical course in a particular technical University, in our case, for the oil and gas majors.

In addition, students must have access to teaching materials on the topics of the course, as well as tutorials and manuals containing professionally-guided math problems, i.e., such training tasks, the wording of which professionally important for students for their future careers and will apply them in lectures, practical exercises and independent work of students, which is one of the ways a professionally-designed student learning engineering mathematics.

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