



Factors In The Use Of Mobile Educational Platforms In Forming General Competencies Of Students In Physics

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Najmiddinov Murat Kamolovich

Independent Researcher at Navoi State University, Uzbekistan

Abstract: This article analyzes the didactic possibilities of using electronic and mobile educational platforms to develop students' general competencies in physics. The heuristic and methodological functions of these didactic tools in improving the quality and efficiency of instruction are demonstrated. Various proposals and recommendations have also been developed to improve mobile applications and software-based educational platforms.

Keywords: Information and communication technologies, e-learning, software-based educational tools, electronic platforms, competencies in physics, mobile learning, description of mobile learning.

Introduction: Research is being conducted in the global education system aimed at forming an innovative information-educational environment and creating effective mechanisms for developing students' subject competencies through the broad introduction of modern information and communication technologies and mobile software applications into the educational process. In the international educational concept developed by international organizations and developed countries up to 2030, it is particularly emphasized that education is the main driving force behind the development of society. Attention is drawn to the relevance of the effective use of virtual educational technologies, massive open online courses, learning management systems, and electronic models of education through the integration of mobile applications into the educational process to ensure quality learning [1].

In particular, in teaching general education subjects—

especially physics—one of the most important directions of the modern educational process is the effective use of mobile applications, electronic educational resources, modern digital devices, interactive software tools, and internet sites. This enables students to gain a deeper understanding of physical processes, develop creative abilities, logical thinking, and a scientific worldview, as well as guide them toward independent learning.

LITERATURE REVIEW

The research of scholars such as K.A. Tursunmetov and A.I. Khudayberdieva [2], V.N. Zoitova [3], V.M. Karimova [4], O.N. Sultanova [5], M. Tolipov [6], and Sh.A. Ashirov [7] reflects the state of the use of the information-educational environment in the education system of our republic, its achievements, and existing implementation problems.

These studies examine issues related to organizing independent study sessions in physics, developing students' skills of independent thinking, using instructional tools, the content and methods of independent learning, and its pedagogical-psychological significance and forms. The theoretical and methodological foundations of using modern technologies, as well as methods for creating and applying electronic and distance information-educational resources, are explored in the scholarly works of A. Abdukodirov [8], U. Begimkulov [9], N.A. Muslimov [10], M.E. Mamarazhabov [11], S.K. Tursunov [12], F.Kh. Gaffarov [13], and others.

However, the didactic possibilities of forming students' general competencies in physics specifically on the basis of educational platforms in the context of the Academic Lyceum of the Ministry of Internal Affairs have not yet been studied sufficiently.

METHODOLOGY

Around the world, various scholarly approaches are being undertaken to address problems related to ensuring sustainable and continuous quality of education. Such approaches include attempts to update the content of lifelong education; the introduction of mobile applications, software, textbooks, teaching and learning manuals, and new educational and scientific sources (including foreign textbooks and methods); ensuring students' academic mobility; as well as improving the relevant processes and rules.

In accordance with the Presidential Decree of the Republic of Uzbekistan dated October 8, 2019 No. PF-5847 "On the Approval of the Concept for the Development of the Higher Education System of the Republic of Uzbekistan until 2030," special attention is

paid to individualizing the educational process based on digital technologies, developing distance educational services, and the broad introduction into educational practice of such technologies as webinars, online learning, blended learning, and the flipped classroom.

Furthermore, the Presidential Decree of the Republic of Uzbekistan dated January 28, 2022 No. PF-60 "On the Development Strategy of New Uzbekistan for 2022–2026" provides that by 2026 curricula and textbooks will be fully revised and implemented based on advanced foreign experience.

At present, new generations of educational resources are emerging, and the issue of their effective use in the educational process is coming to the fore. Policy continues to focus on the further improvement of the system of lifelong education, the expansion of opportunities for quality educational services, and the training of highly qualified personnel in accordance with the current needs of the labor market.

To implement these tasks, it is necessary to create a methodological system for forming the general competencies of academic lyceum students in school subjects—particularly physics—that would ensure interconnections among the content of education, its purpose, objectives, and all components of the educational process.

To successfully accomplish these priority tasks, it is first necessary to study and analyze the scholarly research conducted in this field both in our country and abroad.

RESULTS

At present, educational institutions in countries such as Russia, the United States, Japan, the United Kingdom, China, and the Republic of Korea are effectively using systems for the development, organization, monitoring, and evaluation of a high-quality information-educational environment.

The following universities may be cited as examples:

- University of Toledo (USA) — University of Toledo (<https://www.utoledo.edu/>);
- Tohoku University (Japan) — Tohoku University (<http://www.tohoku.ac.jp>);
- Tokyo Institute of Technology — Tokyo Institute of Technology (<https://www.titech.ac.jp>);
- University of Tsukuba (Japan) — University of Tsukuba (<https://www.tsukuba.ac.jp>).

In the education system of the Russian Federation, in the areas of atomic, nuclear, and elementary particle physics, an electronic platform network has been created, developed jointly by the "General Nuclear Physics" Department of the Faculty of Physics at Moscow State University and the Institute of Nuclear

Physics of MSU — the “Electromagnetic Processes and Interaction of Atomic Nuclei” Department (<http://nuclphys.sinp.msu.ru/>).

This online resource features:

- methodological materials for teaching nuclear physics;
- current news in the field;
- video lectures and video lessons;
- practical classes;
- materials on integrating nuclear physics with medicine, industry, and manufacturing.

This electronic network helps to increase the efficiency of the educational process and to develop learners’ competencies related to the scientific field under study.

In our country, the large information-educational portal “Ziyonet.uz” (www.ziyonet.uz) has been launched, which is of great importance since it hosts educational resources for all types of educational institutions.

In addition, for students of general education schools there is the “Online-maktab.uz” portal, which provides opportunities for online learning. For students of higher educational institutions, the internet network “Talim.uzedu.uz” is actively operating. The information posted on these sites is presented in an integrated form—that is, aggregated across all areas of education.

In foreign countries, various information-educational environments and virtual technological platforms are also created and actively used, based on the capabilities of cloud data storage, distance learning, and corresponding interactive technologies.

For example: In the United States, a team at the University of Colorado Boulder has created more than 1.4 billion simulations in physics, chemistry, mathematics, geography, and biology for schoolchildren and teachers—the PhET platform (phet.colorado.edu).

In the Republic of Kazakhstan, since 2011 an educational center has developed the online platforms bilimland.kz for children of all ages—from preschool to supplementary education.

In the Czech Republic, the information-educational environment vascak.cz has been created for pupils and students, where animations of all physical phenomena and processes are presented. In addition, in a number of foreign countries, virtual laboratory works have been developed for pupils and students on such resources as virtualLab.net, [all-fizika, seninv07.narod.ru](http://all-fizika.seninv07.narod.ru), Physion, and others [14].

In our country, the platform ta'lim.uz has been created for pupils and teachers, designed for distance learning. This site hosts simulations developed by the University of Colorado Boulder team.

In addition, a specialized platform has been created for teaching the section “Atomic, Nuclear, and Elementary Particle Physics” (<http://nuclearphys-edu.uz>). This platform is organized in the format of a course and includes:

- theoretical materials,
- practical and laboratory sessions,
- resources for independent study.

These platforms are aimed at improving the quality of the educational process and developing learners’ competencies in the field of physics [15].

As is well known, as opportunities for free access to information and knowledge anytime and anywhere expand, the role of education—especially formal education—is increasingly called into question, and the relationships among education, society, and technology are becoming even more dynamic.

The use of wireless, mobile, portable, and handheld devices is gradually increasing and diversifying across all spheres of education—in both developed and developing countries. Mobile learning is moving from small-scale, short-term experiments to broader, long-term, and integrated implementation.

Recent publications, projects, and pilot initiatives provide a basis for understanding the future of mobile learning and its essence. At the same time, it is extremely important to analyze the relationship between the challenges of rigorous and adequate evaluation of mobile learning and the difficulties of its integration and dissemination within formal educational institutions.

Growing global attention to mobile learning is evidenced by a number of international conferences and forums devoted to this field. For example, in the United Kingdom the number of international conferences and seminars on mobile learning has been steadily increasing. This is particularly evident in the MLEARN conference series, which has been held regularly in different countries around the world since 2002.

In addition, the International Workshop on Mobile and Wireless Technologies in Education (WMTE), organized with the support of IEEE, plays an important role—it has been held since 2002 and brings together conferences, seminars, and practical sessions.

Since 2005, the International Association for Development of the Information Society (IADIS) has also

been holding a series of conferences dedicated to mobile learning; the first took place in Malta. The topic of mobile learning is becoming increasingly prominent at general academic events as well. For example, the annual conference of the Association for Learning Technology in the UK (ALT-C), held in September, includes numerous presentations and discussions on this subject, which attests to the growing scholarly interest in mobile learning.

Moreover, UNESCO (the United Nations Educational, Scientific and Cultural Organization) holds the UNESCO Mobile Learning Week annually—this is UNESCO's flagship international event in the field of information and communication technologies in education. During this week, educators and researchers from around the world exchange experiences, discuss innovative approaches to learning with mobile technologies, and contribute to their development.

All these facts show that serious attention is being paid to mobile learning worldwide, and, most importantly, there is confidence in the possibility of forming new educational processes using digital mobile devices.

Mobile applications are programs developed for tablets and smartphones, installed on a specific platform and designed to perform specific functions. Simply put, a mobile application performs certain actions and solves a number of user tasks. Most such applications are installed directly on mobile devices or downloaded through special online app stores (Play Market), such as the App Store, Google Play, and Amazon Appstore.

There are three main types of mobile applications:

- Mobile website,
- Hybrid application,
- Native (local) application.

A mobile version of a website is a set of separate web pages or an adapted version of the main site intended for display on the small screens of mobile devices. In this case, the design and structure automatically adjust to the screen size. However, adapting a site for mobile devices does not mean that all the content of the main site should be fully transferred to a small screen [88].

A hybrid application is an intermediate option between a mobile website and a native application. It is created using web technologies but can operate like a regular application. However, such applications have limited access to the hardware functions of a mobile device.

A native application is developed separately for each operating system (Android, iOS, Windows Phone). Its development takes more time and requires greater financial costs, but it runs faster and more stably, does not depend on an internet connection, and saves the

device's battery charge and memory.

For the general secondary education system, the website <http://restm.zn.uz> has been created, which can also be used by students of academic lyceums. The site includes sections such as holidays, textbooks, announcements, methodology, education, events, recommendations, technologies, news, and others.

Similar resources include www.ziyonet.uz, www.pedagog.uz, as well as sites developed by instructors from various training centers. In our country, it is important to establish the creation of such sites for each academic subject in collaboration with experienced professors and teachers.

This will make it possible to:

- consolidate various methodologies and innovative developments;
- publish lesson notes, materials for Olympiads, and their solutions;
- demonstrate physical experiments and demonstrations;
- increase students' interest in the subject and develop the necessary competencies.

The problems of implementing such educational sites in practice can be successfully addressed through the use of mobile applications and educational platforms.

Thus, in forming students' general competencies in physics, mobile applications and educational platforms serve as an important didactic tool. Their effective use in the educational process contributes to taking the system for training competitive personnel to a new level.

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