



INTEGRATIVE APPROACH AS A THEORETICAL BASIS FOR THE IMPLEMENTATION OF A SCHOOL PHYSICAL EXPERIMENT

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ABSTRACT

In this article, studies that reveal the role of integration in education, apply an integrative approach to learning, focus on the use of developing learning, and develop on this basis new approaches to updating the content of school physical education related to the problems of educational physics experiment. However, special studies in which the educational physical experiment is considered on the basis of an integrative approach with the goal of comprehensive development of the student's personality are not yet available.

DISCUSSION

The process of integration of our country into the world economic and information system, integration trends in the development of sciences, the integration of pedagogical knowledge in all spheres of human life determine the strategy for the development of education, which is designed to satisfy the society's need for specialists who can realize their creative potential, both in their own interests and in their own interests interests of society, able to adapt to rapidly changing conditions, with an integrative thinking style, critical of their environment and ourselves. The rapid growth of information, the introduction and constant updating of production technologies makes it necessary to consider training as a process, the basis of which is an independent search for information from various sources, its extraction, critical reflection and adequate transformation to create new knowledge and exchange it in the communication process. The rapid growth of information, the introduction and constant updating of production technologies makes it necessary to consider training as a process, the basis

of which is an independent search for information from various sources, its extraction, critical reflection and adequate transformation to create new knowledge and exchange it in the communication process. The new requirements of society for training, an explanation of its goals, create the prerequisites for resolving the contradiction between the requirement of maximum conjugation of the professional and personal qualities of a graduate of an educational institution and the insufficient implementation of the conditions used for its integral formation.

In recent decades, there has been a decline in the quality of general secondary education. This applies to all natural science disciplines and physics in particular, which leads to a drop in the students' worldview level of development, to the absence of their holistic ideas about a single picture of the world and a person's place in it. There was a need to strengthen the educational and developmental potential of physics as a school subject, to identify new ways to update the content of physical education, to create teaching technologies aimed at



the fullest possible use of educational physical experiment to ensure the integrity of the educational system, activating the activity and creativity of students, preserving their identity and individuality. Based on the fact that conducting an educational physical experiment is the starting point of knowledge about the objectivity of the surrounding world, the creation of optimal conditions for its implementation is required. At the same time, given that many laboratory and demonstration facilities were introduced into the practice of training in the 50s of the twentieth century, some of the funds available at the school are out of order or technically outdated. The contradiction between the new learning objectives and traditional technologies for the implementation of educational physical experiment raises the problem of research. Keeping all the good, proven experience, rational and effective, regardless of the time of its creation, it is necessary to create new modern integrative tools and methods for the implementation of a physical experiment in school, developing and enriching methodological science and pedagogical practice. Such methods and means will organize and direct the perception of students in a new way, objectify the content, fulfill the functions of a source and measure educational information in their unity. The program of development of the continuing education system in Russia for 2001-2010 emphasizes the need to integrate theoretical and practical training of specialists in order to ensure the continuity of the formation of scientific knowledge and skills that allows them to be used in various types of practical activities. At present, in philosophy, psychology, pedagogy and private methods, a lot of attention has been paid to the problems of integration and personal development. For example, A. Ya. Examined various aspects of integration in education in their studies. Danilyuk, V.I. Zagvyazinsky, I.A. Kolesnikova, V.N. Maksimova, V.V. Serikov, N.K. Chapaev, E.G. Yudin et al. Today, certain studies are being carried out in pedagogy, psychology, theory and methodology of teaching physics, revealing the role of integration in education, using an integrative approach in learning, focused on the use of developing learning, developing on this basis new approaches to updating the content of school physical education related to problems of educational physical experiment. However, special studies in which the educational physical experiment is considered on the basis of an integrative approach with the goal of comprehensive development of the student's personality are not yet available.

Thus, the relevance of the proposed study is due to: - modern requirements of society to the development of the individual, with an integrative thinking style, capable of independently mastering knowledge and skills and their application, both in

their own interests and in the interests of society; the presence of psychological, pedagogical, ideological, methodological and methodological prerequisites for the development and implementation of an integrative approach to the implementation of educational physical experiment in order to create optimal conditions for the holistic formation of personality; - the need for pedagogical practice in modern technologies and means of school physics experiment to develop interest in physics and the formation of cognitive learning motives. The object of research is the process of teaching physics at school. The subject of the study is the implementation of a school physical experiment based on an integrative approach. The purpose of the study is to develop the concept of an integrative approach as a theoretical basis for the implementation of the school physical experiment and its practical implementation in high school. The methodological basis of the study is:

- conceptual provisions of philosophy as a methodological basis;
- theory of knowledge;
- The concept of the activity approach and the theory of developing learning;
- psychological and pedagogical theory of personality-oriented learning;
- methodology of physical science;
- Theoretical generalizations in the field of methods of physics on the problems of school physical experiment.

Research hypothesis. If we take into account the objectively existing integrative nature of the personality, the educational process, the science taught, and create adequate teaching aids that provide optimal conditions for interdisciplinary, intrasubjective, interpersonal, and intrapersonal integration when implementing an educational physical experiment, this will contribute to the most complete development of the personality, the formation of learning motivation and improving the effectiveness of physics education at school. Research Objectives:

1. To analyze domestic experience and study the history of the school physics experiment in Uzbekistan.
2. Based on the analysis of psychological and pedagogical research, determine ways to improve the school physical experiment.
3. To study the traditional methodology for the implementation of the school physical experiment, to substantiate the need for its adjustment, taking into account the social and personal approach to setting goals for teaching physics.
4. To determine the objectives and content of the educational physical experiment in the main and specialized school.



5. To analyze the existing traditional and modern educational equipment and determine the possibilities of its use in a changing educational paradigm.
6. Explore the possibilities of using modern computer technology in an educational experiment.
7. Clarify the theoretical and methodological foundations of integration in education and link the integration of pedagogical and methodological knowledge with subject knowledge.
8. To develop the concept of an integrative approach to the implementation of the school physical experiment.
9. To develop equipment for a modern physics cabinet that meets the ideas of integration and personality-oriented education and show ways of its use in the implementation of an educational physical experiment.
10. To develop multilevel front-end laboratory work and justify their need for basic school.
11. To develop hardware and software for conducting a modern physical workshop using computer technology.
12. To develop a set of automated works of a physical workshop for the formation of versatile experimental skills and working skills on modern technical equipment.
13. To substantiate the principles of selecting computer models to expand the capabilities of a modern demonstration experiment.
14. Create pre-profile and profile elective courses for in-depth study of traditional and modern equipment used in the implementation of educational physical experiment.
15. To monitor the functional state of health of students and the motivation of learning during experimental work.
16. On the basis of an integrative approach, develop training kits for conducting multilevel laboratory work and automated work of a physical workshop based on the individual workplace of the student.
17. Experimentally verify the effectiveness of teaching students in the developed educational and methodological kits.

Research Methods:

- Analysis of philosophical, psychological, pedagogical, physical and methodical literature on the research problem;
- Analysis of regulatory documents, copyright programs, textbooks on the school physical experiment, publications devoted to the problems of the educational physical experiment;
- The study and synthesis of best practices of schools and individual teachers;

- Development of training tools adequate to the goals;
 - Search, ascertaining and formative experiment based on research materials;
 - conducting pedagogical measurements (questioning, testing, surveys, testing);
 - processing the results of a pedagogical experiment using methods of mathematical statistics;
- The main stages of the study.

In accordance with the objectives, the study was carried out for 15 years (from 1992 to 2007) in several stages.

At the stage of the ascertaining experiment, an analysis of the literature on the topic under study was carried out, which made it possible to identify the general methodological and theoretical foundations of the study. The history of the formation of the educational physical experiment in Russian schools was studied. The pedagogical experience of teachers of secondary schools was generalized to determine the state of the problems of implementing a school physical experiment in modern conditions, the completeness of the educational equipment available in physics cabinets was clarified. In the course of the search experiment, the research objectives were clarified, the concept of an integrative approach to the implementation of the school physical experiment was formulated. The ways of implementing this concept on the basis of developed, adequate to the goals, training tools during the demonstration experiments, frontal laboratory work, the work of a physical workshop are determined. The necessary training kits for teachers working on an experimental methodology have been created. Experimental and control classes were selected, a methodology for determining the effectiveness of the proposed training technology was developed. At the third stage, a formative experiment was conducted during which the effectiveness of teaching physics was determined based on the application of an integrative approach to the implementation of the school physical experiment and the developed teaching aids. The impact of the created educational and methodological kits on the intellectual development of students, their academic performance and emotional-cognitive sphere was evaluated. The methodological recommendations on the use of research materials in pedagogical practice were refined and corrected.

The reliability and validity of the results and conclusions of the study are provided:

- the consistency of the research results, their compliance with the theoretical provisions and conclusions of the basic sciences; a representative sample of the number of participants in a pedagogical experiment; methods of mathematical statistics for processing the data of the forming experiment;
- Reproducibility of learning outcomes.

The scientific novelty of the study:



1. The theoretical concept of an integrative approach to the implementation of the school educational physical experiment in the unity of its four directions: interdisciplinary, intrasubjective, interpersonal and intrapersonal integration is developed.

2. The objectives of the educational physical experiment are determined taking into account the social and personal approach to ensure the holistic development of the student's personality, integrating previous experience, the development of mental mechanisms, typological characteristics of the personality and the dynamics of its individual properties. The interrelation of all educational physical experiments is substantiated, their various significance for students of specialized classes is revealed, which is determined, first of all, by professional intentions of students.

3. In accordance with the goals of personality development, the requirements for the selection of educational equipment in physics are formulated, which should contribute to the formation of an integrative thinking style, contribute to the most complete development of perception, shape the ability to navigate in different situations, ensure the integrity of the educational process, meet modern requirements of ergonomics, aesthetics and safety precautions.

4. To equip modern physics classrooms, an individual student workstation has been developed that provides a wide functional opportunity for students to act during the lesson, creates favorable conditions for the implementation of various techniques and methods of personality-oriented learning, which allows the use of both traditional and innovative means in the course of experimental activity learning. Received a patent of the Russian Federation No. 30245 dated 06/27/2003

5. A multifunctional modular unit of devices has been developed, intended for use both in classes of various specializations and for level differentiation within one class, which allows for the majority of educational experiments to be varied across all sections of the school physics course, according to textbooks by various authors, including experimental methods.

6. Hardware and software have been developed for carrying out the work of a physical workshop using computer technology, changing the style of the student's experimental work, introducing him to modern research methods, forming versatile experimental skills and working skills on modern technical equipment.

7. Teaching kits have been developed containing multilevel front-end laboratory work for primary school students, automated work of a physical workshop for a specialized school, pre-profile and profile elective courses for in-depth study of traditional and modern equipment, recommendations on the use of computer models to expand the capabilities of a modern demonstration experiment

providing a systematic, independent, research character of educational-cognitive successive activities of students during n

8 methodology has been developed for assessing the functional state of health of students in the process of conducting independent experimental work using the Varicard valeological automated complex, which provides for monitoring the adaptive capabilities of the schoolchildren's body in order to determine the motivation for learning. Practical recommendations are formulated that contribute to strengthening and maintaining the health of students for teachers introducing new pedagogical technologies in physics classes in educational institutions of the city.

9. The significance of the concept of an integrative approach to the implementation of the school physical experiment based on the interconnection of all components of the concept and their integrative functions is substantiated, which makes it possible to maximize the professional and personal qualities of future school graduates.

The theoretical significance of the study is that:

- A modern theoretical and methodological strategy for the implementation of the school physical experiment was developed taking into account the integration of philosophical, psychological, pedagogical and methodological knowledge with the subject of study;

- the structure of the integrative approach in the implementation of the school physical experiment is substantiated, based on the goals of education, its quality, development prospects and the formation of the personality, the use of various methods of cognition and modern educational technologies in accordance with the objectively existing integrative processes inherent in the taught science, education and personality development;

- The principles of creating an individual student workplace have been developed, based on the fact that the equipment of the physical room should be a constantly developing system of didactic tools that meet the goals of training and education of students; the main directions of the use of information technology tools in the school physics experiment have been identified, related to the calculations for processing various results, the use of test and control programs, the use of training simulators, computer modeling of the educational experiment and its automation; The principles of the formation of generalized experimental skills of students when working with automated laboratory facilities are formulated.

The practical significance of the study is as follows:

- created a technology for the implementation of the school physical experiment based on an integrative approach;

- developed guidelines for the organization and



conduct of modern demonstration experiments, multilevel front-end laboratory work and automated work of a physical workshop; /

- workbooks have been created that contain multilevel front-end laboratory work in physics for students of the primary school, providing for various levels of difficulty in their implementation;

- Pre-profile and profile elective courses for in-depth study of traditional and modern equipment have been developed;

- Design and engineering documentation for the manufacture of students' workplaces has been developed, providing various options for their execution (single and double), containing special devices (a system for storing and moving racks, an additional movable tabletop, a folding shelf for placing the system unit, a device for attaching blackout curtains) facilitating a variable school experiment with a computer;

- the design and development documentation for the manufacture of a multifunctional modular unit of devices has been developed, containing circuit diagrams of individual devices, a specification of the elements used, a technology for manufacturing printed circuit boards of devices that allows for their independent location inside the unit and interchangeability; design and engineering documentation has been created for the manufacture of a device for interfacing a computer with experimental installations based on the developed multilayer printed circuit boards, which provides for the assembly technology of the device and the configuration of its corresponding inputs and outputs;

- the work of a physical workshop was created, allowing automation of some of the most complex experiments using the developed equipment; practical recommendations have been developed that contribute to strengthening and maintaining the health of students for teachers introducing new pedagogical technologies in educational institutions on the basis of monitoring of learning motivation that was carried out during experimental work.

Testing the research and implementing its results. On the topic of the dissertation, 64 works were published, 30 reports were made at international and all-Russian conferences, including: at the Congress of Russian physicists and teachers "Physical Education in the 21st Century", Moscow, Moscow State University, 2000; 5th and 7th International Conference "Mathematics, Computer, Education", Dubna, 1998, 1999; 2nd, 3rd International scientific-methodological conferences "New technologies in the teaching of physics: school and university", Moscow, 2000, 2002; 6th, 7th, 8th International conferences "Physics in the system of modern education", Yaroslavl, St. Petersburg 2001, 2003, 2005; scientific-theoretical conference

"Education and science in the third millennium", Barnaul, 2002; the international conference "Problems of physical education in secondary and higher education" Ryazan, 2002; 7th, 9th conferences of the countries of the Commonwealth "Modern Physical Workshop", St. Petersburg, Volgograd, 2002, 2006; annual international conferences "Problems of an educational physical experiment" Glazov, Symposium for Central and East European Countries, 2003 r.

The results of the study formed the basis for the serial production of student tables for physics classrooms at a mechanical plant in Sasovo, Ryazan Region.

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