

THEORETICAL AND METHODOLOGICAL ISSUES OF ORGANIZING AND CONDUCTING COURSES IN THE PHYSICS OF THE ATOMIC NUCLEAR AND ELEMENTARY PARTICLES IN HIGHER EDUCATION

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ABSTRACT

This work presents an analysis of research on teaching nuclear physics in higher education institutions. In the framework of research aimed at increasing the effectiveness of education based on the analyzed computer technologies and innovative educational technologies, it is dedicated to the virtual methods of performing physical laboratories in physics teaching, the methodical system of their use in education, their instructions and interactive lack of research on the application of educational technologies, the traditionality of nuclear physics teaching methods, the lack of attention paid to nuclear physics teaching methods with new innovative computer technologies, the topics related to the development of time. It has been determined that there are almost no jobs devoted to teaching.

INTRODUCTION

In the course of large-scale purposeful work carried out in our country, the fundamental reform of the education sector, bringing it to new levels, the tasks provided for in the newly revised Law "On Education" are being implemented step by step. At the heart of the reforms envisaged in the continuing education system is the task of "developing and implementing thorough mechanisms for the integration of continuing education with science and production". In the full implementation of the tasks set forth, the stated goals and objectives "Strengthening the material-technical and informational base of educational institutions, providing the educational process with high-quality educational literature and advanced pedagogical technologies" forms the basis.

President of the Republic of Uzbekistan Sh.M. Mirziyoev's "CONCEPT of developing the higher education system of the Republic of Uzbekistan until 2030" of October 8, 2019 (Decree No. PF-5847) [1], No. PF-60 "On the development strategy of New Uzbekistan" for 2022-2026, No. PF-6079 of October 5, 2020, approval of the strategy "Digital Uzbekistan - 2030" and its effective implementation on measures", PQ-5032 of March 19, 2021 "On measures to improve the quality of education and development of scientific research in the field of physics", PQ-4165 of February 7, 2019 No. "On Approving the Concept of Nuclear Energy Development in the Republic of Uzbekistan in 2019-2029", No. PQ-4492 of October 16, 2019 "Approving the Strategy for the Development of Human Resources for the Nuclear Energy Program of the Republic of Uzbekistan about" decisions it serves as the basis for the solution of the problems waiting to be solved in the higher education system and the development of targeted research.

Organizational activities dedicated to the development of scientific and innovative activities in the atomic and nuclear sphere in our country by our President, the establishment of the "High Technologies Center" at the National University of Uzbekistan, the rational use of energy resources and the permanent and long-term supply of electricity to the territory of our country

construction of nuclear power plants is the program basis of the scientific and methodical activities that must be carried out in this direction.

In a number of educational laws of our country, it is stated as a matter of priority that persons with appropriate education, professional training and high moral qualities have the right to engage in pedagogical activities. This priority issue determines the need for a professional, as well as a professional-psychological approach to pedagogical activity in the training of specialists and future pedagogues in all higher education institutions.

THE MAIN PART

The rapid development of the fields of physics and technology requires that the "Physics of atomic nuclei and elementary particles" department, which is considered the basis of natural and fundamental sciences, be taught on the basis of high knowledge, skills and abilities in the educational process. The reason for this is, on the one hand, the development of technical progress in society and the complex processes and tasks based on nuclear physics, quantum mechanics, medical achievements, and nanotechnology, and on the other hand, the complexity of the processes and mathematical apparatus used in calculations related to nuclear physics. Therefore, the process of covering topics and events in the teaching of this department in the educational process is systematic with the help of innovative technologies based on information technologies, modern educational methods, creates the need for creative design and teaching. This requires high skills, abilities and knowledge from the pedagogue, shows the need to create modeled developments in pedagogical research according to the competence approach, virtual laboratory works, create educational materials with dynamic illustrations, and create improved developments based on the use of information technologies in education. .

In the age where modern technologies cover all sections of society, a pedagogue is without technical tools"Physics of atomic nucleus and elementary particles" No matter how skillfully he explains the section, it is difficult for the student to understand and remember the topics, laws, events and processes of this section. That is why, on the basis of methodological support, didactic tools and virtual developments enriched with modern science achievements, the effectiveness of teaching will increase even more when the laws and regulations that occur in the nucleus are mastered by logically thinking and performing experiments related to the processes that occur. In this regard, scientific-methodical researches aimed at improving nuclear physics classes with the help of ICT provide a wide opportunity to reveal the nature of the laws of "Atomic nucleus and elementary particle physics" and to increase the effectiveness of teaching.

The introduction of modern innovative pedagogical technologies into the educational process creates the basis for the formation of methodological formation of the scientific worldview and the ability to independently organize this process during pedagogical activities, connecting the theoretical knowledge of students to practice. It is known to everyone that the training of highly qualified specialists is considered the main goal and tasks of higher education institutions.

Physical experiments are the most effective in the development of human consciousness one of the sitasit should be noted that In higher education institutions, high importance is attached to the use of modern science and technology achievements in the educational process, the appropriate introduction of virtual developments created based on their educational and

methodological essence in the educational process.

The results of the conducted observation and pedagogical activity showed that in recent years in our country and in a number of foreign countries, researches on physics education in higher educational institutions have focused on the atomic nucleus and elementary particles physics. Scientific innovations in the field of science and the rapid introduction of modern technology into the educational process, this process is especially related to the "Atomic nucleus and elementary particles physics" brings high efficiency to the department. By using these technologies in education, students are formed as a person who observes, applies and analyzes the studied physical phenomena or laws and approaches them on a scientific basis.

Uzbek Methodist scientists created literature to enrich the science of physics based on scientific, methodical and visual tools.

Theoretical aspects of various ways and methods of organization, formation and development of the physics education process in our country RBBekjonov, BMMirzahmedov, ONAhmadjonov, M. Joraev, SQQahharov, Yu.M. Polatov, AMXudayberganov, N. Sadridinov, M. Qurbanov, HMMahmudova, K. Nasridinov, OETigay, M.Yu.Mansurova, GEKarlibaeva, G.Sagatova, MIDaminov, IUBilolov, SH.SH.Haydarova, FFToshmammedov, ZSBahodirova, DABegmatova, PMJalolova and studied by others. U.SH. Begimkulov, A. Askarov, QP Abdurahmonov, N. Taylokov, N. Qayumova, G. Umarova and others' scientific researches and scientific-methodical literature can also be noted.

As a result of studying the created literature, scientific-methodical developments and practical works, it became known that large-scale works are being carried out in the process of teaching science. In the newly revised Law "On Education" [2] and in the new Development Strategy of Uzbekistan for 2022-2026 [1] established on the development of the field of education and science. It is also a proof that tasks and tasks are performed systematically.

Regarding the large-scale education conducted throughout our country is hot within the framework, the goal is to train highly qualified personnel with modern, mature, knowledgeable, pedagogical and scientific potential. Therefore, "Physics of Atomic Nucleus and Elementary Particles" according to the weight of competitive personnel, including new educational technologies and various means of information transmission, in accordance with the requirements of the time. department teaching methodology we need to increase the potential. In recent years in our republic and in a number of foreign countries, the character of researches related to physics education in higher educational institutions is related to the scientific innovations in world physics and the intensive introduction of modern information technologies into the educational process. We have briefly analyzed the literature, scientific researches and studies created in this regard.

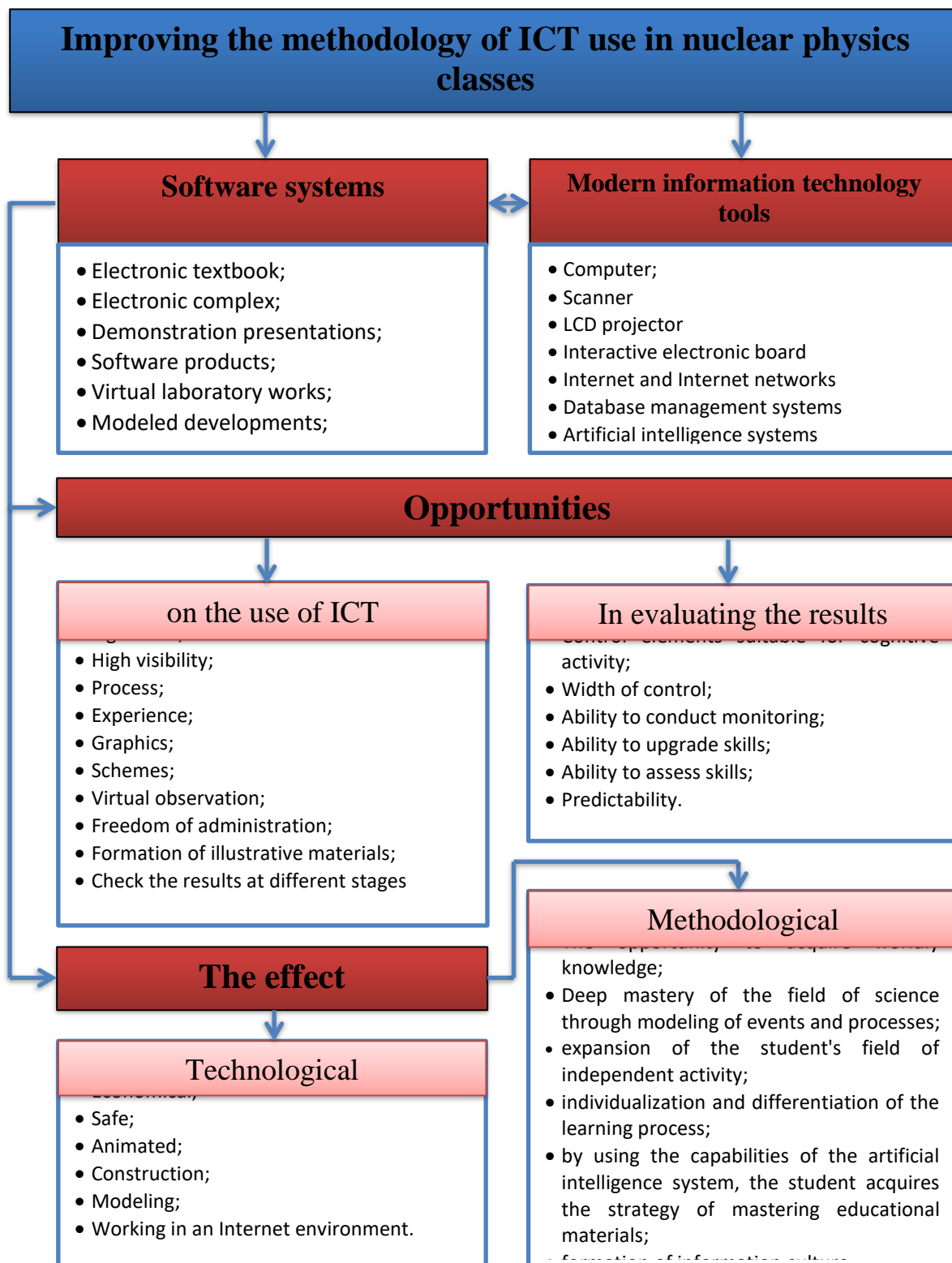
Methodological manuals and literature created by a number of physical methodist scientists of our country were analyzed. In particular, the methodical manual entitled "Educational Experiment from the Physics Teaching Methodology Course" by BMMirzakhmedov, NB Gafurov and FF Toshmukhamedov, The teaching manual "Physics Teaching Methodology" created by M. Joraev [7], O. Akhmadjonov "Physics Course III" created by educational guide, H. Inatov created by "Physics Teaching Methodology" manual, "Modern Educational Technologies" manual created by ODRakhimov, OMTurgunov, QOMustafaev, HJ Ro'ziev, "Effectiveness of Physics Teaching Methodology" created by GEKarlibaeva educational and methodical guide

named "ways to improve", electronic developments "lecture exercises on general physics" created by QP Abdurahmonov, OETigay and others were analyzed. As a result of the analysis, work was carried out on the use of information technologies in the continuous education system of physics, the effective use of virtual education components, the methods of organizing practical and theoretical education, and the organization of education based on fundamental principles. though,

In order to analyze the didactic foundations and methods of teaching the "Nuclear Physics" department of physics, the scientific research conducted by our country and foreign researchers was studied and analyzed. Including M.Yu. Mansurova's candidate's dissertation on "The content of elementary particle physics in higher education and its teaching methodology" [5], GA Umarova's "Sovershenstvovanie metodiki prepodavaniya quantovovoy fiziki na osnove kompyuternyx tekhnologiy v obshcheobrazovatelnoy shkole", HM Mahmudova's "General Physics Course" candidate's thesis on the subject "Use of information technologies in conducting laboratory training" from the "Optics" department, HH Gomulina's «Application of new information and telecommunication technologies and school physical and astronomical education» Candidate's thesis on the topic, M. Kurbanov «Improving the effectiveness of didactic functions of physical experiments in continuing education» Doctoral dissertation [3] of TV Volnistova from the Commonwealth of Independent States "Izuchenie adernoy fiziki v klassakh physiko-matematicheskogo profilya s ispolzovaniem informatsionnyx tekhnologii" candidate's thesis [8], by IAZakharkin «Methodology of studying optical quantum generators in physics secondary school with the use of modern computer technology» candidate's thesis, ESPolat, M.Yu. Bukharkina, MV Moiseeva: AE Petrov's study guide entitled "Novye pedagogicheskie i informatsionnye tekhnologii v sistem obrazovaniya" [2], Dissertation "Formy sovershenstvovaniya demonstratsionnogo eksperimenta po fizike" by XB Aybinder, virtual laboratory work on "Nuclear Physics" among all departments of physics within the framework of the "Physics Education Technology" program at the University of Colorado, USA, in developed countries, D Callahan, Sh. Chakraborty, Sh. Among these are the scientific methodical works of scientists like Majid.

As a result of the analysis and studies, most of the researches are devoted to the virtual methods of performing physical laboratories, the methodological system of their use in education, the guidelines related to them, and the researches on the use of interactive educational technologies are insufficient, nuclear physics the traditionality of the teaching methods, the lack of attention paid to the teaching methods of nuclear physics with new innovative computer technologies, especially the fact that there are almost no works dedicated to the teaching of topics related to the development of time with the help of ICT showed the need to carry out scientific research. In this regard, in the sessions on "Physics of atomic nuclei and elementary particles", filling the content of science with modern scientific achievements, forming the scientific worldview of students, increasing their scientific potential, together with their psychological, methodical, informational, creative, communicative, personal, technological competencies. In order to develop, the goal was to use innovative computer technologies in the education of nuclear physics.

At the initial stage of the realization of the goal, a model of the organization of educational activities of students in the teaching of atomic nucleus and elementary particle physics using computer technologies (see Figure 1) is recommended.



1- picture Use of ICT in nuclear physics training methodology model.

The use of innovative computer technologies in the education of atomic nucleus and elementary particle physics, enrichment of nuclear physics educational materials with the achievements of scientific and technical development and their teaching in a demonstrative way leads to an

increase in the level of knowledge of students and an activation of the educational process. will come.

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