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The Importance of Using Information and Communication Technologies in the Teaching of Physics

Abstract

As indicated in the Education Reforms Program of the Republic of Azerbaijan, in order for education to become a highly developed field, the society must achieve a high level of training of the new generation in order to secure its future. For this, the content of education should be renewed in terms of forming a new society. The creation of new learning technologies should be implemented as an urgent task. Using the possibilities of interactive methods, a wide space should be given to areas that stimulate the work of students and strengthen their interest in learning and reading. In the modernization of the education system, the diverse and wide application of information and communication technologies in the training process has opened up great opportunities and perspectives.

The cardinal changes taking place in humanity today lead to the acquisition of richer scientific knowledge, the creation of fundamentally new technologies, and the need for a new pedagogical approach to the teaching methodology of subjects. In the teaching of physics at school, the application of Information Communication technologies opens up a wide opportunity for the application of individualization of lessons, modeling, individual approach, including interactive training. The direction of development of information technologies, the optimal use of electronic textbooks, automated training systems, and active training methods for the formation of technical and technological bases allow fundamental changes to be made in the physics training process.

Physics is a fundamental science that contributes significantly to many technology and engineering applications that make human life comfortable. It is a subject based on experience and explanations. In the absence of experiments and explanations, it becomes difficult for students to understand physics. The principles of physics are very abstract and require deep knowledge and experience to explain to students.

Keywords: *information, electronic textbook, perspectives, computer technology*

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Fizikanın tədrisində informasiya kommunikasiya texnologiyalarından istifadənin əhəmiyyəti

Xülasə

Azərbaycan Respublikası Təhsil Sahəsində İslahatlar Programında göstəriləni kimi, təhsilin üstün inkişaf etdirilən sahəyə çevrilməməsi üçün, öz gələcəyini təmin etmək məqsədilə cəmiyyət yeni nəslin yüksək səviyyədə hazırlığına nail olmalıdır. Bunun üçün yeni cəmiyyəti formalaşdırmaq

baxımından təhsilin məzmunu yeniləşdirilməlidir. Yeni təlim texnologiyalarının yaradılması təxirə-salınmaz vəzifə kimi həyata keçirilməlidir. İnteraktiv metodların imkanlarından istifadə edərək şagirdlərin əməyini stimullaşdıran, onların öyrənməyə, oxumağa marağını gücləndirən sahələrə geniş yer verilməlidir. Təhsil sisteminin modernizə edilməsində, təlim prosesində informasiya kommunikasiya texnologiyalarının çoxnövli, geniş tətbiqi böyük imkan və perspektivlər açmışdır.

Bu gün bəşəriyyətdə baş verən kordinal dəyişiklər daha zəngin elmi biliklərin əldə edilməsini, prinsipə yeni texnologiyaların yaradılmasını, fənlərin tədrisi metodikasına yeni pedaqoji yanaşma zərurətini meydana çıxarır. Məktəbdə fizikanın tədrisində, informasiya kommunikasiya texnologiyalarının tətbiqi dərslərin fərdiləşdirməni, modeləşdirilməsini, fərdi yanasmanı, o cümlədən interaktiv təlimin tətbiqinə geniş imkan açır. Informasiya texnologiyalarının inkişaf istiqaməti, texnika və texnoloji əsasların formalaşdırılması üçün elektron dərslikdən, avtomatlaşdırılmış təlim sistemindən, fəal təlim üsullarından optimal istifadə fizika təlim prosesində əsaslı dəyişiklərin edilməsinə imkan verir. *Fizika insan həyatını rahat edən bir çox texnologiya və mühəndislik tətbiqlərinə əhəmiyyətli töhfə verən əsas elmdir. Təcrübə və izahlara əsaslanan bir fəndir. Təcrübə və izahatlar olmadıqda şagirdlərin fizikanı başa düşmələri çətinləşir. Fizika prinsipləri çox mücərrəddir və tələbələrə izah etmək üçün dərin bilik və təcrübə tələb olunur.*

Açar sözlər: informasiya, elektron dərslik, perspektivlər, kompüter texnologiyası

Introduction

In modern times, physics is considered the driving force of scientific and technological progress. There is a need to expand the scope of knowledge acquired by students in schools. Now all schools have been provided with computer classes and electronic textbooks.

Physics is a science about nature. Physics studies not one area of nature, but all its areas, unlike other natural sciences. In this regard, physics cannot be learned without practice, experience, laboratory, or observation. Information and Communication Technologies (ICT) are important due to their potential to facilitate conceptual physics, stimulate interest, and increase learning outcomes in physics education. In physics lessons, if it is not possible to conduct experiments in a laboratory or classroom, they can be demonstrated via the Internet (Body of the Ministry of Education of the Republic of Azerbaijan, 2018). Teaching an informatics lesson ensures that students in lower grades can independently use their electronic textbooks in physics lessons. Therefore, it is easy to teach students how to use an electronic textbook in physics lessons. The lesson can be held at a high level with a physics electronic textbook that collects information about the laws and formulas of physics, laboratory work, tests, modeled video images of physical phenomena, and scientists (Ismayilov, 2013).

Research

The use of ICT plays a major role in teaching physics today. In modern times, a lot can be learned with a computer. Students can be explained how to investigate certain issues in groups and collect information. Students can complete these tasks via the Internet and prepare slides. The student can present those slides in the next lesson and discuss the material they have obtained. The course of the lesson in this form increases the interest of students in the subject, activates them, and develops their creative thinking. The application of ICT is especially necessary in the teaching of the topics "Dances and Waves" in the VIII grade, "Types of Energy", "Structure of the Atom", "Mutual Comparison of Electric and Magnetic Fields" in the IX grade. These lessons can be conducted with interest based on slides using the MIMIO program ("Azerbaijani Teacher" newspaper, 2012).

In physics lessons, topics prepared in various programs are also better understood by students. The use of ICT in teaching generally distances teachers and students from lessons that are rote and make them passive. The possibilities of using ICT are rapidly increasing in modern times. Therefore, teachers must constantly work and strive to use these opportunities. Modern schools require this from teachers ("Educational Problems" newspaper, 2014).

Computer technology provides new opportunities for organizing the educational process. It is not necessary to be satisfied with only electronic textbooks. In order to build three-dimensional models of various physical phenomena, to create animation2s, with the help of a computer, POWER POINT

or other graphics programs can be used in the simplest case. Such materials greatly help students to master the topics they are studying and to think correctly about this topic. A lesson taught with computer technology and an interactive method is more interesting for students, unlike a traditional lesson. By using these tools, great interest in the subject can be aroused (Imanov, 2004).

One of the directions of innovation is the use of electronic educational resources and modern information technologies in teaching in the educational process of higher education. Computer literacy for teachers is a requirement of the day and the opportunity to use ICT should always be created. Broad opportunities for the use of ICT have been created in higher education institutions of our country (Ismayilov, 2016).

Since the educational process in the 20th century was mainly based on traditional teaching, the teacher was the leading source of information. In the 21st century, information sources should serve as intermediaries between teachers and students and teach students how to obtain information and effective work methods. This also requires improving the technology and content of education. Therefore, higher education teachers should establish a work system in accordance with information requirements (Fernández Cruz, Fernández Díaz, & Rodríguez Mantilla, 2018).

The educational organization of training includes software and technology tools that support lectures, course management systems, and computer-based testing systems. First, educational software and technology equipment are needed to assist in face-to-face lectures, such as the above-mentioned teaching and learning program. Tools that support lectures in the classroom include LCD projectors, computers, speakers, overhead projectors, etc. Another application of ICT in the educational organization of training is course management systems (for example, DOKEOS, Moodle, WebCT). Sometimes called learning management systems, electronic education systems, content management systems, or learning support systems, they are also applied in the educational organization of training, computer-based testing systems, and computer-based testing systems (Sultanova, 2022).

Information and Communication Technologies (ICT) are important because of their potential to facilitate conceptual physics, stimulate interest, and enhance learning outcomes in physics education. ICT is a set of resources and technical tools for sharing, producing, transmitting, and storing information. In Physical Science, ICT is very useful because of its ability to facilitate abstract topics, stimulate interest, and enhance teaching-learning outcomes (Grimalt-Álvaro, Ametller, & Pintó, 2013).

Many phenomena, processes, and devices of physics can be better understood with computer-based information and communication technologies (Valverde-Crespo, Pro-Bueno, & González-Sánchez, 2018). Strategies implemented to improve students' Physics learning are proposed, and its implementation and results in fully online and hybrid formats are discussed. As I have shown in the article, I describe the experiences, attitudes, and behaviors of physics teachers regarding the contributions, challenges, and solutions of ICT in physics education. ICT offers many tools that transform the traditional learning process (teacher-centered learning) into an engaging and collaborative learning process (student-centered learning) (Area-Moreira, Hernández-Rivero, & Sosa-Alonso, 2016). The importance of perspectives on emerging technologies and various interactive ICT behaviors is emphasized.

The analysis also reveals that more than a quarter of educational institutions across the country have not yet provided technical support for teachers to use ICT. When teachers encounter technical problems with ICT resources such as projectors, laptops, computers, speakers, and printers during teaching through ICT, they find it difficult to use these resources. To solve the problem, teachers and students should be provided with the services of technical experts, and for this purpose, some clusters can be created in secondary schools by specialization.

The article shows that during the lockdown, methods such as online classrooms, virtual laboratories, and mobile learning are preferred for physics research and are used more collaboratively by teachers and students during this period. It can be seen from the recommended conclusion that their joint use in teaching physics is more beneficial than the traditional physics teaching method or the use of information and communication technologies alone. Due to increased concentration, the

ability to organize summaries and improved teaching-learning results, information and communication technologies can be integrated into physics education. Finally, it is concluded that ICT cannot replace the physics teacher.

In modern times, the “State Program on Reforms in the Higher Education System of the Republic of Azerbaijan in 2009-2013” is being implemented in higher education institutions to integrate into the European and world education systems. The experience of countries that have achieved significant progress in the development of education shows that modern, active-interactive teaching methods based on information and communication technologies, developing creative thinking and taking into account the individual characteristics of the student, give higher results.

Internet resources can be used in the process of teaching subjects in several ways:

- a) to make lessons thought-provoking, lively and interesting in order to help students approach the problem of professional preparation more consciously,
- b) to effectively teach program materials,
- c) to develop students' professional abilities and skills by taking advantage of the educational, control and verification functions of the computer.

According to experts, the effect created by the Internet and the computer in classes is very high. The capabilities of the program for visualizing the lesson process are quite wide. The advantages of this program are that the Power Point program has the ability to flawlessly demonstrate any video and audio fragments, images, texts, animation products in front of the audience (Ismayilov, 2012).

Conclusion

1. Information and Communication Technologies (ICT) are important due to their potential to facilitate conceptual physics, stimulate interest and increase learning outcomes in physics education. ICT is a set of resources and technical tools for sharing, producing, transmitting and storing information. ICT is very useful in Physics due to its ability to facilitate abstract topics, stimulate interest and increase teaching and learning outcomes.

2. ICT offers many tools that transform the traditional learning process into an interesting and collaborative learning process. The importance of perspectives on emerging technologies and various interactive ICT behaviors is emphasized.

3. Methods such as online classrooms, virtual laboratories, and mobile learning are preferred for physics research and are increasingly used by teachers and students in collaboration during this period.

4. The experience of countries that have achieved significant progress in the development of education shows that modern, active-interactive teaching methods based on information and communication technologies, developing creative thinking and taking into account the individual characteristics of the learner, produce higher results.

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