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FORMING THE PROFESSIONAL SKILLS OF UNDERGRADUATE MATHEMATICIANS

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Annotation
This article discusses the formation of professional skills of bachelor mathematicians. While the practical training in mathematics has its own characteristics, it also has a pedagogical focus on the formation of qualified professionals with solid professional knowledge, skills and abilities that are common to all of them.

Keywords: mathematics, professional skills, abilities, practical training, problem solving.

Introduction

The main forms of professional training of bachelor mathematicians are lectures, practical laboratories, seminars, teaching and pedagogical practice, writing and defending course and graduation theses, preparation of abstracts, discussions, didactic games, meetings with advanced teachers, pedagogical school research and so on. These forms of training bachelor mathematicians not only serve to improve their professional skills and abilities, but also to train professionals who know their subject in depth and sound, have a variety of modern methods and tools of teaching and learning and rationally use the content, methods, forms and tools of education does.
One of the important factors in preparing bachelor mathematicians for active and goal-oriented pedagogical activity is the formation of their professional knowledge and skills.
Professional skill is a well-understood, pre-planned intellectual professional movement.
Professional qualification is an activity that is developed and automated in the process of performing a conscious professional action of a specialist.
The formation of professional qualifications and skills is mainly based on:
- To study mathematics in connection with school mathematics and to study profession-oriented skills and abilities;

- To disclose the activities that reflect the professional skills and abilities in the study of the basics of science in the interaction;
- Gradual mastering of mathematical sciences and methods of teaching them in connection with psychology, pedagogy, philosophy;
- Understanding, completeness and continuity of the process of formation of professional skills and abilities in the study of mathematics in conjunction with other disciplines;
- To analyze and master every aspect of professional skills and abilities during the pedagogical practice.

Undergraduate mathematicians who have mastered their professional skills and abilities will have ample opportunities to successfully carry out educational work. Criteria for such preparation can be seen in the positive attitude of students towards learning activities.

The main and leading form of training qualified mathematicians in higher education is lectures. However, in practical, laboratory and seminar classes, as well as in independent forms of education, students should be closely acquainted with the solution of the problem of applying the achievements of modern science. Such an approach to practical training plays an important role in the formation and development of professional skills and abilities in them. The main purpose of the practical training is to deepen and deepen the study of the topics. In these classes, sufficiently complex problems of the course are considered, mathematical concepts are developed, strengthened and generalized and mathematical problems of theoretical and practical content are solved.

In practical classes, students learn the scientific methods of education, independent mastery of educational topics, skills and abilities to solve theoretical and practical problems.

The effectiveness and quality of practical training largely depends on the creative activity of students and the correct organization. In preparation for the practical classes, students are expected to develop specific sections of school textbooks, get acquainted with the relevant literature, independently study the methodological knowledge related to methods of solving mathematical problems. Because in the process of practical activities students focus on the search for solutions, problems, demonstrate their creative work, strengthen their understanding of mathematical concepts, rules and regulations, interdisciplinary and interdisciplinary relationships, learn to compare personal observations and conclusions with theoretical, methodological recommendations and practical applications.

Practical training should be organized in such a way as to functionally reflect the problems of training bachelor mathematicians, thus creating ample opportunities for the development of creative thinking, independent choice of convenient rational solutions. Practical training, which combines the functions of teaching, developing and educating, has a general didactic system that activates basic knowledge, skills and abilities that develop practical skills.

From the above, it can be confirmed that problem-based learning in higher education creates rich opportunities for the training of highly qualified bachelor mathematicians, in particular, mathematics teachers for secondary schools, academic lyceums and vocational colleges.

It is known that the didactic purpose of education is to instill in students certain professional skills and experiences of practical activities through a system of concepts. While the practical training in mathematics has its own characteristics, it also has a pedagogical focus on the formation of qualified professionals with solid professional knowledge, skills and abilities that are common to all of them.

It is recommended to follow the above during practical training, independent study, writing course and graduation theses, preparation of abstracts of various contents and debates. Thus, practical training in mathematics, schools, academic lyceums, professional colleges appear as an important tool for training mathematicians in a well-rounded and mature bachelor's degree, who can solve the problems of mathematics education.

Example 1. $x\frac{19-x}{x+1}\left(x+\frac{19-x}{x+1}\right)=84$

solve the equation by the system method.

Solve. $x\frac{19-x}{x+1}\left(x+\frac{19-x}{x+1}\right)=84 \Leftrightarrow$

$$\Leftrightarrow \begin{cases} xy(x+y)=84, \\ y=\frac{19-x}{x+1}, \\ x+1\neq 0. \end{cases} \Leftrightarrow \begin{cases} xy(x+y)=84, \\ xy+(x+y)=19, \\ y=\frac{19-x}{x+1},\ x+1\neq 0. \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} uv=84, \\ u+v=19, \\ xy=u,\ v=x+y, \\ y=\frac{19-x}{x+1}, x+1\neq 0 \end{cases} \Leftrightarrow \begin{cases} u=7\wedge v=12, \\ u=xy, v=x+y, \\ y=\frac{19-x}{x+1}, x+1\neq 0 \end{cases} \vee$$

$$\vee\begin{cases} u=12\wedge v=7, \\ u=xy,\ v=x+y, \\ y=\dfrac{19-x}{x+1}, x+1\neq 0. \end{cases} \Leftrightarrow \begin{cases} x+y=12 \\ xy=7 \\ y=\dfrac{19-x}{x+1}, x+1\neq 0 \end{cases} \vee$$

$$\vee\begin{cases} x+y=7 \\ xy=12 \\ y=\dfrac{19-x}{x+1}, x+1\neq 0 \end{cases} \Leftrightarrow \left[\begin{array}{l} x=3, \\ x=4, \\ x=6-\sqrt{29}, \\ x=6+\sqrt{29}. \end{array}\right.$$

Hence, the set of solutions of the given equation:

$$\{3;\ 4;\ 6-\sqrt{29},\ 6+\sqrt{29}\}$$

Example 2. $(x^2+x+1)^2-3x^2-3x-1=0$ solve the equation with the new variable input method.

Solve. $(x^2+x+1)^2-3x^2-3x-1=0 \Leftrightarrow$

$$\Leftrightarrow (x^2+x+1)^2-3(x^2+x+1)+2=0 \Leftrightarrow$$

$$\Leftrightarrow \begin{cases} t^2-3t+2=0, \\ t=x^2+x+1 \end{cases} \Leftrightarrow \begin{cases} t=1, \\ t=x^2+x+1 \end{cases} \vee \begin{cases} t=2, \\ t=x^2+x+1 \end{cases}$$

$$\Leftrightarrow \begin{cases} x^2+x+1=1 \\ x^2+x+1=2 \end{cases} \Leftrightarrow \begin{cases} x^2+x=0 \\ x^2+x-1=0 \end{cases} \Leftrightarrow$$

$$\Leftrightarrow \left[\begin{array}{l} x=0 \\ x=\dfrac{-1-\sqrt{5}}{2} \end{array}\right. \vee \left[\begin{array}{l} x=-1 \\ x=\dfrac{-1+\sqrt{5}}{2}. \end{array}\right.$$

The set of roots of the equation: $\left\{0;\ -1;\ \dfrac{-1\pm\sqrt{5}}{2}\right\}$

Example 3. Solve the inverse equation:

$$x^5+4x^4-3x^3+3x^2-4x-1=0. \qquad (1)$$

Solve. If the exponent of the inverse equation is an odd number, then its single root is always equal to 1, i.e.

$$(1) \Leftrightarrow (x-1)(x^4+5x^3+2x^2+5x+1)=0.$$

Then

$$x^4+5x^3+2x^2+5x+1=0 \qquad (2)$$

it is sufficient to solve the equation. To do this, we divide both sides of (2) by e. $x^2 (x\neq 0)$

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$$x^4+5x^3+2x^2+5x+1=0 \Leftrightarrow$$
$$\Leftrightarrow x^2+5x++2+\frac{5}{x}+\frac{1}{x^2}=0 \Leftrightarrow \qquad (3)$$
$$\Leftrightarrow \left(x^2+\frac{1}{x^2}\right)+5\left(x+\frac{1}{x}\right)+2=0.$$

$x+\frac{1}{x}=t$ if we define, $x^2+\frac{1}{x^2}=t^2-2$ Let's summarize by putting (3):

$t^2+5t=0 \Leftrightarrow t(t+5)=0 \Leftrightarrow t_1=0,\ t_2=-5.$

1. If so, $t=-5$ there will be a $x^2+5x+1=0$ solution. $\left\{\frac{-5\pm\sqrt{21}}{2}\right\}$
2. If so, $t=0$ there $x^2+1=0$ will be a $\{\pm i\}$ solution.

Hence, the set of roots of the equation: $\left\{1;\ \pm i;\ \frac{-5\pm\sqrt{21}}{2}\right\}$.

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