

# Research skills formed by students through the teaching of general subjects

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**Abstract.** This article discusses the use of research methods in teaching and the fact that they are part of different pedagogical concepts of education and upbringing. In addition, the formation of research skills by students through the teaching of general subjects, certain features of the generality of problem-based and research-based teaching methods, the commonality between research, heuristic and problem-based teaching methods were discussed and demonstrated.

**Key words:** research, concept, general, cognitive education, teaching method, heuristic, problem situation

The use of the research method in teaching has a long history, is constantly emerging from the point of view of practical teachers, and education occurs within the framework of various pedagogical concepts of education [1].

A.Ya.Gerd was one of the first to introduce the research method of teaching into pedagogical practice. It clearly defines the role and importance of research activities in the process of cognitive learning: "All real knowledge is obtained by humanity through observation, comparison, and experimentation, using gradually expanding conclusions and generalizations. but it can be useful to gain knowledge through reading".

B.E.Raykov is an active promoter of the research method, emphasizing the developmental nature of such education. When the research method is formulated correctly, it contributes more to the development of logical thinking skills in the field of concrete facts. Clearly, there is a similarity between student research and research work: the student and the scientist follow a similar logical path. B.E.Raykov describes the research method as "a teaching method that guides a certain logical process based on independent observation of specific events".

It should be noted that the use of the research method as a general pedagogical method of teaching in 20-30 years has led to a consistent violation of the most important didactic principles. Therefore, the research method was temporarily forgotten until the early 60s, when the specific features of the teaching of general sciences required the introduction of elements of research activities into the educational process.

Close to the research method of teaching is problem-based and heuristic learning. Let's look at the commonalities between research, heuristic, and problem-based teaching methods.

First of all, it is possible to note certain features of the generality of problem-based and research methods of teaching. First, in both cases there is an active skill of the individual with methods, techniques that are specific to any creative activity.

M.I.Mahmutov "There is only one way to teach a person to create - he must teach him the creative procedures, that is, the structures that make up the essence of creative activity." Everything only plays a supporting role.

- 1) independently transfer the acquired knowledge and skills to a new situation;
- 2) be able to see the problem;
- 3) see the new function of the object;
- 4) determine the structure of the object;
- 5) find an alternative solution;
- 6) to combine previously studied methods of work with new ones in relation to the problem

"[2].

M.I.Mahmutov who distinguishes three types of problem-based education, directs the research method to the third type of problem-based education. Second, the concept of problem

situation has common roots with the research task. According to, the problem arises only when there are three conditions:

- 1) the existence of a logical connection with predetermined concepts and assumptions;
- 2) dissatisfaction with the level of knowledge, skills and abilities compared to a new, unknown event;
- 3) overcoming difficulties to a certain extent [3].

How? why? what does this mean how can this problem be solved? All of these questions set out some directions for solving the problem, encouraging creative research strategies. Such questions, assumptions, create a problematic view in the broadest sense of the word.

Research and heuristic teaching methods also have common features. According to the research of V.I.Andreev [4], three characters can be distinguished:

- 1) to stimulate students' creative thinking on the basis of heuristic methods;
- 2) development of methodical culture of students in the independent solution of research tasks (application of scientific methods of knowledge);
- 3) creative readiness and the ability to discover new objects in the world around him through real interaction with him.

Thus, the analysis of different active teaching methods (research, problem-solving, heuristic) shows that all of them stem from the need to include elements of research activities related to scientific methods of learning in the content of higher education.

In the modern methodological literature there are various classifications of research works, in particular, their division into qualitative and quantitative, short-term and long-term, planned work and creative tasks. V.G.Razumovsky and others divide research work into two groups: research and design.

In the work of L.A.Ivanova [5] it is proposed to classify the following tasks in scientific research:

- a) prediction of results;
- b) experiment planning;
- c) explanation;
- g) examination of technical and technological concepts and laws, laboratory work.

Practical and didactic research shows that the success of teaching depends on the correct definition of educational goals and content, as well as ways to achieve the goals (teaching methods).

Teaching methods are divided into lectures, stories, explanations, etc., but can also be divided into listening, comprehension, practice, modeling, questioning, exam, project defense, and more. Verbal, visual and practical methods are distinguished by the sources and methods of communication. Depending on the nature of the didactic tasks, methods of learning are distinguished; methods of forming skills and abilities (for example, the method of systematic formation of mental actions and concepts); methods of shaping creative activity; methods of controlling knowledge, skills and competencies. According to the nature of the cognitive activity of students is divided into explanatory-illustrative, reproductive, problem-solving, heuristic (partially research) and research methods.

There are four stages of the research method:

1. observation. Allows scientific facts and their study;
2. formulate a hypothesis. Includes development of initial ideas and concepts;
3. experience. Test the hypothesis. This includes conducting laboratory tests.
4. Processing of results. Explanation and generalization.

We believe that the identified stages of this method should be used as a basis for solving the tasks of teaching and research activities.

The importance of the research method in teaching is explained by its functions:

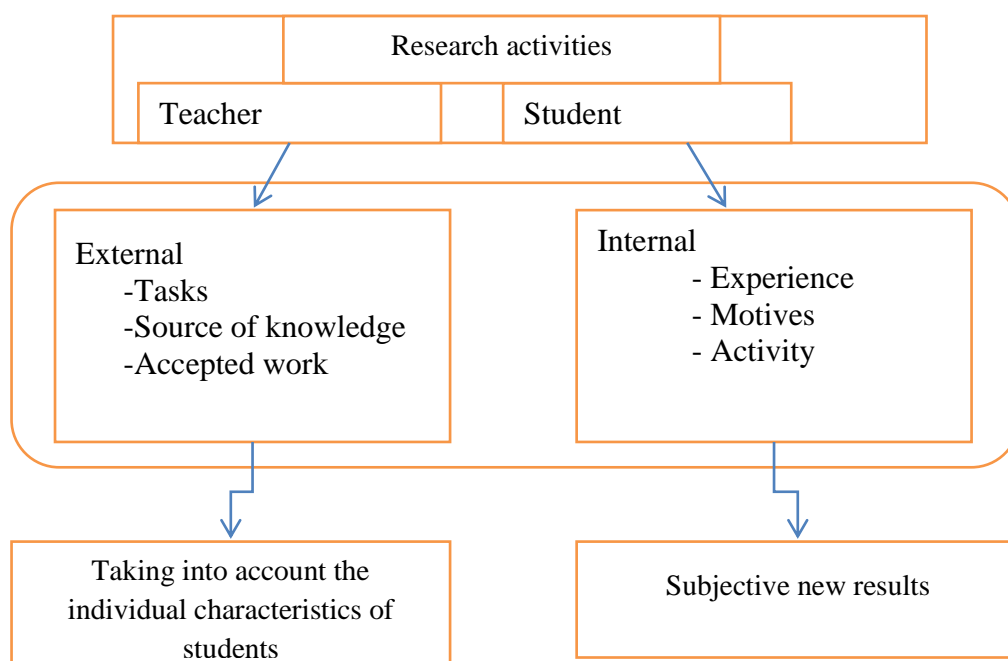
- mastering the methods of scientific knowledge;
- formation of creative abilities, interests, needs;
- acquire conscious and flexible knowledge.

The psychological basis for shaping these needs is innate human needs, including cognitive needs noted that the teaching of scientific methods of cognition, the synthesis of experimental and theoretical methods of studying objects and phenomena, the teaching of the student using scientific research methodology.

Different forms of research work can not only serve the diversity of the educational process itself, but also give a positive impetus to further increase the intellectual level of students. According to V.I.Andreev [4] suggests conducting research by performing programmed tasks (heuristic programming) during a lesson that requires a high degree of independence.

To date, various forms of organization of research activities in higher education practice have been developed, classes on the application of heuristic methods, research classes, application of elements of research activities and extracurricular activities (special courses, student research, participation in conferences etc.) [6].

It is advisable to use independent research assignments in the teaching of general subjects in technical higher education institutions. At the same time, the object of students' research should be a real reality, and the method of learning should be an independent research activity under the direct or indirect guidance of the teacher. An analysis of the organization of this activity is shown in the figure.



**Figure 1. Bilateral description of research activities**

On the one hand, the teacher organizes this activity by showing the sources and means of information to achieve the research goal of the task topics. But the existence of such tasks is not a guarantee of solving them. It is important for the teacher to give research assignments that take into account the individual characteristics of the students; organizing this activity to involve all students; to give a positive impetus to the study of general sciences. On the other hand, the student acquires knowledge and skills, develops intellectual and personal abilities [7]. The wide range of research tasks, various forms of its implementation provide great opportunities for the implementation of an individual approach in the teaching of general sciences.

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