

## **Principles of Organization of Scientific and Research Work of Students of Higher Medical Educational Institutions**

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**Abstract:** Reforms realized in Ukraine significantly change the nature of the work of specialists in many areas of human activity, including in medicine. A modern specialist should not only be aware of his right, but also have an organizing skills and be creative. A background for fulfilling this requirement is the wide involvement of students of higher educational institutions (especially medical ones) in research work, their direct inclusion in the sphere of the scientific life. Organization of research activities of students is impossible without observation to the principles of education and upbringing. Studies are conducted on the basis medical educational institutions of the Odessa region, allow to distinguish and identify the most important ones, which formulate the professional competence of future healthcare workers. We consider it to divide these rules into general pedagogical, didactic and the principles that teachers are guided organizing work on chemical disciplines. Chemistry in a medical school is one of the fundamental sciences in preparing students for the study of special medical disciplines. Therefore, it is important to lay students, basic, initial skills in search, scientific activity in the study of chemistry. Traditional principles of didactics are the basis of studying all disciplines, and also have to regulate the organizational foundations of the educational process at different levels. Principles, which are governing work in the study of chemical disciplines, help students to master natural sciences and prepare for the study of special medical disciplines.

**Keywords:** principles of training and education; organization of research activities of students; professional competence

The social, educational, medical reforms realized in Ukraine greatly change the nature of the work of specialists in many areas of human activity. Accordingly, the requirements for the training of competitive personnel vary. Among the most important are the requirements of the development of a modern creative, initiative person with organizational skills and ability to direct his activity to improve the technological process by introducing into practice new achievements of scientific and technical thought. A observation for fulfilling this requirement is the wide involvement of students of higher educational institutions (especially medical ones) in research work, their direct inclusion in the sphere of scientific life.

The rapid development of science not only changes the content and importance of educational disciplines, but also prompts new forms and methods of conducting educational process in higher medical educational institutions.

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Scientists in different ways interpret the definition of “research work”. In his dissertation, S. Efremov teaches the research work of students as part of their vocational training, which is defined as a search activity of a scientific nature, as a result of which the subjective nature of discoveries can acquire a certain objective theoretical and practical significance and novelty (Efremov, 2010, p. 8). We agree with the researcher and pay attention that such work requires considerable expenses of time, intellectual abilities of the student, physical forces.

It is well-known that in the higher educational institution of medical care are realized two basic types of research work of students: academic research work, provided by curricula (writing abstracts, performing laboratory, practical, independent tasks, performing non-typical research tasks, developing methodological materials) , and research work of students, which is carried out under the guidance of the faculty in extracurricular time (subject scientific circle, problematic group, scientific conference, scientific and practical conference, artistic and creative activity of students). In this aspect we turn to the scientific position of M. Kniazian, according to which educational and research activity is a kind of educational and cognitive work of a creative nature, which is aimed at the search, study and explanation of the phenomena of reality in order to acquire and systematize subjectively new knowledge about them (Kniazian, 2007, p. 9).

The results of research work are reflected in new courses, lectures and practical (seminar) classes. As practice shows, the involvement of students in the scientific work, develops interest in the subject, consolidates theoretical knowledge, stimulates practical activity, and searches. Moreover, research activities are the main part and a prerequisite for the successful work of higher educational institutions. Students not only receive the latest scientific and practical information from teachers at lectures and seminars, laboratory works and production practices (especially senior students), but also participate in research. Rapid technological progress, in addition to positive effects, has a negative impact on the environment and human health. This sphere of human being is the most unprotected. Hence, increasing the efficiency of university research work, attracting students to their implementation, and improve the quality of training of medical specialists. Due to this university science has the opportunity to rejuvenate the scientific staff, since the influx of young scientists is carried out constantly. This feature gives great advantages to higher education both in terms of the development of the research itself and in terms of training academic staff. Therefore, the specifics of the work of higher medical educational institutions require not just, but an organic combination of educational and research work of teachers, postgraduates and students with community problems. Typical in this area is the integration and further specialization of scientific activity and acceleration of its development. In this case, the availability of chairs and specialties of various profiles and directions creates the possibility of conducting complex research. In higher education institutions, scientific research at the intersection of science (eg, chemistry and pharmacology) is often developed. This gives a certain advantage to

scientific research, since, with all the complexity and diversity of the modern world, multiplicity and complexity play a more important role. As you know, institutes, universities, academies have the opportunity to create collective forms of different divisions: such as between the chair and between faculty associations, the involvement of students of different specialties to perform one or another research work, etc.

The methodology of organizing the research activities of students is widely covered in the writings of modern scholars (M. Kniazian, A. Yanovsky, N. Uisimbayeva, I. Lutsenko). However, we believe that this direction of work is not sufficiently highlighted for students of higher medical institutions. Every person seeks to be socially useful, and this is impossible without certain intellectual achievements, which in turn requires a labile, creative, educated, and interested in his or her work. All these qualities are laid out exactly when studying at a higher educational establishment. Especially the medical industry is developing rapidly. Even ordinary citizens feel the consequences of the ecological crisis, the emergence of new diseases, the imperfection of medical care, the effect of poor-quality medicines. Therefore, it is the students of medical schools that are responsible for finding new treatments, new medicines. We believe that every medical officer, regardless of the position he occupies, regardless of the place of work and specialization, must be in one way or another a researcher.

Organization of research work of students is a very laborious business, moreover, in the work schedule of a teacher, as a rule, it is given to non-auditors. Therefore, the fundamental principle of this work is the personal interest of the teacher in the qualitative acquisition of students by a certain scientific discipline. We are aware of that in order to successfully manage any activity, you must have the principles of organization of this process. Under the principle understand the basic, initial position of any theory, the main rule of activity.

According to the experience of organizing students' research work at the medical educational institutions of the Odessa region, an important guarantee of the success of this type of activity is observance of certain principles. We consider it to divide these rules into general pedagogical, didactic and the principles that teachers are guided when organizing work on chemical disciplines. Chemistry in a medical school is one of the fundamental sciences in preparing students for the study of special medical disciplines. Therefore, it is in the study of chemistry, it is important to lay students, basic, initial skills in search, scientific activity.

Thus, to the general, traditional principles of the organization of research work of students of medical educational institutions include:

- The principle of visibility exists in pedagogy since Y. Comenius and was developed by J. Pestalozzi and J.J. Russo. In the pedagogical literature there are different interpretations of the term “visibility”. We understand that when applying

this principle, students will know the properties of substances through all organs of sensation;

- The principle of interaction between learning and life - the relationship between living and materialized work in previously performed scientific research. In the organization of labor the scientific research plays an important role in the study of the heritage of predecessors;
- Principle of natural conformity. It is based on the fact that the subject taken for the research, by the student should not be imposed and made up by the teacher. It should be real, interesting and genuine, and therefore feasible. The student will be able to explore it on their own, without constant assistance of the teacher. The teacher has the responsibility not to overload the student, so you need to be well acquainted with the age and psychological characteristics of students;
- The principle of scientific knowledge requires the relevance of research topics to the modern development of science and technology. It is necessary to form cognitive interests among students, to teach them to possess modern methods of research, to systematically engage in various forms of scientific research, to stimulate interest in such activities. This poses increased requirements for the organization of work, but creates favorable conditions for the full development of the student's personality;
- The principle of consciousness and activity. From the experience we determine that it is impossible to force the student to engage in research. Only a creative, active student can knowingly perform research work. The teacher, when implementing this principle, should motivate the student to engage in activities rather than coerce;
- The principle of independence. Already by nature, a person from an early age tends to independent activity, including cognitive. Therefore, the teacher should take into account this regularity and at all stages of the study to involve students in active teaching work. Attempts of the teacher to explain everything in detail, to simplify the students' educational work lead to the formation of the consumer psychology of the individual, weaken it, make it incapable of self-sufficient productive professional activity.

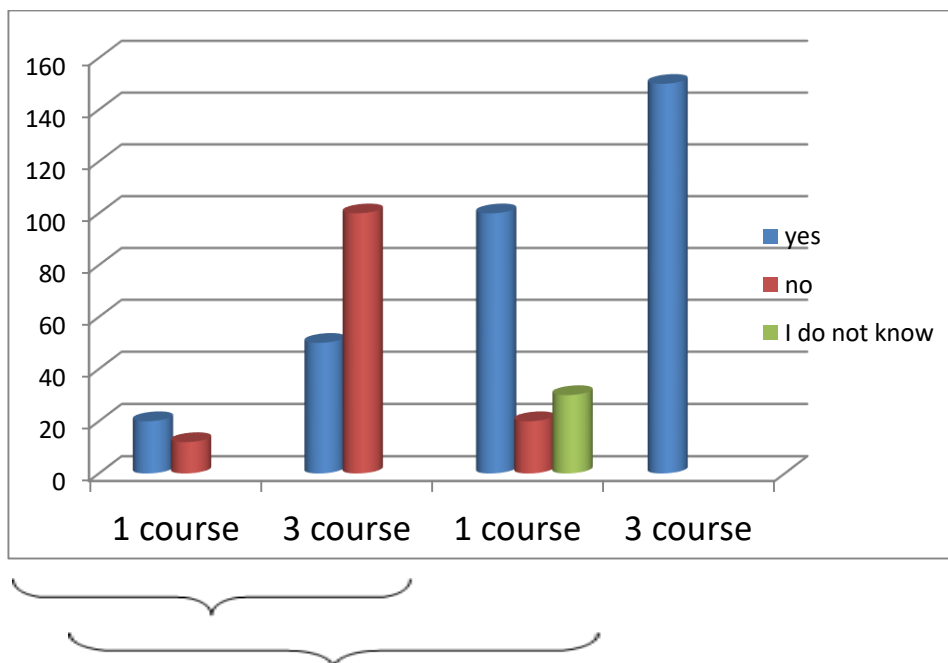
The principles of studying in higher educational institutions are equally important, namely: the unity of educational, developmental and educational functions; humanism; thoroughness; systematicity.

Let's consider the more basic principles that, in our opinion, should adhere to the teachers (for example, chemistry) of chemistry organizing the scientific work of students in higher medical institutions:

- The personal interest of the teacher is one of the main principles. If the teacher is only a mechanical mediator between the theoretical aspects of chemistry and the student, then the latter will never have the desire to delve into practical activity. The

chemistry teacher should himself be interested in the modern achievements of the sciences of the natural cycle;

- Interpersonal communication is a compulsory component of the research. Students should feel the integration of chemistry with medical disciplines: 90% of medicines are chemicals. Therefore, the study of the properties of substances will help to understand their impact on the human body, the rate of absorption, routes of introduction, etc.;
- The principle of experimentation is important, because chemistry is an applied science. And any search should be based on chemical research, the conduct of chemical demonstrations to confirm the theoretical hypotheses and assumptions;
- The regularity of research work is an important factor in the organization of the regime and schedule of the student's day. Teens are learning to plan their day, get used to the fact that any work must be systematic and well organized. Important in the implementation of this principle is health-saving activity. Students should do research not immediately after training, but to choose less workloaded days or after a certain holiday for the given work.
- Continuity and accessibility are needed for comprehension of complex material. It is important to match the content, scope of the material being studied, methods and organizational forms of learning for the age and individual capabilities of students, their knowledge and ideas. In didactics, accessibility is interpreted as a measure of difficulty and does not mean adaptation to the level of student's actual development, but focuses on the immediate prospects of development. In the first year students work more with literature, learn to draw conclusions, generalizations, perform simple experiments. On advanced courses on this topic, more complex experiments, experiments that require more scientific explanation. This principle is clearly confirmed by a survey conducted among Ph.D. students in grades 1 and 3. In total, 300 students participated in the survey (150 respondents from each course). The result is presented in the form of a diagram:



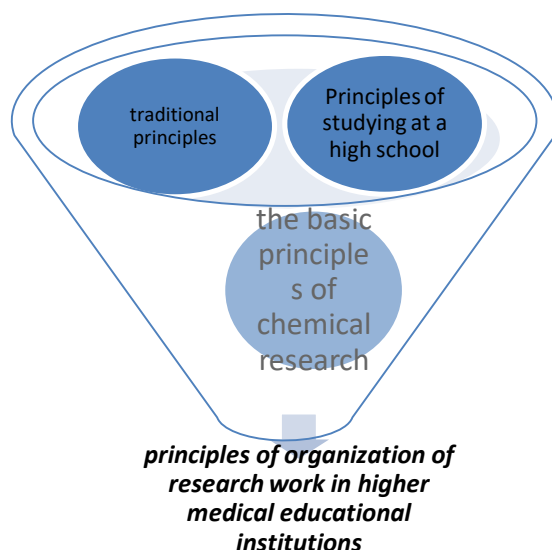
*it is possible to carry out experiments it is possible to carry out experiments only without studying the subject after studying the subject*

- Collectivity is due to the growth of specialization of workers, the scale and complexity of research, the development of the material and technical base of science. When carrying out a chemical experiment it takes time, the use of reagents and equipment. A study conducted by several students will be more effective. Therefore, there was a need to unite the forces of many young researchers, although the immediate process of finding and discovering has an individual character;
- Dynamism, mobility, creative approach is necessary for the development of students' activity in professional activities. Chemical sciences develop very quickly. And what was relevant today, tomorrow is already publicly available information. You need to learn how to approach the problem in a non-standard way;
- Self-organization refers to important principles of life safety. When working in a chemical laboratory, the student must be careful and adhere to the safety rules. It is well-known that chemical reagents are dangerous in the uncontrolled use of them.
- Openness of the research and publication of the results of work significantly affects the formation of important professional competence of the student. Future healthcare worker should be able to communicate with colleagues and patients. It is important that he himself was a sincere and tolerant professional. Most people are

not familiar with medical terminology, and students learn to communicate scientific facts in an “accessible” language;

- Principle of cultural conformity. His decision is the upbringing of students from the culture of observance of scientific traditions, scientific research and novelty, and the originality of approaches in its solution of a scientific problem. The principle of cultural conformity can be considered the principle of creative research, when the student brings into his research something own, unique, permeated with their world-mindedness and worldview, which allows the study to be unique and original.

Represent the above principles in the form of a generalizing scheme:



In our experience, the research work of students was realized through such a form as a chemical circle. The purpose and main content of the work of the chemical circle is the discovery of gifted students and the development of their abilities through in-depth study of the chemistry course, participation in research projects. Teachers of chemical disciplines decided to hold an open meeting of the chemical circle and invite students of the first year. The results of the second-year students’ study on “Noble metals (gold and silver) in medicine and pharmacy” were demonstrated. The first-year students were introduced to the main objectives of this study, which were as follows:

- to deepen knowledge about chemical properties of gold and silver, as d-elements, their ability to form colloidal solutions;
- To collect and systematize data on recent researches of domestic and foreign scientists on the medical and biological role of noble metals (gold and silver) in the human body;

- get acquainted with pharmaceutical preparations containing gold and silver;
- study the application of gold and silver in cosmetology;
- develop a scientific outlook and chemical thinking;
- develop skills of search and research work, ability to generalize and formalize research results;
- to show the relationship of chemistry with clinical and pharmaceutical disciplines (anatomy, physiology, medical biology, microbiology, pharmacology, internal medicine, pharmaceutical chemistry, pharmacy technology of medicines).

After that, the importance of the following research methods was explained:

- work in small groups with scientific sources and Internet resources;
- chemical experiment;
- analysis of thematic scientific articles in professional editions and video materials;
- analysis of drugs containing compounds of gold and silver, which are used in medical practice and presented on the pharmaceutical market of Ukraine;
- compilation of data in the form of circuits, tables, diagrams;
- creation of presentations, booklets and newsletters.

Second year students presented their work through presentations. We would like to note that teachers in this event participated only as project guidance.

From the study we draw a conclusion. The above-described principles form organic unity and carry the organizing start of the joint activity of the teacher and students in the process of organization and implementation of research work. Principles of studying at a higher school perform a regulatory function from the perspective of modeling didactic theories and ways of regulating the practice of the educational process. Traditional principles of didactics are the basis of studying all disciplines, and also have to regulate the organizational foundations of the educational process at different levels. Principles governing work in the study of chemical disciplines help students to master natural sciences and prepare for the study of special medical disciplines.

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