



THEORETICAL ASPECTS OF DEVELOPING SCIENTIFIC THINKING IN STUDENTS

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Abstract: One of the global tasks of innovative development in the world is the formation of scientific thinking in people. This includes activities such as generation of new ideas, ability to find solutions in complex processes, creative approach to professional activity, ability to take reasonable risks, and professional excellence. Modern education at all levels has practically one main goal: to give people knowledge about themselves and the world around them, to teach them to live using this knowledge for the benefit of themselves and society, to contribute to the realization of personal opportunities in their chosen professions. Based on this, education is not a goal, but a tool necessary to achieve more important, strategic goals in life. Higher education plays an important role in modern society. Currently, a lot of practical work on developing the scientific thinking of students is being carried out in pedagogical higher education institutions.

Key words: Education, scientific research, scientific thinking, pedagogical, innovative, competence, knowledge

Introduction. Currently, many practical works are being carried out in higher pedagogical educational institutions to develop the scientific thinking of students. In connection with the search for new approaches to pedagogical education based on the requirements of the time and development, the method of providing knowledge through a scientific approach is becoming a priority in the activities of higher educational institutions. As a practical example of this method, the establishment of the "Scientific and Practical Museum", "Library of Scientific Literature", "Experimental Fields of Selection Experiments", "Regional Research Center", "Pedagogical Innovation Center", "Pedagogical Scientific Research" Center, "Small Schools", "Quarking Center", etc., which were established under the departments based on scientific research, can be cited as an example. The establishment of such centers is the basis for the administrative and organizational aspects of establishing, supporting, and encouraging scientific research of students based on scientific research.

In implementing the tasks set out in this resolution, research work on the development of scientific research competencies in students is of great importance.

Discussion. The high professional training of pedagogical personnel largely depends on the potential formed in higher educational institutions, meeting their educational needs and the level of professional training. In this regard, there is a need to fundamentally revise the education system, expand opportunities for acquiring professional knowledge, train specialists with high scientific thinking who are able to work in new conditions, new modern technologies.

Scientific thinking as a cognitive ability has the following components:

- formulation and development of the problem statement;
- formulation of the scientific question;

- formulation of hypotheses;
- adaptation of the formation of research materials (artifacts);
- generation of data/evidence;
- evaluation of data/evidence
- formulation of conclusions
- includes critical classification and presentation of results.

The development of scientific thinking in students is achieved by ensuring the effectiveness of interdisciplinary integration. Interdisciplinary integration is based on the following three principles, if we want integration to be effective, it must be based on three principles: contextualization, conceptualization, and problem-based learning.

Scientific analysis of the concept of "scientific thinking" requires, first of all, an analysis of the concept of "thinking". Thinking is considered a higher form of human mental activity, characterizing the process of reflecting objective reality in the human mind. Thinking is seen as a means of knowing the environment, social phenomena, reality, and the main condition for the implementation of human activity. Thinking is a higher cognitive process that more fully and accurately reflects reality than intuition, perception, and imagination.

A number of scientists have conducted research on the development of students' scientific thinking. In particular, the issue of human intellectual development has been the focus of attention of thinkers, philosophers, historians, psychologists, and pedagogical scientists at all stages of the development of human society.

R. U. Mamaraimova indicated the following guidelines for opening up broad opportunities for the development of thinking:

- the emergence of a problem and the formation of an intellectual task;
- searching for and finding an answer to the task;
- to perceive this answer as the discovery of subjective novelty;
- to prove the correctness of the answer obtained, to justify it to another person, to explain it.

The development of scientific thinking in students is a necessary task not only for their orientation to scientific research activities, but also for their engagement in professional and pedagogical activities. The most effective way is for students who have graduated from a higher educational institution to start their first work in pedagogy and prepare a scientific research paper on a problem they have observed in their pedagogical activities. Solving a problem whose solution is unknown, discovering laws related to the object under study for use in practice, and developing new knowledge are important for professional and pedagogical activities.

The opportunity to participate in scientific research work is an important pedagogical condition for the development of scientific thinking in students. Involving students in scientific research activities in accordance with their educational direction has always yielded effective results. N. Shermukhamedova analyzes scientific research activities into the following types:

1. Individual scientific research. Individual scientific research is research that is carried out individually and is intended to be personally responsible for the results of a discovery or innovative invention. In individual scientific research, targeted activities are carried out within the framework of the scientist's personal interests. In all types of individual research,

the level of knowledge and the scope of the researcher's interests are of course an important factor.

2. Collaborative scientific research. Targeted activities based on a scientific order are collaborative activities. In collaborative scientific research, a specific goal and ways to achieve it are carried out on the basis of a joint plan. The participation of the team should be clearly reflected in the plans and reports. Also, fundamental, applied, innovative research programs that are currently relevant are also the product of collaborative creativity, since the tasks of team members are clearly defined according to the type of activity based on the plan developed in them.

3. Technical scientific research. Technical research is associated with the practical (technological) transformation of reality. Technical creativity, although close to scientific creativity in its psychological characteristics, also has different aspects. They are manifested in the following. 1. Technical research relies on the visual-figurative and visual-affective components of thinking.

4. The process of technical research is manifested in inventiveness, design, and is the invention of mechanisms and structures that meet the requirements of practice and its result. In this sense, technical research has a rational and utilitarian nature. What is invented is based on the existing technical base, the level of technical progress achieved.

5. Scientific research related to artistic creativity. Artistic creativity is associated with the aesthetic mastery of reality and the satisfaction of people's aesthetic needs. Its features, although abstract-logical and visual-impressive thinking are important in artistic creativity, are mainly based on visual-figurative thinking. The main component of artistic creativity is an emotional phenomenon that manifests itself at the peak of a person's inner experiences. Artistic creativity is a special form of social consciousness - it is realized in all types of art.

6. Pedagogical scientific research is the search and discovery of novelty in the pedagogical process. The first stage of such creativity is the discovery of novelty for oneself, the development of non-standard means of solving pedagogical tasks. Such means are already known, but not used by the teacher. The second stage is the discovery of novelty not only for oneself, but also for others, that is, it is manifested in innovation. Of course, when starting a first scientific research activity, a researcher will experience an initial sense of excitement, pride in their research, setting a vision, and, in turn, inspiration from it. This is undoubtedly a sign of the initial fruits of the scientific process.

Conclusion. In conclusion, it can be said that today the organization of scientific research in higher education requires improving the quality indicators of the educational process and training competitive, high-level scientific specialists in accordance with world standards. Finding solutions to these problems, their widespread application in practice, as specific tasks, is reflected in the correct organization of the scientific research process, the effective use of advanced innovations and technologies, further improvement of scientific research programs in accordance with world standards, the introduction of modern pedagogical technologies of teaching into practice, the widespread use of technical means, including distance learning methods.

As is known, today's education system does not allow the educational process to be carried out in an outdated manner within the framework of new standards and programs created based on the demand for modern specialists. For this reason, pedagogical innovation is now considered as a holistic complex process, and its interactive qualities, educational

components, functional characteristics and continuity are being consistently studied. In this regard, it is a pedagogical necessity to explore the possibilities of applying the design thinking method in the field of education.

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