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IMPROVING THE METHODOLOGY OF TEACHING PHYSICS IN TECHNICAL HIGHER EDUCATION INSTITUTIONS THROUGH THE APPLICATION OF DIGITAL TECHNOLOGIES

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Abstract: This article discusses the relevance, advantages, and methodological approaches to the integration of digital technologies in teaching physics in technical higher education institutions. It substantiates the role of virtual laboratories, LMS systems, AR/VR technologies, and simulations in enhancing the effectiveness of teaching, as well as the importance of developing teachers' digital competencies.

Keywords: physics education, digital technologies, technical higher education, methodology, virtual laboratory, LMS, simulation.

The modern education system is facing transformations driven by globalization, digital transformation, and artificial intelligence. In particular, the methodology of teaching physics in technical higher education institutions now requires a shift from traditional approaches to more effective and interactive methods. In this process, digital technologies play a leading role.

Comparison of Traditional and Modern Methods For many years, lectures and laboratory work using traditional methods, along with textbooks and study manuals, have been the main tools in teaching physics. However, these methods often turned students into passive listeners, resulting in low levels of comprehension.

Modern approaches rely on the following methods:

- Interactive lessons and discussions
- Problem-Based Learning (PBL)
- Digital resources and platforms (PhET, Moodle, Google Classroom)
- Virtual laboratories
- AI-based educational systems

Integration and Opportunities of Digital Technologies

1. Learning Management Systems (LMS):

Platforms like Moodle, Google Classroom, and Edmodo allow systematic management of course materials, assignments, and tests. They provide continuous feedback for students.

2. Simulations and Virtual Experiments:

Platforms such as PhET offer interactive experiments modeled on physical laws. These simulations allow students to explore scenarios that are often not possible in traditional laboratories.

3. AR/VR Technologies:

Augmented and virtual reality tools provide the opportunity to visually study complex physical phenomena in 3D format. This is especially useful for mastering topics such as electromagnetic waves and atomic physics.

4. Distance Learning and Video Resources:

Lessons are conducted online via platforms such as Zoom and Microsoft Teams. Lesson videos can also be prepared using platforms like YouTube or Loom, allowing students to study independently.

Teaching physics in technical higher education institutions through modern and interactive methods requires the deep integration of digital technologies into the educational process. This approach not only enhances students' comprehension but also develops them into practically-minded, innovative professionals. In the future, it is essential to develop dedicated platforms and enrich the methodological base for the national education system in this direction.

Psycho-pedagogical foundations of digital technologies in physics education

When integrating modern technologies into education, it is important to consider not only their technical capabilities but also their pedagogical and psychological aspects. Digital technologies serve as effective tools for capturing students' attention, increasing motivation, and developing independent learning skills. For example:

- **Gamification elements** (points, rankings, badges) enhance students' interest in learning.
- **Adaptive learning systems** (based on artificial intelligence) offer personalized tasks tailored to each student.
- **Multimedia tools** (videos, animations, audio) engage multiple sensory systems, thereby reinforcing knowledge retention.

Digital laboratories and their advantages

Compared to traditional laboratories, digital laboratories offer the following advantages:

Criteria	**Traditional laboratory**	**Digital laboratory**
Time and resources	Time-consuming, requires physical equipment	Quick access, usable anytime
Error probability	High (due to human factors)	Low (algorithmic control)
Repetition capability	Limited	Unlimited
Remote accessibility	Not possible	Fully available

Recommended Digital Platforms for Physics Education

1. **PhET Interactive Simulations** – Free simulations developed by the University of Colorado.

2. **Algodoo** – A user-friendly tool for visually teaching the laws of mechanics.
3. **Labster** – 3D virtual laboratories for biology and physics (based on VR).
4. **Google Scholar, Khan Academy, Coursera** – Free and open-access courses are available for Uzbek students as well.

List of Digital Competencies for Teachers

- Effective use of office software (Word, Excel, PowerPoint)
- Organizing lessons on educational platforms (Google Classroom, Moodle)
- Creating multimedia content (video lessons, screencasts)
- Working with simulations and AR/VR technologies
- Information security and data protection

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