

INNOVATIVE APPROACHES TO DEVELOPING STUDENTS' SKILLS RELATED TO THE ELECTRIFICATION OF OBJECTS IN PRACTICAL TRAINING AND INDEPENDENT LEARNING SESSIONS

Shukurov Elnurbek Obidjon oglu

Shakhrisabz State Pedagogical Institute Independent researcher.

Shakhrisabz, Uzbekistan

E-mail: shukurovelnur42@gmail.com

F-Tel: +998972612202

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Abstract. This article analyzes innovative approaches to developing students' knowledge, skills, and practical competencies related to the electrification of objects during practical training and independent learning sessions. The study highlights the pedagogical potential of interactive methods, digital technologies, virtual laboratories, and experimental activities in teaching electrostatic phenomena. Furthermore, the factors contributing to the development of students' independent thinking, scientific observation, and competencies in the practical analysis of physical processes are substantiated. The article also scientifically explains the significance of training sessions organized on the basis of modern pedagogical technologies in enhancing educational effectiveness.

Keywords: electrification phenomenon, electrostatics, practical training, independent learning, innovative technologies, interactive methods, virtual laboratory, physical experiment, competency-based approach, educational effectiveness, digital pedagogy, scientific thinking.

Introduction. The development of students' knowledge, skills, and practical competencies related to the electrification of objects in the process of teaching electrostatic phenomena is considered one of the pressing pedagogical issues of modern education. Processes associated with the electrification of objects through friction, contact, and induction constitute an important component of physical phenomena, through which fundamental concepts such as electric charge, the interaction of charges, and electrostatic fields are formed. Integrating theoretical knowledge with practical activities in teaching these topics contributes to the scientifically grounded development of students' thinking abilities. In particular, the use of various experiments, observations, and analytical tasks during practical sessions helps students achieve a deeper understanding of the subject matter. At present, the expanding application of innovative technologies, interactive methods, and digital tools within the educational system is creating new pedagogical opportunities for teaching electrostatic phenomena. As a result, students become not merely passive listeners but active participants in the educational process.

The research-oriented organization of topics related to the electrification of objects within the process of independent learning contributes to the development of students' independent thinking, scientific observation, and problem-solving abilities in challenging situations. The use of virtual laboratories, multimedia tools, and interactive assignments facilitates both the visual and practical understanding of the essence of electrostatic phenomena. At the same time, analyzing electrification processes encountered in everyday life enables students to develop the competency of relating theoretical knowledge to real-life situations. Practical training and independent learning sessions organized on the basis of innovative approaches enhance the effectiveness of the educational process and contribute to strengthening students' scientific worldview and professional preparedness. Therefore, the scientific investigation of modern pedagogical mechanisms for developing skills related to the electrification of objects possesses significant theoretical and practical importance.

Literature Review. Scientific studies devoted to the methodology of teaching the phenomenon of electrification of objects recognize the explanation of electrostatic processes through practical experiments as an important factor in increasing students' learning effectiveness. Research conducted on the teaching of physical phenomena through innovative pedagogical technologies extensively

highlights the significance of interactive methods in developing students' independent thinking and scientific reasoning. In particular, scientific sources substantiate that integrating physical experiments with virtual laboratories enables the visual and practical reinforcement of theoretical knowledge [5]. Researchers also emphasize that the use of digital technologies and multimedia tools in teaching electrostatic phenomena increases students' interest in the subject and facilitates a simpler understanding of complex physical processes [6].

The analysis of pedagogical and methodological literature demonstrates that organizing practical training on the basis of problem-based learning, project methods, and research-oriented assignments is highly effective in developing students' competencies [3]. Certain scientific studies note that teaching the topic of electrification of objects through its connection with electrostatic phenomena encountered in everyday life contributes to the formation of students' practical thinking skills [7]. Furthermore, it has been determined that the use of electronic resources, video lessons, and simulation programs in the process of independent learning enhances the quality of independent knowledge acquisition [1]. Based on the analyzed scientific sources, it can be concluded that the application of innovative approaches in developing skills related to the electrification of objects constitutes one of the important methodological directions of modern education.

Research Methodology. In this study, methodological approaches aimed at identifying innovative methods for developing students' skills related to the electrification of objects during practical training and independent learning sessions, as well as evaluating their pedagogical effectiveness, were employed. During the research process, methods such as pedagogical observation, comparison, analysis, and generalization were applied. In addition, the influence of interactive methods, virtual laboratories, multimedia tools, and experimental assignments on educational effectiveness in teaching electrostatic phenomena was investigated. The extent to which students integrated theoretical knowledge with practical activities, as well as the development of their independent thinking and experimental competencies, was analyzed through pedagogical monitoring. The obtained results were scientifically and methodologically processed, and relevant conclusions regarding the effectiveness of innovative pedagogical approaches were formulated.

Results and Discussion. The theoretical analysis of teaching topics related to the electrification of objects through practical training and independent learning demonstrates the significant role of modern pedagogical approaches in enhancing educational effectiveness. Analyses conducted on the basis of scientific and methodological sources confirm that teaching electrostatic phenomena through innovative technologies contributes to students' deeper understanding of the subject matter. In particular, integrating the processes of object electrification with interactive methods creates opportunities for the systematic formation of students' physical concepts. According to theoretical perspectives, the use of activity-based methods in the educational process increases students' interest in the subject and intensifies their cognitive activity. Therefore, innovative approaches in teaching electrostatic phenomena are regarded as an important pedagogical tool.

The analysis of scientific literature indicates that traditional explanatory methods used in teaching electrostatic phenomena do not always provide a complete understanding of the essence of physical processes. This is because concepts such as electric charge and electrostatic fields possess an abstract nature, and explaining them solely through verbal interpretation may not create sufficient understanding among students. Therefore, pedagogical studies extensively emphasize the advantages of using visual and interactive tools in the teaching process. From a theoretical perspective, virtual laboratories, multimedia materials, and simulation programs provide opportunities for a clearer representation of electrostatic phenomena and contribute to improving students' level of comprehension of the subject matter.

Pedagogical sources place particular emphasis on the role of practical training in the educational process. According to theoretical analyses, forms of instruction based on experimentation and observation constitute an important factor in the development of students' scientific thinking. In teaching the topic of object electrification, assignments aimed at explaining the causes and consequences of various physical phenomena contribute to the formation of students' logical reasoning

abilities. At the same time, an approach based on drawing independent conclusions promotes the development of students' scientific worldview. Research findings emphasize that knowledge becomes more durable and meaningful when students analyze and comprehend it independently rather than merely receiving it in a ready-made form.

Theoretical sources also extensively highlight the effectiveness of interactive methods in teaching electrostatic phenomena. Methods such as "Brainstorming," "Problem-Based Situations," and "Discussion" not only increase students' classroom engagement but also contribute to the development of their competency in independently analyzing the subject matter. In instructional sessions organized on the basis of such methods, students emerge not merely as recipients of knowledge but as active participants in the educational process. As a result, students develop skills in expressing independent opinions, drawing scientifically grounded conclusions, and explaining the essence of physical phenomena. This, in turn, corresponds to the requirements of the competency-based approach in modern education.

Theoretical perspectives on the pedagogical potential of independent learning also demonstrate its significant importance in mastering topics related to electrostatic phenomena. Independent assignments associated with electrification phenomena contribute to students' deeper understanding of the subject matter and encourage them toward scientific inquiry. Observing manifestations of electric charges in everyday life and explaining them on the basis of physical laws enable students to recognize the practical significance of theoretical knowledge. At the same time, the use of electronic resources and multimedia tools is regarded as a modern factor in enhancing the effectiveness of independent learning.

Scientific and methodological literature pays particular attention to the impact of innovative technologies on the quality and effectiveness of education. From a theoretical perspective, digital technologies provide opportunities for presenting educational materials in a visual and systematic manner. The representation of electrostatic phenomena through computer models facilitates the explanation of complex physical processes in a simple and comprehensible form. Therefore, modern pedagogical approaches are regarded as important methodological tools for enabling students to master the subject matter quickly and effectively. In particular, instructional sessions organized on the basis of information and communication technologies enhance the interactivity of the educational process.

As a result of the theoretical analyses, the priority of the competency-based approach in teaching the topic of object electrification was also identified. In the modern educational process, it is not sufficient for students to possess only theoretical knowledge; it is equally important that they are able to apply the acquired knowledge in practical and real-life situations. Theoretical findings demonstrate that teaching electrostatic phenomena through innovative methods contributes to the development of students' competencies in analyzing problem situations, scientific thinking, and independent decision-making. This, in turn, facilitates the formation of essential qualities required for future professional activities.

Overall, the conducted theoretical analyses demonstrated that the application of innovative pedagogical technologies in developing skills related to the electrification of objects possesses significant scientific and methodological importance. Approaches based on interactive methods, virtual tools, and independent learning are regarded as effective factors in ensuring students' deep mastery of knowledge, the development of their scientific thinking, and the formation of a conscious attitude toward physical phenomena. Therefore, the use of modern innovative approaches in teaching electrostatic phenomena is considered one of the important methodological directions for improving the quality of education.

Conclusion. The theoretical analysis of teaching topics related to the electrification of objects through practical training and independent learning demonstrates that innovative pedagogical technologies serve as important methodological tools for the effective acquisition of knowledge by students. Interactive methods, virtual laboratories, multimedia tools, and digital technologies contribute to presenting the essence of electrostatic phenomena in a clear and comprehensible manner. At the same time, these approaches support the development of students' independent thinking, scientific reasoning,

and competencies in analyzing physical phenomena. Analyses conducted on the basis of theoretical sources indicate that methods grounded in the active participation of students in the educational process are more effective than traditional teaching approaches in modern education.

Furthermore, it was determined that organizing independent learning on the basis of innovative approaches strengthens students' interest in scientific inquiry and creates opportunities for connecting theoretical knowledge with real-life processes. The use of a competency-based approach in teaching electrostatic phenomena theoretically substantiates the development of students' skills in analyzing problem situations, drawing scientifically grounded conclusions, and applying their knowledge in practical activities. Therefore, the broad application of innovative pedagogical technologies in teaching topics related to the electrification of objects is regarded as one of the important factors in improving the quality and effectiveness of education.

References

1. Ismailova Z.K. Pedagogy. – Tashkent: Moliya, 2007.
2. Quronov M. National Education. – Tashkent: Kamalak, 2016.
3. Hasanboyev J., To'raqulov X., Alqarov I., Usmonov N. Pedagogy. – Tashkent: Fan va Texnologiya, 2011.
4. R. Mavlonova, N. Voxidova, N. Raxmonqulova. Theory and History of Pedagogy. – Tashkent: Fan va Texnologiya, 2010.
5. Azizxo'jaeva N.N. Pedagogical Technologies and Pedagogical Mastery. – Tashkent: Fan, 2006.
6. D.A. Begmatova, M. Qurbonov, Sh. Sodiqova, N.Q. Abdullayeva, O.D. Suvonova. Methodology of Teaching Physics. – Tashkent: Innovatsiya-Ziyo, 2021.
7. Xolmatov D.S. Methodology for Organizing Physical Experiments. – Bukhara: Durдона, 2021.