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Research Article

FORMATION OF PRACTICAL SKILLS AND COMPETENCIES OF PUPILS WHEN PERFORMING EXPERIMENTAL EXERCISES IN PHYSICS

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ABSTRACT

In this article, the effect of competences in the formation of practical skills and qualifications of pupils in conducting experimental physics classes in the educational process is considered.

KEYWORDS

Physical experiment, level of knowledge, skill, qualification, competence, mastery levels.

INTRODUCTION

The variety of situations of uncertainty faced by the young generation puts before the general education system a wide range of tasks related to the accumulation of positive experience by pupils in finding answers to questions related to real events in the surrounding world. In addition to knowledge, graduates of modern schools should develop the ability to analyze problems, understand complex situations, solve various problems, and draw conclusions.

The national educational initiative of the state educational standard emphasizes that the most important conditions for the development of a modern personality are qualities such as initiative, creative thinking, and the ability to find innovative solutions. Particular attention is paid to the need to involve schoolchildren in research projects and creative activities, through which pupils learn to design, invent, and apply the acquired knowledge in practice.

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The development of pupil's ability to conduct scientific and research activities is clearly promoted as one of the main directions of improving education, in which physics education traditionally plays a leading role.

The works of V.I. Andreev, L.I. Antsiferov, V.V. Mayer, V.A. Orlov, I.G. Pustilnik, V.G. Razumovsky, A.V. Usova, who emphasized the importance of solving experimental problems as the most natural problem, and a number of other well-known researchers of general education problems are related to the study of real natural phenomena. It is a process that contributes to the development of various pupils. However, the changed conditions of school physics education, including the possibilities of the modern educational environment, as well as the requirements for educational results and the organization of educational and research activities, make us physics forces to reconsider the issue of studying science. To emphasize the research orientation of experimental assignments, development of skills and abilities in the process of teaching physics.

When we look at the pedagogical process from a dialectical point of view, we see in it a whole consisting of activities between two parties, "teaching-educator" and "educator-receiver" [1-3]. In the educational process, the goal-oriented and coordinated organization of the activities of the "educator-educator" and "educator-educator" parties, assimilation of knowledge on the subject and the necessary skills and vision is considered important as it focuses on the formation of skills. In revealing the vital importance of the essence of the knowledge imparted by the teacher to the learner, including the formation of interest in physics, it ensures a good understanding of the educational material.

The teacher takes into account the character of each pupil's knowledge acquisition and ability to retain knowledge in memory, and accordingly the type of knowledge, skills and qualifications he has acquired (theoretical knowledge, the ability to apply them to practice, independent laboratory training level of performance and research) and based on being aware of the size, the teacher plans to give assignments and instructions to the pupil. This situation, in turn, creates an atmosphere of mutual trust and interest in science in the important relationship between the pupil and the teacher. That is why the didactic principle of cooperation between the pupil and the teacher is considered an important factor in ensuring effective teaching. Didactics divides the acquisition of knowledge into three different levels: the first level - receiving, understanding and remembering, the second level - being able to apply the acquired knowledge in familiar situations, the third level - being able to apply the acquired knowledge in new, unfamiliar situations. Today, modern pedagogical technologies are used in the teaching process in order to increase pupils' knowledge acquisition to a high level [4; 5].

It is known that most of the specialists trained in educational institutions will work in various fields of production in the future. Therefore, the acquisition of competences (knowledge, skills, and abilities) in the use of educational equipment in experimental classes from physics, which is considered the basis of technology, of future specialists being trained in educational institutions, is considered an important factor in the formation of professional competence in them [6].

Pedagogical studies show that it is advisable to repeat the given knowledge at least 2-3 times for the learner to master, and for children with weak intellectual activities, it is more appropriate to give assignments and exercises. As a result of repetition, the scientific concepts and knowledge formed by the pupil

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regarding a certain process undergo quantitative changes and then take on a clear qualitative form, and in a certain sense, the process of "awakening" occurs in the mind of the pupil. In the process of cognitive activity of a person, information is recorded by his sense organs, and then he compares the received information and data through observation and analysis. Eventually, they become solid knowledge as a result of better understanding. Since not all pupils in the class can think in the same way, it is natural that their learning abilities are not the same. Consequently, the pedagogue plans the educational process taking into account the learner's ability and the age-appropriate physiological characteristics of the pupil.

In the conducted pedagogical experiments, when the pupils in the class were given an experimental task, most of them could measure the force of gravity with the help of a dynamometer, for example, but they did not know friction or Archimedean force (despite having formed knowledge about the nature of these forces) we can see that the identification skills are not well formed. The reason for this is that the practical application of the acquired fundamental knowledge of the pupil in teaching, the practical use of tools and educational equipment is not brought to the level of "competence".

Based on our experience, we present the problem of formation of the pupil's science-related competence, that is, conducting experiments, measuring physical quantities, being able to use tools in practice, and drawing conclusions, as an example of determining Archimede's force.

Necessary equipment for determining Archimedean force: dynamometer, liquid container (in the form of a cylinder), metal body and liquid (water).

Order of work:

• Hang an object on a dynamometer and measure its weight in air. Record the value shown by the dynamometer as F1 = …….

• Lower the object attached to the dynamometer into the liquid. (In this case, the body should be completely immersed in the liquid, but the body should not touch the bottom of the container). Note also the value F2 = …… that the dynamometer shows when the object is in the liquid.

• The force difference F1 – F2 gives the value of the Archimedean force. Based on the measured results, calculate the Archimedean force acting on the body.

Based on the above algorithm, when the pupil repeats the experiment 2-3 times, the competence of conducting the experiment, measuring physical quantities, using tools in practice and drawing conclusions is effectively formed.

Table 1 shows the results of the pedagogical research conducted in the 25th general education schools of Shorchi district in the experimental and control groups.

Table 1. Results of experimental and control groups on determination of Archimedean force

Grade indicators	Groups	
	Experimental group	Control group

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	20 pupils		18 pupils	
	Foundational experience	A rewarding experience	Foundational experience	A rewarding experience
5	3	7	2	5
4	9	8	10	9
3	5	4	4	3
2	3	1	2	1

Based on the results of experimental and control groups in Table 1, a mathematical-statistical analysis was carried out in order to study the scientific-pedagogical correct organization and effectiveness of the experimental work. The Pupil-Fisher method was chosen for statistical analysis [7]. In the experimental group, the mastery rate increased by 25%.

Although pupils are interested in working with electrical devices during pedagogical practice, in most cases, we witness that pupils do not have enough practical knowledge and skills in assembling an electric circuit and using electrical measuring devices. To get out of this situation, it is better to choose the simplest circuit diagram for the pupil at first based on the given scheme, he performs the work of assembling the electric circuit and at the next stage performs the measurement work. According to the observation of the pupil's practical activity by the teacher and his mastery, by adding other elements to the electric circuit, the appearance of the electric circuit becomes more complicated. Pedagogical experience shows that it is easy to achieve the intended goal if it is organized on the basis of an algorithm that can ensure the work in a certain logical sequence to perform the work of measuring the physical parameters of the chain through any educational equipment or measuring devices.

CONCLUSION

• The introduction of the teaching method organized in an orderly and logical sequence, which ensures the interdependence of the activities of the teacher and the pupil in the teaching process, is one of the main tasks of the teaching process - education ensures strict

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adherence to educational and developmental functions.

• The principle of unity of theoretical and empirical methods of knowledge in the educational process, with the formation of knowledge, practical skills and qualifications achieved by pupils through all practical training organized on the basis of the optimal combination of theoretical and practical knowledge of physics in teaching is of particular importance.

• Develops pupil's creative abilities in their activities, activates their cognitive abilities, increases lesson efficiency, teaches independent work and logical thinking, requires implementation based on new pedagogical views, competency approaches.

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