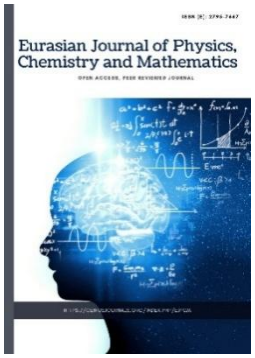

Home Experiments And Observations As A Form Of Independent Work Of Pupils In Physics

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ABSTRACT

In this article, it was noted that in the process of teaching physics, various types of independent work are used. Formation learners' ability to work independently with educational and additional literature, schoolchildren' independent homework in physics as necessary elements of the educational process.

Keywords: Independence in cognitive activity, acquisition of skills, educational literature, additional literature, home independent work

Speaking about the formation of independence in schoolchildren, it is necessary to keep in mind two closely related tasks.

1. To develop schoolchildren' independence in cognitive activity.
2. Teach schoolchildren to apply their knowledge independently in teaching and practice.

The schoolchildren' independent work should be understood as such work that they perform without the direct participation of the teacher, but on his instructions, under his supervision and guidance, at a time specially provided for this. Independent work involves active mental actions of schoolchildren, associated with the search for the most rational ways to fulfill the tasks proposed by the teacher and with the analysis of work results. In the process of teaching physics, various types of independent work are used, which, for didactic purposes, can be divided into the following groups [1]:

Independent work of those in need			
№	Work groups	№	Kind of activity
1	Acquisition of new knowledge and skills. Mastering the ability to independently	1	Working with the textbook: learning new things, working with tables
		2	Observations.

	acquire knowledge from various sources.	3	Experiments in the classroom and at home.
		4	Working with handouts.
		5	Study of the device and the principle of operation of devices according to models and drawings.
		6	Derivation of formulas expressing the functional dependence of physical quantities.
		7	Analysis of formulas, obtaining on this basis conclusions about the nature of the dependence of the physical quantities included in the formulas.
		8	Work with primary sources, reference books, popular science literature.
2	Improving knowledge and developing skills to apply knowledge in practice.	1	Problem solutions: computing with abstract content; computing with production and technical content; high quality; graphic; experimental.
		2	Proof of the validity of the formulas.
		3	Experiment: checking the fairness of laws; establishing a connection between laws, phenomena; establishing a quantitative relationship between values; study of the physical properties of substances; determination of physical quantities.
		4	Observation in order to clarify the conditions in which the phenomenon occurs.
		5	Coming up and arguing examples for new laws.
		6	Compilation of tasks for the application of new physical laws and formulas.
		7	Fulfillment of assignments for classification: devices, machines, installations, circuits, electrical circuits; properties of bodies, substances; phenomena; forms of movement, etc.
		8	Drawing and reading electrical circuit diagrams.

3	Formation of pupils' skills and abilities of a practical nature	1	Solving and compiling various tasks and questions.
		2	Reviewing the answers of other pupils and assessing their activities in the lesson.
		3	Reviewing the answers of other pupils and assessing their activities in the lesson.
		4	Construction and analysis of graphs.
		5	Assembling devices from finished parts.
		6	Identification of malfunctions in devices and their elimination.
		7	Manufacturing of devices according to ready-made diagrams and drawings.
		8	Measurement of physical quantities.
		9	Assembly of electrical circuits.
4	Development of pupils' creative abilities	1	Preparation of reports and abstracts.
		2	Development of a new version of the experience.
		3	Development of a methodology for setting up an experiment.
		4	Changes to the design of the device.
		5	Technical modeling and design.
		6	Drawing up tasks for the use of new ones.
		7	Constructing hypotheses.
		8	Performing experiments with research elements.
		9	Creation of thematic presentations and websites.
		10	Implementation of individual and group assignments in connection with excursions and observations in nature.

These groups are closely related to each other. This connection is due to the fact that the same means can be used to solve various didactic problems.

For example, with the help of practical laboratory work, the acquisition of skills and abilities, the acquisition of some new knowledge, as well as the application of previously acquired knowledge, is achieved. The content of independent work at each stage should be feasible for school children. In order for independent work to contribute to the formation of initiative and cognitive abilities of pupils, it is necessary to offer such tasks, the implementation of which would not allow actions according to ready-made recipes and templates. Only then desired result will be achieved.

Pupils' independent work with a textbook and additional literature. To instill school children' love and respect for the book as a source of scientific and technical knowledge, to teach them to work with it independently is one of the most important tasks of teaching physics and other academic subjects at school. Forming pupils' ability to work independently with educational and additional literature is part of the problem of developing pupils' ability to independently acquire and deepen knowledge. During their studies in secondary school,

schoolchildren should master the following skills and abilities in working with a book [2]:
• highlight the main thing in the text;
• independently understand the mathematical derivations of formulas;
• use pictures, tables and graphs;
• make a plan (synopsis) of the read;
• express what you read in your own words, logically, consistently, supplement the material available in the textbook with information obtained from other sources; • use the table of contents, subject and name indexes;
• work with the catalog, compile a bibliography on the subject of interest.

Work with educational and additional literature may have the goal of:
• repetition of the material passed in the lesson;
• study of new material, which is presented in an accessible form in the textbook and for the conscious assimilation of which the pupils are well prepared;
• expanding and deepening the knowledge gained in the lesson;
• preparation of reports and brief reports on the life and work of scientists and inventors, on the latest achievements in the field of physics, on the application of the studied phenomena in technology and everyday life; • writing essays and abstracts in physics.

Along with the study of literature, homework in physics can include solving problems, observations and experiments, making simple instruments, preparing reports and messages, measurements, and collecting collection material. Sometimes it is helpful to give homework assignments in two or three versions of the pupil's choice, especially if the assignment is creative. As a rule, tasks related to the conduct of observations, the design of instruments, and the preparation of messages are given for a long time. Along with assignments common to the entire class, individual assignments should be systematically given, taking into account the preparation and interests of the pupil. Talented pupils should be systematically offered more complex tasks [3]:
• solving problems, including elements of research;
• performance of more complex experiments and observations;
• creation of diagrams of electrical circuits and automatically operating installations; • reading additional literature.

This contributes to the further development of their abilities, fostering the desire to gain a deeper understanding of the material being studied and preventing the appearance of self-confidence in them, a superficial attitude to the study of the subject. A special, individual approach is necessary for pupils who, for some reason, have fallen behind the class or whose interest in the subject has not yet been awakened in the classroom. If the text of the textbook includes an explanation of the essence of the phenomenon or a description of the device and the principle of operation of devices and mechanisms, the test should be carried out by the method of individual survey, which can be supplemented by a frontal survey, which makes it possible to make additions and clarifications to the knowledge gained by pupils on their own. For example, in a lesson devoted to the study of the boiling process, first recall the main provisions of the molecular kinetic theory, the phenomena of evaporation, cooling during evaporation, the presence of saturated vapor pressure, etc. then after setting a new topic, it is suggested to read the paragraph "Boiling". At this time, the teacher is writing questions on the board:
1. How to explain the appearance of bubbles inside the liquid at the beginning of heating?
2. What is the reason for the bubbles rising?
3. Explain the increase in bubble volume.
4. Explanation of the difference in the change in the volume of rising bubbles at the beginning of heating and after the liquid has warmed up.
5. What is boiling?
6. At what temperature does boiling occur?
7. How does the boiling point of a liquid change with pressure?

Answers to these questions are prepared according to the textbook, after which a conversation is held in which the boiling process is analyzed from a molecular-kinetic point of view. An experiment is set up with boiling water in a flask. Attention is drawn to the emergence and rapid rise of bubbles, the constancy of the temperature during the boiling of the liquid, the decrease in the boiling point

with the decrease in pressure, the boiling of the sodium chloride solution is checked. This technique creates a solid assimilation of the material, since independent work is combined with their active mental activity, guided by a teacher. During the survey, it is advisable to call the pupils to the demonstration table so that, when answering, they have the opportunity to use visual aids, reproduce the experiments described in the textbook, make the necessary drawings, sketches and notes on the board. In some cases, verification of the results of independent work with a textbook can be carried out using written answers. An important role in teaching the techniques of independent work with a book is played by the final conversation, in which the teacher helps pupils to reveal their shortcomings in working with literature and shows the most rational techniques.

Pupils' independent homework. Pupils' independent homework in physics is one of the necessary elements of the educational process. With the right organization, it helps to consolidate and deepen the knowledge gained in the lesson. The need for independent homework is dictated by a number of other factors. The assimilation of the essence of physical phenomena, concepts and theories, the process of developing skills and abilities among different pupils is not the same. Some quickly assimilate the material being studied, others need more time to comprehend and memorize it. At home, schoolchildren have the opportunity to work each at their own pace. When organizing pupils' homework, the following should be borne unmind [4]

1.Homework in physics cannot be reduced only to memorizing paragraphs of a textbook and solving problems. You need to use more creative tasks. This increases pupils' interest in homework and the subject in general.

2. You should not give homework at the very end of the lesson, and even more so after the call, without explaining the techniques for their implementation. As a result, pupils can spend a lot of time completing the assignment and sometimes to no avail. This gives them a lack of confidence in their strengths, reduces interest in the subject.

3. When determining the content and volume of homework, the individual characteristics of schoolchildren must be taken into account.

In all cases, proper supervision of homework is necessary. Talented pupils need to be systematically offered more complex tasks:

•solving problems including research elements.

•performance of more complex experiments and observations;

•creation of diagrams of electrical circuits and automatically operating installations;

• reading additional literature.

This contributes to the further development of their abilities, fostering the desire to gain a deeper understanding material being studied and preventing the appearance of self-confidence in them, a superficial attitude to the study of the subject.

References

1. Decree of the President of the Republic of Uzbekistan No. PQ–3931 dated September 5, 2018, *"On Measures to Introduce New Principles of Governance in the Public Education System"*. Available at: https://lex.uz/docs/3893416
2. Decree of the President of the Republic of Uzbekistan No. PQ–5032 dated March 19, 2021, *"On Measures to Improve the Quality of Education in the Field of Physics and to Develop Scientific Research"*. Available at: https://lex.uz/docs/5338558
3. Decree of the President of the Republic of Uzbekistan No. PQ–289 dated June 21, 2022, *"On Measures to Improve the Quality of Pedagogical Education and Further Develop the Activities of Higher Education Institutions Training Pedagogical Personnel"*. Available at: https://lex.uz/uz/docs/-6079561
4. Suyarov, K., Usarov, J., Sangirova, Z., Ravshanov, Y., & Buranova, N. (2022). *Physics: Textbook for Grade 7*. Tashkent: Reliabel Print. 192 pages.
5. Habibullayev, P., Boydedayev, A., Baxromov, A., Usarov, J., Suyarov, K., & Yuldasheva, M. (2019). *Physics: Textbook for Grade 8*. Tashkent: O'qituvchi Publishing House. 176 pages.

6. Sunnatova, L. M. (2024). Realization of STEM education in general secondary education as a pedagogical problem. *Pedagogika*, (5), 115–118.