AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Pedagogical and Educational Research
ISSN (E): 2832-9791| Volume 35, |April - 2025

COMPULSORY PRINCIPLE IN TEACHING THE FUNDAMENTALS OF NATURAL SCIENCE

Mirzaev M. Sh.
Teacher of the Department of "Natural Sciences" of Karshi State Technical University

A B S T R A C T

The paper presents a very relevant problem in educational practice – how to develop interest in a difficult physics course and its successful understanding. The principles of developmental education, the activity approach, problem solving-based education, high motivation, compulsory success.

K E Y W O R D S

Individual orientation in content choice, profound theoretical material, compulsory material, independent experiments.

INTRODUCTION

In accordance with the requirements of the laws "On Education" (1) and "National Program of Personnel Training" (2), "Physics" is included as a general education subject in the curriculum of the stages of continuous education in our country: general secondary schools, academic lyceums (with the exception of academic lyceums in the direction of specific subjects) and vocational colleges. As a result of improvement and optimization of the structural structure and content of physical education in the above educational institutions in accordance with the requirements of the time, integration between the above stages of education has created the need to ensure coherence.

The present era, i.e., the educational system of the information society, requires the introduction of the principle of compulsion in the study of natural sciences, including physics, which is important for the formation of students' scientific outlook, independent critical thinking, and practical skills. This principle is particularly important in the context of continuing education, including general secondary schools, academic lyceums and vocational schools. This article analyzes the methodological and practical aspects of the implementation of the mandatory principle, as well as modern pedagogical approaches and regulatory and legal bases.

The principle of compulsorily teaching natural sciences implies the implementation of the following:

- systematic - balanced study in accordance with the curriculum;
- ease of perception - adaptation of educational material to the level of preparation of students;
- practical orientation - linking theory with real-life phenomena and technologies.

Realizing that physics has a strong place in the development of science, technology and technology and is of great importance in the development of society, its practical application of the laws of physics as a scientific discipline, an integral part of human culture, acquaints students with natural and scientific knowledge. In this regard, the standard of physics education in general secondary education at the stages of secondary, secondary specialized and vocational schools of continuous education is of

great importance. The standard of physics education at the above educational stages should be aimed primarily at the formation of ideas about physical phenomena and scientific methods of studying nature, as well as the physical picture of the world.

In our country, this principle is enshrined in the Law "On Education" and the "National Development Program" of general secondary education, including the "State Education Standards", where the need for in-depth study of physics and other natural sciences is emphasized.

The second important direction in this area is the development of students' intellectual, creative cognitive abilities, the formation of skills and qualifications for independent mastery of new knowledge. In the process of teaching physics, it is necessary to form and develop students' scientific worldview, the ability to think logically, the ability to understand and solve problems in nature and society, the development of science and technology, familiarize them with the activities of physicists of the past and present who have contributed to the development of physics, and educate them in the spirit of national patriotism by connecting the content of education with local and historical materials.

In the practice of general secondary schools, academic lyceums and vocational schools of continuous education, the task of developing mental and creative abilities of students is usually considered as a secondary task. In order to ensure the principle of compulsory success in these stages of education, it is necessary to continue such an approach. L.S. Vygotsky stated that education and development can be effective if the tasks offered in the educational process are somewhat higher than the achievements of learners in terms of complexity.

Therefore, in the current era, it is necessary to start by offering students a solution to a complex problem that can only be solved with the help of a teacher. Only then will students be able to independently solve the “complex problems” set for them in the digital technology environment tomorrow. In this approach, it is necessary to set intellectually challenging “complex problems” for students in each lesson. In the digital education environment, the teacher should not begin preparing for the lesson by determining the educational, educational and developmental goals of education and compiling a list of elements of knowledge, skills and qualifications that students should acquire during the lesson. Approaching the lesson process based on this principle is a wrong and erroneous situation. Because students do not owe anything to the teacher. Rather, the teacher should help students acquire knowledge independently. Because when a teacher chooses this profession, in particular, from the moment he enters the workforce, he enters into an employment contract with society. Therefore, the teacher needs to identify the main goals that he or she sets for himself or herself in the context of digital technologies. The teacher should not only evaluate and monitor the results of the students' work during the lesson, but also make necessary adjustments when necessary, while monitoring the results of his or her own work.

Physics, compared to other academic subjects, has great opportunities to attract the attention of students in each lesson, that is, to demonstrate the physical effectiveness of natural phenomena unknown to them in each lesson.

How can we increase students' interest in the lesson in the conditions of digital technologies? We believe that the main key to solving this problem is an active approach to the educational process. The development of a person's cognitive abilities occurs only in the process of developing students' independent active cognitive abilities. Therefore, it is necessary to teach students to independently carry out and draw theoretical conclusions when observing all simple and safe physical experiments, experiments on studying the physical properties of objects, and testing scientific hypotheses.

In this case, the method of problem-based education can be a means of increasing the effectiveness of motivating creative cognitive activities. And this requires mental problems that require significant mental strengthening before the students, that is, when performing experimental research, theoretical thinking and processing of the obtained results.

Compulsory education can be successful for all students (3). Yes, the principle of compulsory successful education is questionable to many. Why should such education in physics be mandatory for all students in the class? Let each student receive an assessment in accordance with his abilities, opportunities and diligence in the educational process. However, in practice, this approach to assessing educational outcomes at the general secondary, secondary specialized and vocational college levels of continuing education is generally accepted. It is logically justified and is based on regulatory documents. What is its strength based on?

First, and most importantly: a student is not a product that can be labeled to determine its type. A student is a person and should be treated as a goal, not a means.

A student is not an object or material of education, which, according to the parameters set in academic lyceums or vocational schools, is formed by its graduates, a person has the same importance as any other person. A student is a goal, teachers of the above educational institutions, educational subjects should play the role of a tool, a tool that helps each person to develop to the level of their abilities and possibilities. The main task of a teacher in accordance with the requirements of the time is to use various opportunities for the development of the student's personality at the level of the means and possibilities of his subject, and to continue education by noting all the successes and achievements of students and guiding them. In the current educational conditions, there cannot be students who cannot master the educational material. If a teacher manages to teach students the educational material in his subject in a simple and understandable way, then each student can achieve some positive result in mastering the studied educational material in any conditions. The task of the teacher is to be able to see such iconography and achievement in each student and evaluate it according to the student's mastery.

Assessment based on this approach, depending on the student's activity in the complete mastery of the educational material, changes the student's independent work on himself and his attitude to the educational process. For any success in human activity, the main motive is, first of all, his continuation of any activity. Where there is no success and achievement, there is no interest and opportunity to continue the activity (4). Where there is no interest, aspiration, and opportunity, there is no activity itself, and it can only be faked. Therefore, without informing students, it is necessary to help them find solutions to these complex problems "independently". The most effective option in organizing physics lessons is to implement an active approach in education in conjunction with problem-based learning - this is to offer students to read a paragraph, independently complete experimental tasks given in the paragraph, and independently answer self-control questions.

As a result, the following question arises: does the principle of mandatory success not lead to various contradictions or contradictions in the implementation of test control tests?

These contradictions and contradictions are only formal in appearance. Firstly, if students in general secondary schools are given very low grades, thereby extinguishing their interest in studying science, then there is no confidence that these students will successfully master the knowledge, skills and abilities in accordance with the requirements of the time at the levels of academic lyceums and vocational colleges. Secondly, the ideal fulfillment of the requirements of the physics education

standard does not apply to all graduates of the academic and vocational colleges, but only to those students who will continue their education in the future, who will have to master the requirements of the physics education standard at the higher levels of continuous education. If a teacher at the levels of general secondary schools, academic lyceums and vocational colleges follows the principles of successful education, then in the future the number of his students who will choose this direction of education will be large.

Adding another principle to the above principle, namely the principle of person-oriented education, can achieve a certain level of implementation of the tasks of physics education (5). According to this principle, the volume of educational content, its complexity should be determined by the student himself. Unfortunately, in practice, there are a number of obstacles to the implementation of advanced effective principles and approaches that can be used in the educational process. The first of these obstacles is the inconsistency of the volume of traditional compulsory education educational material with the time allocated for its study.

The second obstacle is the lack of textbooks that provide educational methodological materials aimed at an active approach to education and the use of problem-based methods.

These obstacles can be overcome by adopting goals and means in the educational process of the stages of continuous education, secondary specialized and vocational schools, and by adopting a position on their mutual relationship: the goal is the maximum development of the student, his personal abilities, and general secondary schools, academic lyceums and vocational schools, teaching subjects, teachers are the means to achieve the goal. In this case, the educational standard of the above educational institutions is only a systematic integration of educational materials for teachers and students to successfully achieve the main educational goals: to develop the creative and intellectual abilities of students, to form skills and qualifications for independent acquisition of new knowledge in accordance with life requirements, to develop their interest in knowledge. In the educational standard, these unified educational materials can be re-analyzed and reconsidered from the point of view of the usefulness of their elements for an active approach to the educational process and a problem-based method. Based on the results of such an analysis, it is possible to implement a new composition of the educational material as a result of planning the educational material by topics, developing a set of problems and tasks for the experiment, and selecting educational problems.

As a result of the analysis of the educational material, it is possible to reduce the size of the educational material, which is mandatory for all students to learn, as a result of its new composition, which is presented in the review of the current standard of physics education (6). Only as a result of the implementation of these conditions, it is possible to move from the verbal method of education to the problem-based method of education, from passive acquisition of information to the development of independent work of students.

It is only possible to separate the most important material from each subject from the compulsory material that all students must master from the standard of physics education, as a result of a strict selection of compulsory material. The newly structured teaching material is implemented only by developing additional material for each subject for students. As a result of the above work, the total volume of teaching material in physics education offered to students will not only fully comply with the educational standard, but will even slightly exceed its mandatory requirements. Reducing the volume of compulsory material in the textbook by half will allow all students to spend more time during the lesson on their interests. For talented students interested in physics, the textbook will

provide in-depth theoretical material and the necessary tasks for conducting independent experiments. The remaining students will have more free time to successfully master other subjects that are interesting to them.

Modern methods and technologies in teaching physics. To increase the effectiveness of teaching in the educational process, the following are used:

- digital laboratories (virtual experiments, simulators).
- gamification (the use of game elements in learning).
- distance courses (for students in remote regions).

These methods are consistent with the "Strategy for the Digital Transformation of Education in Uzbekistan", which emphasizes the importance of IT technologies in education.

The use of a person-centered approach in education is a simple form of educational differentiation. Most importantly, the fact that this form of differentiation is “entered” and “exited” freely and openly in each lesson is always a true sign of the person-centeredness of the educational process.

"State Educational Standards" set the minimum requirements for students' knowledge. The Constitution of our country guarantees the right to education, which strengthens the compulsorily of studying natural sciences. Methodological manuals for teachers include modern methods of assessing knowledge (formative assessment, portfolio).

The principle of compulsory teaching of natural sciences, especially physics, is important in the formation of a scientifically literate generation. Its successful implementation includes:

- Modern pedagogical technologies.
- State support (legal framework, financing).
- It depends on the qualification of pedagogical personnel.

References

1. Copyright holder of the illustration Getty Images Image caption presidential elections in the Republic of Uzbekistan (2020)
2. Bozhovich E.D. Psychodidactic issues of schoolboy development as a subject of learning // Psychological and pedagogical problems of schoolboy development as a subject of learning. Moscow: MPSI Publishing House, Voronezh: MODEK Publishing House, 2000.
3. Kabardin O.F. Psychodidactic aspects of school textbook problems // Psychodidactic aspects of modern education. Moscow, 2004.
4. Kabardin O.F. Personality-oriented foundations of cognitive abilities development in modern schools. – Chernogolovka: INIM RAO, 2009. // www.inim-rao/ru
5. Kabardin O.F. Physics. Personality-oriented textbooks for secondary schools. Textbooks for grades 7, 8, and 9. Moscow: Prosveshchenie Publ., 2009.