

Efficiency of Using Smart Technologies in Teaching Technical Sciences in Higher Educational Institutions

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Abstract:

This article presents the problems, solutions and advantages of using SMART technologies in the teaching of technical sciences in higher education institutions. At the same time, the essence of the concept of SMART is highlighted in pedagogical-psychological and methodological terms

Key words: SMART, SMART technologies, professional competencies, ICT competence, e-learning.

Introduction

Today, the world's leading countries in the ICT Development Index (South Korea, Denmark, Sweden, USA, Singapore) are making extensive use of databases, communication networks and SMART-technologies in the field of education. Special attention is paid to creation.

Bringing the education system in our country in line with international educational standards, ensuring the quality and competitiveness of staff training in higher education institutions, improving the quality of the world-based higher education system, one of the most effective ways to introduce innovations in continuing education. The Strategy of Actions for the Further Development of the Republic of Uzbekistan includes "Stimulation of scientific research and innovation, creation of effective mechanisms for the implementation of scientific and innovative achievements, research and development centers of higher education and research institutes." such as stable functions are noted.

In the world, the globalization of the information space, openness and the strengthening of mass communication expand the opportunities for professional and creative development of students in an integrated learning environment. Development trends in the field of education indicate the need for wider introduction of modern teaching aids in the information society and further increase their effectiveness. In the world community, UNESCO's program "Development of teachers' competence in information and communication technologies" [1; 1-115] and "Cooperation Strategy of the Council of Europe in the field of education and training until 2020" [2; On the basis of pp. 2-12, a large-scale practical work is being carried out.

It is known that the formation of knowledge, skills and abilities in a person in a certain field directly depends on the education system. The effectiveness of the education system is directly ensured by the level of teachers, the needs of students, the content of textbooks and the infrastructure aimed at the formation of independent learning. This means that the training of advanced personnel, increasing their competitiveness in accordance with the requirements of the labor market, the development of creative thinking professionals is closely linked with the educational process in educational institutions.

Today, smart-education, which is an advanced form of e-learning, is developing rapidly. Smart in Europe - a program for the formation of a "single European university" on the principle of education [3; Pp. 5-12], a program to revolutionize education in the United States in this decade [4; Pp. 3-5], SMART Education in South Korea is a digital textbook initiative and KERIS is an edunet system [5; Pp. 1-3], IBM - the concept of education for the intelligent planet [6; Pp. 1-3], China PLS (Personal Learning Space) Model List [7; Pp. 1-2], "Smart University" at Moscow, Omsk, Perm, Kazan universities in Russia [8; Pp. 144-145] are formed.

In our country, the Strategy of Actions for the Further Development of the Republic of Uzbekistan includes "increasing the quality and efficiency of higher education institutions, educating intellectually developed, independent-minded, determined and loyal to the Fatherland.

Methodology

The term "SMART" was coined in 1954 by Peter Ferdinand Drucker, a scientist, economist, publicist, and educator, used by Paul J. Meyer in 1965, and George T. Doran in 1981 [9; 1 p].

SMART - from the English words "Specific", "Measurable", "Attainable", "Relevant", "Time-bound". expressed in capital letters [10; Pp. 4-5].

Technology - a set of methods and processes in the field of certain development [11; 237].

One of the leading scientists of our republic According to A.A.Abdukodirov, Smart technologies are technologies that are transferred to procedures based on interaction and exchange of experience, primarily based on information and knowledge. The main feature of "Smart" is the ability to interact and adapt to the environment. This feature has an independent value and can be applied to the city, university, education, technology, society and many other categories [12; Pp. 6-7].

SMART is a feature of a system or process that manifests itself in its interactions with the environment and has the ability to adapt to the changing environment, to respond immediately to changes in the external environment, to develop and develop independently.

Today, the main tool of SMART-technologies is the Internet of Things (IoT). The Internet of Things (IoT) is a remote-controlled home appliance, vehicle, and other equipment equipped with a network of specialized electronics, software, sensors, and a network system for the exchange of data between receiving and transmitting devices. IoT technology empowers researchers to develop smaller and cheaper wireless systems that use less power and can be used on almost any type of device.

We are talking about the use of SMART-technologies and IoT - "Internet of Things" in the educational process in foreign countries today.

The Polytechnic University of Singapore has a Smart Campus, where each student is identified by an electronic concierge. An electronic concierge is a system of Internet services that provides instant access to information, answers to inquiries, navigation and other services in various fields. This system introduces students to the news of the university, the list of recommended literature by professors and teachers. The analysis of the data is well-structured and even identifies students who are unable to complete coursework in a timely manner and informs science teachers about them [13; 1 p].

The University of John Curtin in Australia has launched the Internet of Things. Based on the information obtained with the help of this system, conclusions are made about the occupancy of classrooms and libraries, attendance and daily life of professors, teachers and students [14; 6].

At the Malaysian University of Technology, artificial intelligence-based education collects information about students from beginning to end. With the help of such observation, their

participation in the training is studied, and this information is the basis for further decisions. The course on artificial intelligence analyzes the lessons and gives advice on ways to further improve its quality [15; 438].

In Japan, students can take advantage of the full set of virtual reality to participate in a "virtual school", listen to teachers and take tests with the help of a special program for smartphones, and other school students through a separate platform. Students are assigned separate teachers, from whom they can answer their questions by phone or e-mail, and meet with the teacher if necessary [3; P. 2].

The SweetRush system (<http://www.sweetrush.com/>) in San Francisco, California, USA, develops and tests training solutions for e-learning and mobile learning. Individual training is possible under the guidance of a teacher-guide, which allows you to meet again in real time. The course consists of competitive games and audio-video animations, which help to attract more participants [17; Pp. 1-2].

A number of scientists from foreign countries and our country are studying the problems of teaching the subject "Network Technologies", pedagogical computer programs are being developed and implemented in the educational process. Despite the fact that in our country, effective work is being done to raise the level of work in this area, the following problems still need to be addressed: the availability of textbooks and manuals in Uzbek, modern textbooks and manuals on the subject of network technology; lack of e-learning resources in science; Inadequate methodological guidelines for practical, laboratory and independent study.

In overcoming the above problems and developing a system for the development of professional knowledge of future professionals, first of all, methodological, professional, motivational, pedagogical, psychological, systematic, theoretical-scientific, creative-practical, self-assessment, self-esteem. Factors such as cognition need to be considered.

The main purpose of teaching the subject "Network Technology" is to provide students with theoretical and scientific knowledge on the methodology and technology of network technology, network management, network design. Its task is to create in students the knowledge, skills and abilities to create modern methods of network technology, network technology and its software, to work in network management systems [17, p. 5].

Lectures on the subject "Network Technologies" require more modern theoretical information, enriching its content. The following content can be used in the selection of training materials: comprehensive development of the future specialist; high scientific and practicality; complexity corresponds to the real learning opportunities of specialists; compliance with the established time and time in the study of the given subject.

The content of professional competence in the new form of the content of the subject "Network Technologies" studied during the study was developed in accordance with the educational objectives of the Bloom's taxonomy. (See Table 1.).

Table 1. Components of professional competence in the new form of the content of the subject "Network Technologies"

Classes of B. Bloom's taxonomy		Competences
Knowledge	B1	Knowledge of the principles of building computer networks
	B2	Knowledge and differentiation of reference models and network levels for the interaction of open systems

	B3	Knowledge of the components of modern network and information and communication technologies
Understanding	T1	Understand the functions and methods of use of modern network devices
	T2	Understanding the role of network technology in education.
Application	Q1	Design and implementation of computer networks with the help of modern network technologies
	Q2	Application of modern network technologies in the organization of network partnerships in education
Analysis	TL1	Analysis of network technology standards
	TL2	Establishing the interconnectedness and relationship of the components of modern information and communication technologies, identifying the principles that make up the integrity.
Synthesis	C1	Summarize the parts provided for the production of new components of network technology
	C2	Development of a network creation project
Evaluation	BIII1	Communication and summarization of network design
	BSh2	Identify and justify the positive and negative aspects of the industry
	BS3	Presentation and evaluation of solutions based on specific criteria

Cloud technologies, IoT-Internet of Things, NB-IoT technology, Smart Campus, LPWAN and LoRaWAN, Wireless network, WBirebree, Wireless network HD) have been enriched and systematized by the introduction of such concepts. At the same time, the topics were summarized while maintaining the number of hours of the audience set in the working schedule. Recommended new types, methods, tools and forms of lectures on the basis of scientific and practical analysis of didactic aids for SMART-technologies (Smart Digital Podium - interactive control system, Smartboard - interactive whiteboard, SMART Notebook, SMART Notebook The conference program) was enhanced through the introduction of collaborative networked learning resources and interactive multimedia tools.

Laboratory and practical classes are of great importance in strengthening the theoretical knowledge of students in the field of "Network Technology" and the formation of practical skills. However, in most cases they do not give the expected results due to the following reasons: the existing laboratory rooms are not adequately equipped with the necessary equipment; most laboratory equipment does not fully meet modern requirements and is obsolete; students may not be able to make the most of their time due to the time required to complete some laboratory assignments, and so on.

Conclusion

In short, the problems of teaching the above-mentioned subject "Network Technologies" include: obtaining the necessary materials from the Internet, new literature and updating information in science; development of special Web systems and electronic information educational resources of the subject, taking into account the updating of materials; creation of electronic textbooks, electronic manuals and electronic teaching aids for teaching the subject; This can be solved by developing a methodology for the use of new pedagogical and information technologies based on SMART technologies in the conduct of laboratory, practical and independent learning activities in science.

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