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FORMATION OF PRACTICAL SKILLS AND ABILITIES OF STUDENTS ON THE BASIS OF KHAZANKIN TECHNOLOGY

Abstract: This article illustrates the importance of effective, productive issues in the development of acquired knowledge, abilities and skills as competencies given in the example of a practical training project.

Key words: productive problem, technology of Khazankin, control training, mathematical knowledge, experimental work, supervisor, control activities, assessment, practical work.

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Introduction

The special "productive issues" technology of teaching mathematics, proposed by Khazankin [1], provides for the development of creativity in students.

The knowledge, skills and competencies acquired within a particular subject can be applied beyond its limits, transforming a particular skill in a subject into a universal learning movement. Productive issues are not aimed at consolidating mathematical knowledge, but at teaching students to apply their knowledge independently. As a result, knowledge is not just a result but a means of an individual's development becomes productive issues for students range from reproductive issues is relatively interesting and important.

Productive problem solving is done in the following steps:

1. Understand the problem (what to do?).
2. Find the necessary information (text, picture, etc.).
3. Change the form of information according to the problem (find the cause, separate the basic information, evaluate, etc.).
4. "I think ...", "... because,...", "First,...", "Second,..." and so on formulate an answer using words.

5. Independent full answer (story) without relying on the teacher's reference questions.

Using productive issues allows you to develop the following skills [9]:

acquiring new knowledge based on existing experience;

apply skills in non-standard situations;

independent selection and adaptation of methods of action required to solve the problem situation, finding different ways to solve it;

work with different types of information, adapt, evaluate and change them;

critical thinking, selection of optimal methods of action, reflection.

Problem-solving mathematics teaching technology is based on the following conceptual ideas: personal approach, pedagogy of success, pedagogy of cooperation;

teaching math = teaching problem solving;

problem-solving training = problem-solving skills training + basic problem-solving skills;

individualization of "complex" and "capable" teaching;

proportionality of individual and collective activity;

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conversations of students with different levels of mastery management;

adaptation of audience and extracurricular activities.

The system of trainings organized in the process of introduction of this technology includes the following classes: non-traditional lectures, practical training to solve "basic problems" (allocation of a minimum number of key issues on the topic, solving each problem by different methods, solving different information systems), problem-solving by students, independent problem-solving), competitions and Olympiads, consulting classes (students' questions on the basis of pre-prepared cards, work with cards: analysis, generalization, filling in cards), control classes (individual tasks, oral report to senior students), correction in pair work until fully understood, putting three grades - the answer to a theoretical question, the solution of an example on a card, for written logical speech - evaluation motivation) [4].

In particular, the organization of the process of asking students questions on pre-prepared cards in mathematics consulting classes in higher education institutions can be carried out at the following stages:

issues are divided into groups depending on the content, methods of solving, the level of complexity;

from the proposed problems, the problem is selected in such a way that the method of solving it is the basis, the model for the problem-solving methodology of the whole group;

a single problem is formed and solved that allows students to get acquainted with the solution of several problems on different cards;

find the underlying issues on the cards;

the resources available to solve individual problems included in the cards are identified by the students;

in addition, an important (in the opinion of the teacher) issue is added for all.

In technology of Khazankin a special place is given to control training. The purpose of them is to organize individual work, assistance of higher education to lower level, gradual transition to the solution of relatively complex problems.

In higher education institutions, there is an opportunity to monitor and evaluate students' mathematical knowledge in the organization of practical training in mathematics, as well as to carry out individual work of students serving educational, pedagogical and developmental purposes.

During the experimental work on the research, we verticalized the pedagogical impact on the control process: each student had one stage above the supervisor and one stage below the student. Students are supervised and supervised by a volunteer or teacher, provided that supervision is provided among a group of students selections were organized [7].

The upper echelons took control from the lower echelons. This form of monitoring knowledge, skills, and competencies led to higher results than traditional question-and-answer and other control activities: the teacher was exempted from assessment in practical work and focused on managing student activities; creative roundtables were held during the session; problems were discussed amicably among students, and no "2" grade or reprimand was used for students to express their opinions freely.

After the topic was repeated for the lower level students, the upper level students took on the task: they prepared a card to control the knowledge of the lower level students [8]. Theoretical questions on the card, the basic issues and examples that take into account the abilities of the student taking the control, individual qualities, level of knowledge included (developing interests, developing skills problematic situations, issues and assignments, etc.).

Controls were conducted on each topic, usually once a week. The student who forms and accepts the content of the test also achieved positive results: re-understanding, systematization of the study material, comparison of new and old - at the same time developed the thinking as a "controller".

Algorithm of stages of organization of control work:

1) the student performs an individual task on the card;

2) oral report of students is heard (pair work);

3) gaps or inaccuracies in the student's knowledge are identified;

4) the conversation in the couple continues until it is fully understood;

5) The student receiving the control work puts three marks on the control card:

a) the answer on theoretical knowledge;

b) for solving the problem on the card;

c) for performing independently assigned tasks in the notebook.

6) the student receiving the control work determines the quality of solving each problem by means of symbols;

7) evaluation motivation [4].

The use of game technology in solving interesting problems in mathematics lessons is widely used in general secondary schools. Elements of play are used in the organization of practical training in higher education institutions in pairs, in small groups, in the organization of joint educational activities of students in the team.

One of the most complex and important tasks of didactics is to make the study work as interesting as possible for the student and at the same time not to turn this work into a game. The purpose of organizing such practical classes is to expand and systemate students' mathematical knowledge based on the application of interesting problems [6].

Qualities of interesting topics:

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- 1) such an issue (like any issue in general) has an evolving direction;
- 2) it is necessary to use non-standard forms of the given data and methods of their representation;
- 3) the initial data and situations are conceived and used from real characters in order to achieve the set goal;
- 4) this is a qualitative problem, the solution of which is based on reasoning without the use of mathematical conclusion;
- 5) the issue includes an unusual question.

The following can be mentioned as tasks to be performed [10]:

1. Get acquainted with the methods of using interesting problems in mathematics lessons.
2. Learn how to create interesting problems.
3. To study the use of interesting topics in game technology [5].

Below we present the project of practical training for the formation and development of practical skills and abilities of students [2, 3] (tables 1, 2).

Table 1. Technological model of practical training on "Derivatives of composite functions"

Time - 2 hours	Number of students: 15-26
Form of training	Practical training
Plan	1. Find the product of complex functions. 2. Find the derivatives of given functions functionally and explicitly.
The purpose of the lesson: to achieve full assimilation of practical skills on derivation of composite functions, parametric and implicit functions on the basis of theoretical knowledge and partial practical skills acquired independently by students on composite functions, parametric and explicit functions	
Pedagogical tasks Teacher: 1. Development of students' ability to derive composite functions. 2. To teach students the formulas for derivation of functions given parametrically and explicitly. 3. Development of skills in solving examples on the application of the formula for deriving a function from a given parametric method. 4. Strengthen the ability to derive from a given function without explicitly. 5. Strengthening practical skills on the basis of assignments, achieving full mastery.	Learning outcomes Student: 1. Knows how to derive a product from a composite function. 2. Can distinguish given functions functionally and explicitly. 3. Knows how to derive a product from a given function in a parametric way. 4. Knows how to derive a function from a given function implicitly. 5. Can solve examples on the topic independently.
Methods	Brainstorming, question and answer, two-part diary
Tools	Textbook, ICT
Organize the learning process	Individually, in pairs, in teams
Learning conditions	Projector, computer-equipped auditorium

Table 2. Technological map of practical training

Stages, time	Activity content	
	the teacher	a student
Step 1. Introduction (15 min.)	1.1. The topic, its purpose, training questions (plan), expected results of the training are announced . 1.2. Introduces the evaluation criteria. 1.3. Check the task given for independent preparation. 1.4. 2 examples of finding the product of a complex function are given 1.5. Comparison with reference.	1.1. Hears, writes. 1.2. Hears. 1.3. Indicates the function. 1.4. The example works.

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		1.5. Each student evaluates themselves by examining examples they have worked on.
Phase 2. The main part (60 min.)	2.1. Knowledge on the concepts of parametric function, product of parametric function on the basis of "Bloom's cube" is activated. 2.2. Peer review: assign each student partner as an expert. 2.3. The implicit function conducts a question and answer according to the algorithm for finding the product of the implicit function. 2.4. Based on the "confused logic chain", the stages of the algorithm are strengthened. Establishes mutual control on the basis of the standard. 2.5. Collaborate: Work with students on an example of finding the product of an undisclosed function. 2.6. Reinforcement: gives examples of independent work on finding the derivatives of functions. 2.7. Peer review is a collaborative learning process. Participates in questions and answers, writes the necessary places.	2.1. Participates in questions and answers, writes the necessary places. 2.2. Evaluates the work of the partner. 2.3. Participates in questions and answers, writes the necessary places. 2.4. Solves the "confusing chain". The partner checks the answer. 2.5. Works together, writes an example. 2.6. Individual example works. 2.7. Checks the work of his partner at the back desk, teaches his example to his partner next to him.
Step 3. The final (10 min.)	3.1. Reflection. Provides the task of filling a two-part diary. Work in pairs. Mutual control. Comparison. 3.2. Assigns them to write homework assignments. 3.3. Tell each pair of students to determine the average grade for each of the three assignments. Announces the current grades received by students, puts them in the journal. 3.4. Concludes the lesson. Students listen to their opinions. Announcing the topic of the next lesson and saying goodbye.	3.1. Fills in a two-part diary, evaluates the work of his partner, compares his answers with the work of his back partner. 3.2. Record. 3.3. Calculates, announces the price of the partner, writes down his mark. 3.4. Hears, says goodbye.

Mathematical skills based on an algorithmic sequence of practical actions that are formed in students during practical training depend on the ability to solve basic problems, abstract correct imagination, which is initially formed. Effective, productive issues play an important role in the development of acquired knowledge, formed skills and competencies as

competencies. Examples and problem solving requirements, rules are complete by students achieving mastery, while understanding the essence of algorithmic actions, step-by-step training in their conscious implementation, the correct selection and implementation of appropriate methods and tools will increase the effectiveness of practical training.

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