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FACTORS AFFECTING THE PROCESS OF FORMING RESEARCH SKILLS IN STUDENTS

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ABSTRACT

The article discusses the factors that affect the process of formation of teaching and educational research skills in students.

Keywords: teaching-research work, teaching-research activity, teaching-research skill, educational technology, didactic process, principle, factor, methodical support.

INTRODUCTION

In the context of the evolution in world education, scientific knowledge and changes in its paradigms, the exact sciences, including physics, are seen as a multifactorial phenomenon that affects the development of an individual's intellectual potential. The widespread use of computational mathematics methods and information and communication technologies in modern physical research requires the training of modern competent researchers working together on topical fundamental issues such as interdisciplinary research, technical and physical experimental base, globalization of physical research (e.g., Large Hadron Collider)

The preparation, organization and conduct of experiments aimed at developing students' research activity, creativity, research skills as an important factor in the formation of an information-educational environment that allows to develop the creative potential of the individual requires the improvement of modern didactic tools, forms and methods. In this regard, the use of interactive teaching methods in teaching physics, integration of traditional and modern teaching methods, information and communication technologies, the gradual development of teaching and research skills in students are becoming increasingly important.

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LITERATURE REVIEW

A number of psychologists and pedagogical scientists, including A.I.Savenkov, A.S.Obukhov, A.V.Leontovich, A.V.Stepanchenko, P.V.Seredenko, A.N.Gladkova and others researchers have been conducted studying activities.

A. И. Savenkov [1] analyzes research activity and emphasizes that it consists of three autonomous components: exploratory activity, divergent thinking and convergent thinking. Research for the successful implementation of the activities of subject, it should be able to research. The following positive qualities are reflected in the subject of research ability: curious, strong motivation to learn; able to see the problem; high research activity; the ability to think is well developed, that is ability to think convergent and divergent.

Educational research activity is an educational technology that is used as a tool in educational research. The research activity, under the guidance of a research supervisor - an expert, aims to create an understanding of the phenomena of the environment, as well as assume that a problem that is not known in advance can be solved by students. Research work is a process in education, which is carried out on the basis of research activity technology [2].

According to A.S. Obukhov in the process of carrying out research activities, the student demonstrates the quality of research and develops skills. The quality of research is an important personal quality, based on which the researcher not only actively reacts to changes in the world around him, but also forms the need to know and search for previously unknown things [3].

A.V. Leontovich describes the preparation of students for educational activities as a method of involving them in independent activities, direct observation and educational and research work. The meaning of the word research work in the field of general education is interpreted in the context of activity work in the description of education. If this activity ends with a new result in the research work, the main goal in the research work is the development of intellectual abilities of student's personality [4].

M.I. Starovnikov [5] teaching and research activities in education, the results are as follows. These are: the formation of a scientific worldview in the student through the practical application of the method of scientific knowledge; development of interest in learning; the ability to see the problem and advance the hypothesis, the formation of the ability to work together as a team in the problem-solving process, and so on.

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It is obvious that the term "research activity" is interpreted differently in different psychological and pedagogical educational and scientific literature. Summarizing the views of the psychologists and educators mentioned above, we have described the research skills as follows. When we say research skills, we mean the effective implementation of creative activities using research methods. The development of research skills is based on the conscious integrative use of knowledge gained from different disciplines at all stages of activity [6].

The process of developing research skills in students is inextricably linked to learning objectives. The specificity and description of research skills are reflected in the content of teaching, and its level of development is the result of the didactic process. Although the didactic process of teaching depends on the influence of external and internal factors, they are not always clearly distinguished in research. Typically, in encyclopedic dictionaries, the concept of factor is interpreted as a process, a force that determines and drives the description or specific properties of an event [7]. I. P. Podlasyy [8] identified the following four factors that affect the effectiveness of the didactic process in teaching. These are: training material; organizational and pedagogical impact; level of mastery of students; learning time.

RESEARCH METHODOLOGY

Research ability is an individual psychological feature of the student, in which several types of practical activities (such as collecting data on research work, conducting experiments, using mathematical models and ICT programs) are carried out effectively.

The organization of educational and research activities is based on the following principles. The first principle is compliance with the requirements of the state as a social order (upbringing of a harmoniously developed generation); the second principle is integrity (the process is coordinated around a single goal and the result is focused on the development of the individual's intellectual potential); the third principle - scientific (the information presented in the research work corresponds to the development of science and technology, the comparison of newly acquired new knowledge with other sources); the fourth principle is the unity of theory and practice (having the skills and competencies to apply the acquired knowledge in practice).

It should be noted that research activities are built on the basis of a special type of logically structured considerations as a method of acquiring scientifically based knowledge. At the same time, the research activity consists of motives, content, goals

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and assessments, which meet the requirements of logical consistency and systematization in the object of educational and research activities, in the provision of educational and research work applied (textbooks, equipment).

Factors influencing the solution of the problem of formation of research skills in students on the basis of physical experiments. Let us consider the example of I.P. Podlasy's views:

The first factor is the training material. The content is appropriate to the teaching materials in the teaching of physics and the content needed to develop research skills are identified. When Podlasy spoke of such content, he considered it as a system of knowledge, skills, and competencies selected for mastering in a particular educational institution. In support of his view, we must first address the question of what principles should be used in the development of content of the formation of research skills in students on the basis of physical experiments. In our opinion, it is expedient to organize on the basis of the following principles:

- scientific (basic concepts based on teaching and research activities, the study of laws);
- systematic (achieved through the development and implementation of a comprehensive approach to physical experiments, including in-class and out-of-class);
- consistency (each new task is based on the previous one);
- comprehensibility (provided through the use of demonstration experiences related to cognition, creative assignments and creative issues, teaching and research issues, problem-solving opportunities);
- relation to real life (linking theoretical knowledge with real educational and research activities in the process of performing physical experiments);
- age-appropriate abilities and capabilities of students.

The second factor is the organizational and pedagogical impact. Factors influencing the organizational and pedagogical impact of classroom and extracurricular activities include:

1. Teaching methods. Students are encouraged to use conversations, lectures, discussions, exercises, creative physical experiments, laboratory classes, cognitive demonstrations, and problem-solving techniques to develop teaching and research skills.

2. Different forms of teaching are used in the organization of educational and research activities: individual, group and frontal.

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3. Training equipment and teaching aids. The material and technical base of the educational institution is one of the important factors in the effective organization of education and the development research skills in students on the basis of physical experiments. The level of development research skills in students directly depends on the equipment of educational laboratories and the provision of educational institutions with modern teaching aids (modern information and communication technologies, pedagogical software and other modern teaching aids).

4. Information support. It is important to gather new data for the needs of research. It is necessary to teach students to use new information effectively, which allows them to develop research skills through teaching and research activities. The collected data provide information on the basics of science and contribute to the effective completion of educational and research work.

5. Monitor and verify the results. Certain results are achieved by controlling the level of formation of teaching and research skills in students. The teacher's assessment of student work should be sufficiently substantiated.

6. Requirements to the teacher. The pedagogical skills of the teacher (organizational, communicative, research, scientific-cognitive abilities) are of special importance. The teacher should organize teaching and research activities in such a way that the student can express himself through activities in this area.

The third factor influencing the effectiveness of the didactic process is the level of readiness of students (general preparation, i.e. the availability of basic knowledge to engage in research activities, the formation of the ability to acquire teaching and research skills, psychological characteristics, personal qualities, etc.);

The fourth factor - the time (direct distribution and efficient use of the time).

Among the factors listed above is another factor that directly affects the process of formation of teaching and research skills - the methodological resource of the educational institution. Because the material support of the educational institution is important in teaching. Ensuring this factor will largely depend on the quality of education management in the educational institution, the professionalism of Methodist scholars and each educator.

The process of developing research skills in students depends on the combined influence of the factors listed above. The introduction of a holistic approach in the educational process allows students to successfully develop teaching and research skills based on different levels of experience.

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During the investigation of the study based on the analysis of the literature study and research skills of students, taking into account the factors affecting the process of identifying the structure of the teaching and research skills. These are:

Practical skills

1. Mastering the elements of research activities (such as setting a goal, setting a problem, advancing a hypothesis).
2. Obtaining and using information from research sources (textbooks, popular science journals, reference books, the Internet).
3. Experimental skills (planning, assembling the device, performing measurements).
4. Carrying out computational work in the processing of research results, the use of mathematical models, modern ICT programs.

Intellectual skills

1. Analysis and synthesis of the obtained results
2. Independent writing of research work.
3. Prepare a presentation of the work.
4. Present the work presentation to the class.

The criteria for assessing the formation of practical skills in students in teaching and research activities are given in the table

Criteria for assessing the practical skills formed in students

Ability	Low	Average	High
Mastering the elements of research activities	The investigation on the case is not clearly understood. Under no interest in teaching and research activities, external influences are busy with research work.	Have an attitude to teaching and research activities (motivational - interest in research work and knowledge of the essence of the phenomenon).	Attitude to teaching and research activities (motivational - interest in research work and knowledge of the essence of the phenomenon) is high. Can give an idea on a cognitive-research problem. Putting and searching for a problem, can formulate a research hypothesis.
Obtaining and using information on research work on the topic from information	Gathers information based on specific help.	Gathers the necessary information for the research work, but has not fully	From the cognitive point of view - effective work with the received information, well-mastered methods of scientific knowledge

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sources		mastered the methods of scientific cognition.	
Ekspermental skills	With the help of external assistance, an experimental plan is drawn up and assembles its device.	With the help of partial external assistance, he draws up an experimental plan and assembles his device, performs measurement work.	Cognitively - independently develops an experimental plan, knows the sequence of the experiment and the correct organization of work. Performs measurement and calculation work independently.
Use of mathematical models, ICT programs and tools	Inefficient use of mathematical models and ICT programs.	Uses mathematical models and ICT programs based on external assistance.	Doing creative research can give you a variety of ideas, mathematical models and independent access to ICT

ANALYSIS AND RESULTS

On the basis of practical work on "Assessment of the size of molecules" and "Study of the heat balance between bodies" in the school textbook [Pages 9, 38 and 63] in the context of estimating the size of small particles by comparison, students of school 126, Chilanzar district, Tashkent educational and research work was recommended. Based on the conducted experiments, the level of formation of teaching-research (practical) skills in students was studied, and its results are shown in the following diagram.

Diagram of the development of practical skills in students

	Total students	low	avarage	high
Practical lesson 1	34	16	12	6
Practical lesson 2	34	11	14	9

CONCLUSION

1. The introduction of research elements in education increases the activity, initiative, curiosity of future professionals. Increases their interest in independent research, "inventions", "discoveries" and "new ideas", develops thinking and research skills.

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2. It was found that the formation of teaching and research skills in students is based on the principles of: systematization, interdisciplinary integration, creative activity, self-evaluation.

3. Activities aimed at developing research skills based on physical experiments help students to master certain elements of research work (such as planning an experiment, being able to see and distinguish connections between objects in research, work, summarizing, drawing conclusions) and cognitive and found to be the basis for the development of creative qualities.

4. By involving student in research activities, first of all, they develop search activity and independent research activity; secondly, this activity, formed in the student, serves as a basis for new successes in the future, that is, they are manifested in active research, rationalization, inventive activity. That is why this activity is an important part of the educational process.

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