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USE OF PRACTICAL TRAINING AND INDEPENDENT WORK IN TEACHING MATHEMATICS

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Abstract
It is appropriate to take into account that the optimization of the educational process does not require the constant use of any form of education, but the harmony of forms. In the following article, the forms and methods of teaching with the help of practical training and self-study forms of education in the teaching of professional subjects, including: mathematics, are widely covered.

Keywords. Mathematics, vocational sciences, vocational skills, practical training, independent study, mathematical analysis, functions.

Introduction

Teaching of special subjects in higher educational institutions reflects a specially organized learning-educational process aiming at two twin goals. Teaching students in special subjects and forming professional skills and cultural elements in them.

Today, the following are the main forms of education at a higher educational institution: lecture, practical training and independent work. Each of the listed has its place in the educational process and is of certain importance.

In the traditional way of organizing the educational process, independent work was approached at the second level. Studies have shown that students spend only one to two hours a day on independent work, and some less, which indicates that they do not have the basic skills for independent work. The reason for this is that students do not pay attention to independent work. But it is the only tool that educates to think about the studied phenomena, to understand its essence independently. At the same time, independently developed thinking and interest in knowledge is an incentive for independent work and causes the formation of a demand for continuous self-improvement. Today, from the model of the educational process aimed at mastering the system of ready-made knowledge, this model is much more modernized, that is, other components of independent work; there was a need to move to a flexible type, which has an equal component, such as lectures, practical training and student control of the educational process.

Consequently, if independent work is not given enough attention in classroom learning, students will pay even less attention to independent work outside the classroom. But considering that independent work is work that needs to be done outside the classroom, it is done without a supervisor or supervision,

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and this can cause gaps in the knowledge and skills of specialists, as well as weak general and professional training.

Forms and manifestations of independent work in the classroom and outside the classroom, their integration into a single system closely related to each other serve as a foundation for thorough knowledge, creative thinking, positive approach to learning, optimal methods and ways of mental work, independence and activity of students.

Systematization of students' knowledge is observed when completing individual tasks: while presenting the material in full, the student should be able to independently determine what subject materials are required to know in a specific issue.

It is necessary for students to learn new concepts and sections in practical training and independent work, and thus the greatest attention should be paid to repetition of learned topics. Because as a result of repetition, the topic is studied more deeply, the material is systematized, the connections between new and old topics are studied, and their differences and similarities are considered.

One of the content areas of school mathematics courses is the concept of numbers, which is completed with the concepts of real and complex numbers. Students will gain knowledge about the set of real numbers that can be imagined in the form of arbitrary infinite decimals.

Problems of construction of sets of real numbers are considered in one form or another in the lectures of mathematical analysis, and in practical training they are given very little attention.

Functions are an important component of the content area of the school mathematics curriculum. The concept of function is the basis of all other concepts and is studied during the school mathematics course. Students are introduced to simple functional relationships in elementary school when considering how one variable in an equation depends on another variable. Then a general understanding of functions is formed in schoolchildren.

When studying functions, students should be able to find its domain and set of values: function zeros, continuity and monotone intervals, extremums, continuity intervals, graphs of elementary functions. In testing the skills and abilities listed above, students can use the function and its combinations learned in school in practical activities of mathematical analysis. In making graphs of such a function, it is important to shift and compress it by some basic (the graph of which is known in advance) functions. It provides an opportunity for them to study more deeply the features of the functions that they should learn in school.

The level of mastery of problems related to the analysis of functions in school mathematics varies, but the logical study of functions is completed by analyzing numerical functions using derivatives. Therefore, it is necessary to show these levels of mastery in each of the practical exercises aimed at learning functions and to be able to explain to students the need for analysis using the derivative.

Another section that develops the abilities of schoolchildren is equations and inequalities, as well as real substitutions of expressions. Therefore, it is recommended to use them efficiently for the professional formation of students, if there is an opportunity for this in any mathematics class. Mathematical analysis classes provide a great opportunity for this.

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For example, when studying the applications of the derivative, it is appropriate to look at issues related to the application of the derivative to dividing expressions into multipliers, solving equations with parameters, and inequalities. For example $x(y^2-z^2)+y(z^2-x^2)+z(x^2-y^2)$ if an expression is required to be factored, this $f(x)= x(y^2-z^2)+y(z^2-x^2)+z(x^2-y^2)$ function of chicken, in this case, we take y, z as constant. We find and simplify the product of this function: $f'(x)=y^2-z^2-2xy+2xz=(y-z)(y+z)-2x(y-z)=(y-z)(y+z-2x)$. From this $f(x)=(y-z)(y+z-x)x+C$, where C is a constant independent of x but dependent on y and z. To find s, we give x some value, for example x=0. Then it will be $f(0)=C=yz^2-y^2z$. We express this obtained result $f(x)=(y-z)(y+z-x)x+C$. As a result

$f(x)=(y-z)(y+z-x)x+yz^2-y^2z=(y-z)(y+z-x)x-yz(y-z)=(y-z)(xy+xz-x^2-yz)=$

$=(y-z)(x(y-x)-z(y-x))=(y-z)(y-x)(x-z)$.

So, $x(y^2-z^2)+y(z^2-x^2)+z(x^2-y^2)=(y-z)(y-x)(x-z)$.

As a second example, consider the problem of finding the number of real roots of the equation $2x^3-3ax^2+1=0$ for each value of a. For this, we find the monotonic intervals of the function $f(x)=2x^3-3ax^2+1$. We find the derivative of this function $f'(x)=6x^2-6ax=6x(x-a)$. Stationary points of the function consist of x=0, x=a. There can be three cases. 1- case: $a=0$, in this case the equation has a unique solution. 2-case: $a<0$, in this case f'(x)>0 at $x\in(-\infty;a)$, so f(x) is an increasing function; $x\in(a;0)$ at $f'(x)<0$, $f(x)$ the function is decreasing; $x\in(0;+\infty)$ at $f'(x)>0$, $f(x)$ the function is increasing. The considered function reaches a local maximum $f(a)=-a^3+1>1$ at the point x=a<0, and a local minimum at the point x=0 f(0)=1. It follows that if a<0, the equation has a unique solution. 3- case: $a>0$, $x\in(-\infty;0)$ at $f'(x)>0$, so the function f(x) is increasing; $x\in(0;a)$ at $f'(x)<0$, $f(x)$ the function is decreasing; $x\in(a;+\infty)$ at $f'(x)>0$, $f(x)$ the function is increasing. The considered function reaches a local minimum $f(a)=-a^3+1$ at the point x=a, and a local maximum f(0)=1 at the point x=0. If 0<a<1, then f(a)>0 and the equation has a unique solution. If a>1, then f(a)<0, and the equation has three different solutions. If a=1, then f(a)=0, and the given equation has three but two overlapping roots. Thus, the given equation has one real solution at a<1, three roots with two overlapping at a=1, and three different roots at a>1.

In the practical exercises of mathematical analysis, it is necessary to focus on issues that allow students to express their own conclusions about the concept being studied.

Examples of very important exercises in the development of skills and competences in the formation of the above concepts are making the field of definition in analytical language into a geometric view and vice versa; exercises representing the correct and inverted forms of expressions; exercises to build objects according to the previously given characteristics; and finally we can show exercises that demonstrate the ability to apply the concepts learned in different situations, especially in practical training.

This contributes to the formation of significant professional-methodical skills in teaching students to solve problems.

It is necessary to organize special systems of problems (for each subject and for each student) that provide a professional direction of teaching in order to organize knowledge and learning activities for solving problems.

A critical analysis of traditional methods of conducting practical training shows that their use has its advantages and disadvantages. In teaching students to solve problems, an approach such as the use of a combined form of educational organization is considered appropriate.

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The most appropriate form of conducting practical training is the combined form, which includes all the elements of the seminar. It helps to establish feedback between teachers and students, to activate students' thinking skills by using active teaching methods (organization of problem situations, games in groups, use together with discussion of controversial lectures).

The use of a combined form of conducting training, which includes elements of a seminar, helps to apply didactic and educational-research tasks in training.

Each practical exercise is considered a "step forward" and should be approached differently compared to the previous ones. For this, different methods, methodological approaches, and organizational forms are required. In practical training, the principles of awareness and independence should be implemented, and students should master the methodology of conducting lessons, especially the practice function of solving problems.

It is an important feature to separate issues for collective, group and individual work on each topic of training, to have diversity in training methods, approaches, and organizational forms. In order for each practical session to be a "step forward", regardless of the appropriate composition of the material content, the possibility of applying various didactic and scientific-research tasks is provided in each session.

Also, it is appropriate to take into account that the optimization of the educational process does not require the constant use of any form of education, but the harmony of forms.

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