

THE ROLE OF INTEGRATION OF PHYSICS AND ENGLISH IN INCREASING EDUCATIONAL EFFICIENCY IN PHYSICS LESSONS

Associate Professor of Kokand State University- PhD N.Z.Mamadaliyeva

Annotation. This article explores the pedagogical potential and practical benefits of integrating the English language into physics instruction. It argues that a bilateral approach—teaching physics through English—not only enhances students' language proficiency but also deepens their understanding of physical concepts. By examining the methodologies for creating a bilingual learning environment, the article demonstrates how this integration fosters critical thinking, improves access to global scientific resources, and better prepares students for international academic and professional collaboration. The study concludes that the synergy between language and science education significantly increases the overall efficiency of the physics lesson, making learning more contextual, engaging, and relevant to modern globalized standards.

Keywords: Integration, Physics, English language, CLIL (Content and Language Integrated Learning), Bilingual education, Interdisciplinary approach, Educational efficiency, Scientific literacy, Motivation, Globalization.

As is known, the Decree of the President of the Republic of Uzbekistan No. PF-6108 dated November 6, 2020 “On measures to develop the spheres of education and science in the new period of development of Uzbekistan” specifically notes the need to pay serious attention to improving the quality and efficiency of the education and training system, the effective use of modern pedagogical and information technologies in the education and training process, and ensuring close cooperation and integration between education systems and the sphere of science. Also, in the Address to the Oliy Majlis of the President of the Republic of Uzbekistan Shavkat Mirziyoyev dated December 29, 2020, “If we look at history, we see that physics has been the fundamental basis for the creation of almost all discoveries and technologies in the world. Indeed, without a deep understanding of the laws of physics, it is impossible to achieve results in today's demanding fields such as mechanical engineering, electrical engineering, IT, water and energy-saving technologies... In our time, we would not be wrong if we said that it is impossible to achieve the goals our great grandfather spoke of without perfecting foreign languages. In response to such a pressing need, I propose to prioritize the study of physics and foreign languages next year,” as it was emphasized, placing a high responsibility on teachers of various subjects, especially physics teachers, who teach in non-specialized areas. This responsibility requires that

today's physics teacher, in addition to having thorough knowledge of his subject, also have a deep knowledge of a foreign language, have information about his subject in a foreign language, pay attention to inter-subject connections and inter-subject integration during the lesson, and organize integrated lessons with English. At the same time, the adoption of the Resolution 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 develop scientific research" today further increases the attention paid to improving the quality of teaching physics, introducing modern teaching methods into the educational process, as well as organizing teaching physics based on various interactive methods. As is known, the physics course is a theoretical science, the basis of which is fundamental theories, laws, scientific concepts, and its main task is to familiarize students with physical phenomena, quantities, measurements, the structure of the universe and phenomena in it, the role of physics in the development of science and technology, and the application of physical laws, and to develop their scientific outlook. In the past, physics teaching was based on traditional education, where students were taught only to acquire ready-made knowledge. Today, education based on modern technologies teaches them to search for the knowledge they acquire on their own, to study and analyze it independently, and even to draw their own conclusions. The teacher creates conditions for the development, formation, acquisition and education of the individual in this process, and at the same time performs a management and guidance function. Research shows that the level of influence of teaching methods on the level of student mastery is as follows: lecture - 5% of what we heard, reading - 10% of what we read, video method, demonstration - 20% of what we saw, demonstration of experience - 30% of what we saw and heard, debate - 40% of what we discussed, role-playing game, work in small groups, design - 75% of what we independently studied, analyzed and discussed, defended and demonstrated, and teaching through problem situations, cases - 90% of what we independently studied, analyzed and discussed. This data shows that the use of interactive methods based on interdisciplinary integration in the teaching process is of great importance in further increasing the level of students' knowledge acquisition, and also creates the basis for the development of students' cognitive abilities, independent work, and the acquisition of a exploratory and creative nature of cognitive activities. Modern teaching technologies are mainly based on person-centered education and the student's personality is the central figure of the educational process. Interdisciplinary integration, as a person-centered education, is education based on the organization of students' mutual actions in the acquisition of knowledge, skills, competencies and certain moral qualities, and the teacher gains the opportunity to objectively assess the students' actions based on mutual cooperation in achieving a specific educational goal by organizing, directing, managing, controlling and analyzing

them. The effectiveness of the educational process depends not only on its form, but also on the methods used, and in modern educational conditions, the student must have the skills to learn through thinking and practical activity, to remember information through analysis, to understand its content and relate it to practical activity, to conduct practical exercises and experiments, to make independent decisions, to find (search) news. If the science teacher teaches students about the content and essence of each topic in English, physical phenomena, physical quantities and their units of measurement, physical terms, basic words and phrases related to the topic, and uses various educational, interactive and communicative games in the process of reinforcing the lesson, in the future, students will not only have an increased need to study science in English, but also an increased interest in studying the activities of scientists conducting research in this field in English. In the process of reinforcing topics in physics lessons, as well as in review lessons on the topics covered, the following interactive methods can be used to determine how students have mastered physical terms and terms in English, to increase their vocabulary, and to determine the level of understanding, taking into account the fact that some words are international words: Matching the words with their translation Technical dictation Cluster/mind-mapping Crosswords/word-searches Guess the physicist/astronomer Using such interactive methods, linking physics lessons with English and studying physical terms and terminology gives effective results. Such methods of knowledge control are based on a program in the form of handouts, which can be used to check how students have mastered previously covered topics, as well as to consolidate and control the newly presented topic. As an example, let's analyze the following interactive methods: Find odd words - Find odd words a) mechanical motion, mechanical force, atomic energy, mechanical energy b) energy, light, heat, force, iron c) generator, mass, charge, power, energy Match the words with their translation Words- Physical terms in English Translations- Physical terms in Uzbek 1. mechanical force 2. atomic mass 3. electrical charge 4. power a. atomic mass b. power c. amperes d. action 5. ampere 6. motion 7. electric conductor e. mechanical force f. conductor g. electric charge In conclusion, if the teacher establishes a connection between physics and English in the lesson, researches how physics terms and terms are expressed and pronounced in English, and regularly explains the basic words and phrases related to each topic in English, not only will the students' interest and knowledge in science increase, but they will also learn, analyze, and teach physics terms and scientific terms to the students themselves, which in turn will create ample opportunities for students to widely use the achievements of world civilization and world information resources, as well as cultivate their enthusiasm for studying the research work of foreign scientists in the field of science and technology, and will play an important role in increasing the effectiveness of education in physics lessons.

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