Pedagogical Cluster- Journal of Pedagogical Developments
PCJPD: Volume 2 Issue 10, October 2024, online: ISSN 2956-896X

PEDAGOGICAL CLUSTER
JOURNAL OF PEDAGOGICAL DEVELOPMENTS

Website: https://euroasianjournals.org/index.php/pc/index

Development Of Pupils' Learning And Research Skills Through Experimentation

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Abstract: The article is devoted to the development of theoretical foundations of the methodological system of development of teaching and research skills of students and its model, to the illumination of psychological and pedagogical aspects of the teacher's and student's activity in the process of development of teaching and research skills of students.

Key words: educational-research work, educational-research skills, creative thinking, methodological system, experiment.

Развитие Учебно-Исследовательских Навыков Школьников На Основе Экспериментов

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Аннотация. Статья посвящена разработке теоретических основ методической системы развития учебно-исследовательских умений у учащихся и ее модели, освещению психолого-педагогических аспектов деятельности преподавателя и ученика в процессе развития учебно-исследовательских умений у учащихся.

Ключевые слова: учебно-исследовательская работа, учебно-исследовательские умения, творческое мышление, методическая система, эксперимент.

Introduction

In the context of the development of world education, changes in scientific knowledge and its paradigms, the exact sciences, in particular the subject "Physics", are considered as a multifactorial phenomenon that influences the development of the intellectual potential of the individual. The widespread use of methods of mathematical calculation and information and communication

technologies, interdisciplinary scientific research, the complication of the technical, physical experimental base, the globalization of current fundamental problems (for example, the Large Hadron Collider) in research work on physics require the training of modern competent researchers working in collaboration. As an important factor in the formation of an information and educational environment that promotes the development of creative abilities of the individual on a global scale, it is necessary to improve modern didactic tools, forms and methodology of preparation, organization and conduct of physical experiments aimed at developing activity, research, creativity, research abilities of students. At the same time, the issues of using interactive education methods in teaching physics, integrating traditional and modern methods of teaching physics, equipping based on information and communication technologies and the gradual improvement of the technology of educational and research skills in students are becoming more relevant.

The degree of study of the problem

In our republic, as well as in the countries of the Commonwealth and foreign countries, a number of research projects have been carried out aimed at improving the education system and increasing the creative abilities of students. Currently, educational paradigms are changing - the transition from a learning process aimed at conveying accurate knowledge to students in a certain volume to a new direction in learning, that is, to "learning to learn." The need for such a transition has been discussed in the psychological and pedagogical works of many scientists, such as A.V. Leontovich, A.S. Obuhov, A.V. Khutorskiy, R. Ishmukhamedov, and others. [1-4].

We, summarizing the opinions of psychologists and educators, defined research skills as follows: when it comes to research skills, it is necessary to understand the ability to effectively carry out activities using research methods. The development of research skills is carried out at all stages of activity based on the conscious integrative application of knowledge acquired in various subjects.

When creating a methodology for a methodological system for developing students' research skills, it was determined that it consists of the following components:

1) elements of the process of developing educational and research skills students;

2) objects of the process of developing educational and research skills students;

3) modern pedagogical technologies in the process of developing students' research skills;
4) forecasting the level of development of educational and research skills students.

We also studied the factors influencing the development of students' research skills based on physical experiments. The first factor is the basis of the research work. To clarify the content (scientificity, systematicity, consistency, accessibility, compatibility of age-related abilities and opportunities) necessary for the development of educational and research skills in students involved in the research work; the second factor is the organizational and pedagogical influence. This factor includes the following: teaching methodology (conversation, solving creative and experimental tasks, laboratory classes, demonstration experiments related to cognition), organization of educational and research activities (individual or group), teaching aids and teaching aids, information support, control and verification of results and requirements for teachers (organizational abilities, communicativeness, research, scientific knowledge, etc.); fourth factor - the level of preparation of students, which influences the effectiveness of the educational process (general preparation, i.e., the availability Also, the material security of the educational institution, the quality of management of the educational institution, the professional qualification of the methodologists and each teacher are of great importance in teaching.

Implementing a comprehensive approach to the listed factors in the process of developing students' educational and research skills allows for the successful development of students' educational and research skills in secondary schools.

Based on the scientific and methodological research conducted on the topic "Developing Students' Research Skills Based on Physical Experiments," the following conclusions were drawn.

From a theoretical perspective, the methodological system for developing students' research skills consists of the following components: the model of pedagogical activity for developing research skills; forecasting the level of development of pedagogical technologies and objects, as well as research skills in the process of its development.

Through physical experiments based on the application of personality-oriented educational technologies, it was determined that engaging students in research activities, the stages of preparing them for research work and developing their research skills are an effective method for developing students' research skills.

It has been established that the development of students' research skills is based on the principles of systematicity, interdisciplinary integration, creative activity, and self-esteem.

It has been established that activities aimed at forming and developing educational and research skills based on physical experiments become the foundation for students to master certain elements of research work and develop their cognitive and creative qualities, as well as students' practical and intellectual skills.

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