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TASKS AS A MEANS OF ACTIVATING COGNITIVE ACTIVITY OF STUDENTS IN THE PROCESS OF TEACHING DESCRIPTIVE GEOMETRY AND ENGINEERING GRAPHICS

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Abstract. *The article notes that a powerful means of enhancing the cognitive activity of students is the use of tasks that will attract students to an active cognitive search. This type of activity is not aimed at mechanical memorization and reproduction of ready-made knowledge, but the conscious mastery of knowledge and skills in the process of active cognitive activity. It is proposed to apply a partial-search method to find rational ways to solve educational problems; method of problem presentation to stimulate motivation to study general engineering disciplines; discussion method to activate professionally oriented communication of students in the collective solution of problems. The results obtained indicate that these methods helped to create problem situations, share knowledge, organize the mental activity of students, which ensured the development of personal qualities and the ability to work in a team, using communication skills and experience gained.*

Keywords: *descriptive geometry and engineering graphics, general engineering training, cognitive activity, tasks, active learning methods, engineer.*

Introduction.

One of the areas of professional development of a modern specialist is general engineering training, the main task of which is the formation of professional knowledge, the comprehensive development of a personality that seeks to further enrich and increase its educational potential.

The main documents that define and establish the set of requirements for the content, its volume and the results of educational activities within each specialty in accordance with the National qualifications framework, the level of educational and professional training of specialists is the educational and professional program. According to the educational and professional program (field of knowledge 13 «Mechanical Engineering», specialty 133 «Industrial Engineering»), one of the tasks of the educational industry is the formation of harmoniously developed personalities aimed at implementing their own contribution to the development of the Ukrainian economy, statehood, civil society [1]. Therefore, the preparation of students requires a new direction of the educational process, aimed not at the mechanical memorization and reproduction of ready-made knowledge, but at the conscious mastery of knowledge and skills in the process of active cognitive activity.

Main text.

Involving students in active cognitive activity requires the use of appropriate methods, technologies, techniques, teaching aids that will contribute to the formation of not only professional knowledge, but also the development of personal qualities (intellectual mobility, activity, creativity). Therefore, it is advisable to consider some teaching methods, the use of which will contribute to the activation of activities in the process of general engineering training. From our point of view, it is effective to stimulate students to learn through the method of problem-based learning (the teacher defines the problem for students and determines ways to solve it, which contributes to the search for ways to overcome the problem through hypotheses).

Such teaching methods are used as: active simulation (business game, game design, situation modeling, communicative task) and non-imitation (express poll, discussion, «Brainstorming», «Microphone» technology, «Blitz-interview» technology, an approach peer-learning) form: communication skills, leadership, teamwork, time management, adaptability and flexibility, tactical and strategic thinking, project thinking, persuasion and argumentation, planning, the ability to resolve conflicts, etc. So, Z. Bakum believes that methods interact with each other, but cannot be part of each other, and techniques can be a component of different methods [2].

It should be noted that the discussion is an active tool in the process of solving various problems, contributes to the development of personal, professional and communication skills, activity and the ability to express one's own thoughts and ideas. The discussion provides for a collective discussion, during which students put forward hypotheses, find simple and rational algorithms, which increases motivation, makes it possible to prove and argue their vision of the problem. In the process of general engineering training, we propose to use the method of problematic presentation of the material in combination with partial search methods. Given this, the discussion should be used as a means of collectively solving educational and cognitive problems to enhance the professionally oriented communication of future engineers.

A powerful means of enhancing cognitive activity in the process of teaching general engineering disciplines is the use of tasks that will attract students to an active cognitive search [2]. In the process of solving problems, not only an in-depth understanding of the material being studied is achieved, but also consolidation in various educational situations. To activate cognitive activity, it is necessary to adhere to the algorithm of gradual complication of tasks: from tasks that do not require active mental activity, which cannot be solved without knowledge of the previous material, to tasks that have novelty, which will require independent identification of a new one in the condition of the task and a wide transfer of knowledge.

Each teaching method is implemented using techniques (components of the method) that are used in its implementation. The selected teaching methods allow us to identify the techniques that are used in the process of solving problems: analysis, cognitive search, putting forward hypotheses, planning, abstraction, generalization, concretization, forecasting (Figure 1).

When selecting tasks, the teacher must analyze the methods of cognitive activity

necessary for solving, take into account the knowledge of students, and offer a number of situations that students may encounter during work. Properly selected tasks contribute to: activating the mental and cognitive activity of students; independent finding of a simple and rational algorithm; development of the ability to analyze, predict, generalize and concretize; systematization, deepening and consolidation of theoretical material; development of creative abilities; effective application of acquired knowledge in the process of collective problem solving.

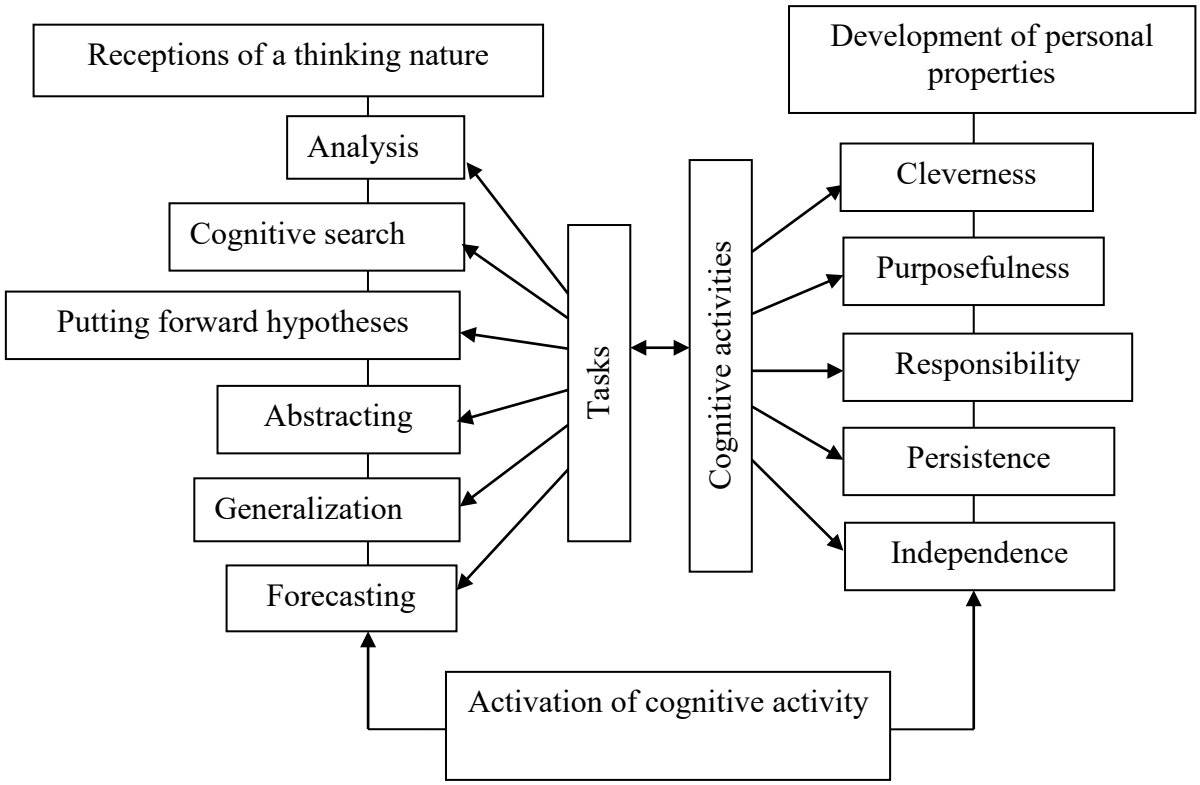

Figure 1 – Activation of cognitive activity of students in the process of general engineering training

Authoring

To activate cognitive activity, the tasks should be an element of a complex task, which will not only ensure the relationship between the topics of theoretical and practical material, but also contribute to meaningful and deep assimilation of knowledge.

Through pedagogical observation, conversations with teachers and students, it was revealed that many students have insufficiently formed professional and personal qualities from the discipline «Descriptive geometry» for successful professional communication. In the process of educational and cognitive activity, it was difficult for students to show activity, creativity – qualities that ensure independent transfer of previously acquired graphic knowledge, skills and methods of activity in a practical situation [3]. Therefore, to enhance the cognitive activity of students in practical classes in the discipline «Descriptive geometry», only active teaching methods were used: problematic (problematic presentation, partially search), discussions.

Students were asked to solve problems in descriptive geometry using active teaching methods to develop the ability to analyze and synthesize educational material; the ability to explain, verify, analyze, predict the result of one's own activity; readiness to listen and supplement the hypotheses of other colleagues.

After such an organization of the educational process, students did not have any difficulties in the process of completing tasks in which it is necessary to construct missing images of surfaces with through prismatic holes, because the student is able to analyze and highlight individual components of the task, represent the shape of objects and their relative position in space, which contributes to interest in learning the disciplines of the graphic cycle.

Before solving any educational and cognitive task, students learned to analyze the condition, identify elements of the known, which prompted discussions in the process of collectively solving a graphic task, contributed to the development of strong-willed qualities (ingenuity, purposefulness, responsibility, perseverance) and the ability to work in a team, using communication skills and received knowledge.

Students, solving graphic tasks, got into a problematic educational situation, which they tried to solve collectively, which positively affects not only the development of the ability to analyze and forecast, but also the ability to listen and supplement the hypotheses of other colleagues. Analysis of the obtained results showed that 20% of students are able to work in a team, using communication skills and independent experience; 30% demonstrate flexibility of thinking and behavior in the process of solving graphic problems; 30% are able to tolerantly solve educational problems; 20% of students demonstrate intellectual mobility, sociability, and emotional stability during work.

On the basis of the above, it can be stated that using the method of problem presentation of the material in combination with partial search methods and discussion as a means of collective solution of educational and cognitive tasks, students solved tasks with interest in practical classes on sketch geometry and were involved in active cognitive activities.

Summary and conclusions.

The obtained results make it possible to assert that the use of the partial search method contributed to finding rational ways of solving educational tasks; the use of the problem presentation method provided motivation to study general engineering disciplines; the discussion method made it possible to intensify the professionally oriented communication of students during the collective solution of problematic issues. The proposed methods contributed to the creation of problem situations, the exchange of knowledge, the organization of students' mental activity, which ensured the development of personal qualities and the ability to work in a team, using communication skills and acquired experience.

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