PROFESSIONALLY-ORIENTED TASKS IN TEACHING MATHEMATICS USING VISUAL MODELING TECHNOLOGY

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ABSTRACT

Our analysis of the state educational requirements of a graduate in the specialty allows us to determine the main purpose of studying at a university: the formation of highly qualified specialists in the engineering field who have fundamental theoretical training and are able to apply the acquired knowledge to creatively solve practical problems. Based on the selected selection criteria, a set of professionally oriented problems in mathematics has been developed that contribute to the growth of motivation and professional competence of students of engineering specialties of technical universities.

Keywords: Professional, orientation, mathematical, preparation, engineering, specialties, creterias.

INTRODUCTION, LITERATURE REVIEW AND DISCUSSION

In modern conditions of the intensive use of mathematical methods in the natural sciences, engineering, and related sciences, which will certainly be reflected in the changing programs of university mathematical education, the problem of more efficient use and development of integration processes in the teaching of mathematics in the system of psychophysiological laws and mechanisms for the perception of complex information by a person learner, the development of his mathematical abilities, thinking and culture.

As mentioned earlier, one of the important directions of the applied and professional orientation of the mathematical training of the future engineer is the selection and study of professionally oriented tasks. Such training can be successful provided a holistic approach to the organization of this process. It is necessary at all stages of educational interaction through professionally oriented tasks to effectively use the mathematical apparatus studied, to show its application in the study of general technical disciplines in the future professional activities of a mining engineer.

Teachers of the department of higher mathematics at a technical university (almost always) are torn, as a rule, from the state educational standard of specific areas of specialist training. In addition, teachers of higher mathematics in the specialties they work for do not always have the latest mathematical methods that can be applied to solve professional problems in this area.

The integration of mathematical education involves the holistic formation of integration concepts among students within a limited time interval, since it eliminates duplication in the study of educational material, thereby providing significant time savings when using various forms of organization of classes.

The integrated representation of information by virtue of its compression, concentration, generalization is an effective tool for rationalizing memorization and understanding. This level obliges to consider objects and phenomena of reality in their interconnection and

interdependence. Under these conditions, the outlook on intra- and interdisciplinary communications is radically changing. In a whole series of cases, mathematics should not become a source, but a consumer of the knowledge offered in classes in professional disciplines, based on ideas formed during the study of these disciplines.

Methodological research, observation, and training practice show that students often cannot use mathematical knowledge in a particular production situation. This, in particular, is due to the fact that the formation of the mathematical apparatus is not sufficiently oriented towards its further use in the study of the disciplines of the natural sciences, general professional and special cycles, as well as in the student's future professional activities.

One of the promising innovative techniques that can solve many problems of modern subject-separated professional education is integration. The concept of subject-centrism is not opposed to integration, and the development of a vocational education system does not go the way of limiting or replacing one principle with another. The learning process takes place within the boundaries of an individual subject precisely because it is an integrated system. Subcentocentrism and integration are two dialectically interconnected positions that condition each other. Practically subject-centrism is an external form of intrasubject integration. The development of the vocational education system should indeed take place through integration, but it is important to understand that this process can and should not occur from subject-holistic education to integration, but from intrasubject integration to intersubject. Such an objectively developing transition does not imply replacement, but the addition of one provision to another.

One of the ways to implement the integration of mathematical education is in modular-block connections, which are carried out with the aim of filling the knowledge gaps in engineering students, as well as generalizing and systematizing educational material. The mechanism for implementing this level is as follows: In the course of mathematics, substantive lines are highlighted, a list of main questions and the amount of material on each line are indicated, their development is examined, the main intersubject communications that require consideration in the classes are highlighted, a methodology for their organization is developed [1, p.103- 104].

Consider the matching graph using an example of the use of interconnected elements of the mathematical apparatus and physical concepts.

Based on the matching graph, the following conclusion can be made. The content of the disciplines “Higher Mathematics” and “Physics” presents enormous opportunities for the implementation of interdisciplinary connections between them using the technology of visual-model learning.

Moreover, almost every topic of the course "Higher Mathematics" involves addressing either one or several types of mathematical models, their construction, research, which provides tangible help in the analysis of engineering processes simulated with their help, interpretation of the results and making high-quality decisions in a course in engineering disciplines and in future professional activities.

The implementation of this technique, with the necessary condition for taking into account the essential functions of mathematical integration, allows you to create integrated tasks of methodological and mathematical content and orient the teacher towards: 1. The development and conduct of integrated classes; 2. Integrated study of topics from mathematics courses [1, p.106].

For the effective use of professionally oriented tasks in training requires a specially developed technique, it is important that students, solving professionally-oriented problems, study mathematics and learn to apply mathematical knowledge in future professional activities.

Integration of mathematical knowledge based on the consideration of professionally-oriented problems allows you to carry out professionally-engineering orientation of teaching mathematics and increase interest in mastering professional knowledge.

Consideration of a complex of professionally oriented tasks by the method of visual modeling is advisable to introduce into the educational process the training of future engineers in current classes in higher mathematics in resource classes. By resource lesson we will mean a lesson that focuses students on future professional activities and describes the meaningful interaction of mathematics and general technical disciplines.
In the basis of the development of resource classes, we adhere to the principles highlighted by T. Shalkina:

- the principle of relevance - to adequately respond to rapidly changing information, knowledge, technology, etc;
- the principle of integration: to combine knowledge not in one selected course (discipline), but in several, i.e. Describe a subject area;
- The principle of vocational guidance: to orient students towards future professional activities by introducing professionally-oriented tasks into the educational process, the results of which are significant in practical activities;
- The principle of student activity: to contribute to the formation of skills of independent search, research activities of students and a creative approach in solving professionally oriented problems in teaching mathematics [2, p.264-265].

Thus, there is an increase in mathematical and applied resources during the educational process, which are then accumulated in the resource lesson by consideration of engineering problems. This contributes to the implementation of professional-engineering orientation in teaching mathematics to future specialists.

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