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Research Article

COMPARATIVE ANALYSIS OF THE USE OF SMART TECHNOLOGIES IN HIGHER EDUCATION INSTITUTIONS BETWEEN THE EDUCATION SYSTEMS OF UZBEKISTAN AND FOREIGN COUNTRIES

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ABSTRACT

This article provides an analysis curriculums of the using SMART technologies in higher education universities in Uzbekistan and abroad. A total of 215 respondents from Jizzakh State Pedagogical Institute, Navoi State Pedagogical Institute and Kokand State Pedagogical Institute were involved in the pilot work. The analysis of the curriculum of the education system in Altai, Belarus and the Republic of Uzbekistan is also presented.

KEYWORDS

SMART technologies, HEU, Internet of things, Euler-Venn diagram, comparative analyzing.

INTRODUCTION

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The 2030 Concept of International Education, adopted by international organizations (UNESCO, UNICEF, UN) and developed countries (South Korea, China, Japan, Russia, etc.), emphasizes that education is a key driver of social development and an important factor in achieving sustainable development goals. Virtual learning technologies, mass online open courses, mobile learning technologies, education management systems and e-learning models are effectively used to provide quality education [Online learning service with Edunet].

Today, the world's leading countries in the ICT Development Index (South Korea, Denmark, Sweden, USA, Singapore) paid more attention for using databases, communication networks and SMART-technologies in education system. These process demand specialists have such quality as creativity, self-confidence, making original ideas and etc.

One of priorities of our country harmonize the education system with international educational standards, ensure the quality and competitiveness of training in higher education, improve the quality of higher education based on world practice, develop effective methods of innovation in continuing education. The Action Strategy for the Further Development of the Republic of Uzbekistan states priorities such as "Stimulation of research and innovation activities, creation of effective mechanisms for the implementation of scientific and innovative achievements, establishment of specialized research and experimental laboratories, high technology centers and technology parks at universities and research institutes" [2; P.11].

The object of the study were students of undergraduate education in pedagogical higher education institutions of the Republic of Uzbekistan. At the same time, the process of teaching students the subject "Network Technologies" was determined, and a total of 215 respondents from Jizzakh State Pedagogical Institute, Navoi State Pedagogical Institute and Kokand State Pedagogical Institute were involved in experimental work.

METHODS

In the process of research, comparative study and analysis of pedagogical, psychological and methodological resources, didactic literature, curricula and programs, textbooks and teaching materials, socio-pedagogical (observation, interview, diagnosis, survey, test), experimental, mathematical statistical processing of monitoring results.

The scientific novelty of the research is:

The content of the subject "Network Technology" is enriched by the introduction of concepts such as cloud technology, IoT-Internet of Things, NB-IoT technology, Smart Campus, LPWAN and LoRaWAN, wireless network technologies (Wibree, ZigBee, UWB, Wireless HD);

Introduction of collaborative network improved by educational resources and interactive multimedia technologies based on SMART-technologies (Smart Digital Podium - interactive management system, Smartboard - interactive whiteboard, SMART Notebook and SMART Meeting Pro - collaborative learning software, SMART Bridgit - conference program);

Criteria for assessing the knowledge, skills and professional competencies of students in the field of "Network Technology" (motivational, intellectual and

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active) are determined on the basis of modern methods of control and monitoring of the educational process;

The methodological basis of teaching the subject "Network Technology" has been improved through using of electronic didactic materials (media resources, web technology and network simulator program) in integrated learning environment and the model "Flipped classroom".

Thus, scientists highlight the relevance of the problem of developing the ICT competence of teaching staff in the framework of their professional education. However, solutions to the problem under consideration are offered only within the framework of the professional training of future teaching staff in higher educational institutions. The issues of developing the ICT competence of future teaching staff with the help of SMART technology remain aside.

The purpose of the article – to develop ICT competence of future specialists (teachers) with helping SMART technologies.

METHODOLOGY

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

Today, smart-education, which is an improved form of e-learning, is developing rapidly. Program for the formation of a "Single European University" on the principle of Smart - education in Europe [3; P. 3-5], SMART Education in South Korea - digital textbook initiative and KERIS - edunet system [1; P.1-3], IBM - an educational concept for the intelligent planet [4; P.1-3], China PLS (Personal Learning Space) Model System [5; P.1-2], "Smart University" in Moscow, Omsk, Perm, Kazan universities in Russia [6; P.144-145] is formed.

In our country, the Action Strategy for the further development of the Republic of Uzbekistan prioritizes "improving the quality and efficiency of higher education institutions, educating intellectually developed, independent-minded, strong-willed, loyal to the Fatherland" [2; P.10-11].

The term “SMART” was first introduced in 1954 by scientist, economist, publicist, educator Peter Ferdinand Drucker, in 1965 by Paul J. Meyer, and in 1981 by George T. Doran in his research [P.Ferdinand, 1965].

SMART - English words "Specific", "Measurable", "Attainable", "Relevant", "Time-bound", "Time-bound" represented by capital letters [7; P.4-5].

Technology - (visual: technology, rus: technology) a set of methods and processes in a particular field of production [8; P.237].

One of the leading scientists of the Republic According to A.A.Abdukodirov, Smart technologies are technologies which are transmitted to procedures on the basis of 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,

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university, education, technology, society and many other categories [7; P.4-5].

SMART is a feature of a system or process that manifests itself in its interaction with the environment and allows the system to process its capabilities, respond immediately to changes in the external environment, adapt to changing conditions, develop independently and self-manage, effectively accomplish results [9; P.43].

Today, the main tools of SMART-technologies are IoT (Internet of things). Internet of Things IoT (Internet of Things) is remote control of home appliances, vehicles, etc. using artificial intelligence, equipped with a network system consisting of special electronics, software, sensors, interconnection of receivers and transmitters. To implement the principles of "Life Long Learning" in the XXI century, announced by UNESCO, which is smaller and cheaper for IoT technology researchers, it consumes less energy and can be connected to almost any type of device. Conditions are created through SMART education. SMART-education creates learning opportunities “anytime, anywhere and anytime”. SMART - the society poses global challenges to higher education institutions, such as the training of creative potential professionals with modern thinking and ability to work. To do this, they need to develop the following practical skills: communication in social networks, search and selection of useful information, work with electronic resources, creating a personal database that requires changing the environment of the learning process [10; P.12].

The main principles of SMART education include:

1. Use of up-to-date information in solving educational problems provided in educational programs.

2. Organization of independent learning, research and design activities of students.

3. Carry out the learning process in a distributed learning environment. The educational environment should not be limited to the boundaries of the educational institution’s regional or distance education system. The learning process should be continuous.

4. Flexibility of educational directions and individualization of education, ie individual orientation.

Thus, "SMART-education" expands the opportunities for personal development of future professionals and forms the necessary creative potential. In this case, SMART-technologies and "Internet of Things" (IoT) serve as the main tools for teaching. It should be noted that the country has not yet developed specific methodological recommendations based on the concept and research on the use of SMART-technologies and IoT-Internet in the education system.

The study used such general scientific methods as analysis and synthesis, comparison and generalization. In addition, to identify the attitude of computer science teachers to the problem of developing creativity, testing was carried out, and Student's criterion was used for statistical analysis of the data obtained.

The validity and reliability of the data obtained was ensured by the organization of the experiment in accordance with the goals, objectives and conditions for implementation, a representative sample, the adequacy of the methodology used, and statistical processing of the experimental data.

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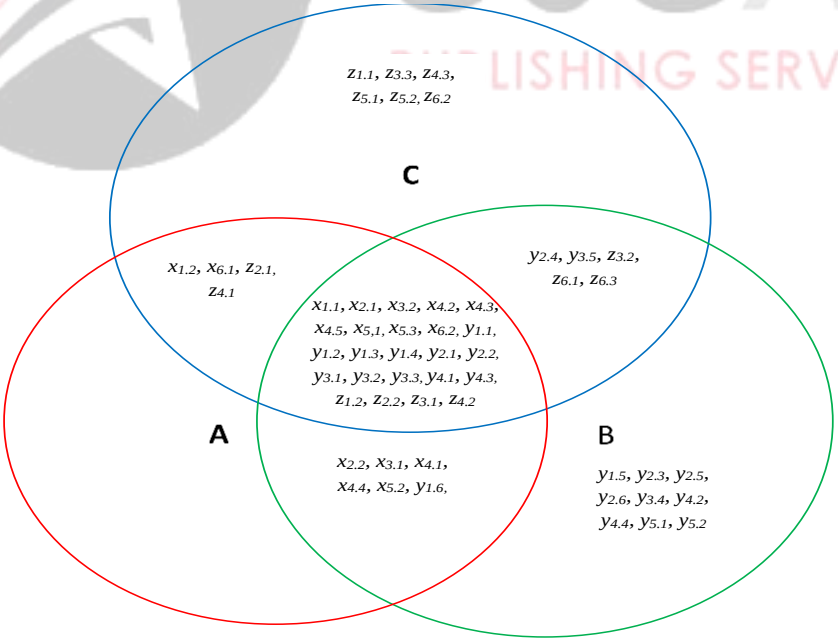
DISCUSSION

The problems of teaching the subject "Network Technologies" are being studied by a number of scientists from foreign countries and our country, educational computer programs are being developed and implemented in the educational process. Despite the fact that the country is working to raise the level of work in this area, the following problems remain: the lack of textbooks and manuals in Uzbek on the subject of network technology, including electronic versions and the lack of modern requirements; lack of e-learning resources in science; the level of methodological guidelines for practical, laboratory and independent study is not at the required level.

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

RESULTS

We perform methods of analysis by comparing topics in the content of science programs. To do this, we use the theory of algebraic sets i.e. we defined the Altai State Pedagogical University of Russia as Set A, the Belarusian State Pedagogical University as Set B, and the Pedagogical Higher Educational Institutions of Uzbekistan as Set C. We represent the numbers of topics given in the table (Appendix 1) as set elements x, y and z, respectively. We find their intersection and merger and interpret them in the Euler-Venn diagram. (See Figure 1.1).



Pic.1.1. Euler-Venn diagram.

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Table 1.1.
Altai State Pedagogical University

Theme №	1.1	1.2	2.1	2.2	3.1	3.2	4.1	4.2	4.3	4.4	4.5	5.1	5.2	5.3	6.1	6.2
Element	$x_{1.1}$	$x._{1.2}$	$x_{2.1}$	$x_{2.2}$	$x_{3.1}$	$x_{3.2}$	$x_{4.1}$	$x_{4.2}$	$x_{4.3}$	$x_{4.4}$	$x_{4.5}$	$x_{5.1}$	$x_{5.1}$	$x_{5.3}$	$x_{6.1}$	$x_{6.2}$

Table 1.2.
Belarus State Pedagogical University

Theme №	1.1	1.2	1.3	1.4	1.5	1.6	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4
Element	$y_{1.1}$	$y_{1.2}$	$y_{1.3}$	$y_{1.4}$	$y_{1.5}$	$y_{1.6}$	$y_{2.1}$	$y_{2.2}$	$y_{2.3}$	$y_{2.4}$	$y_{2.5}$	$y_{2.6}$	$y_{3.1}$	$y_{3.2}$	$y_{3.3}$	$y_{3.4}$

3.5	4.1	4.2	4.3	4.4	5.1	5.2
$y_{3.5}$	$y_{4.1}$	$y_{4.2}$	$y_{4.3}$	$y_{4.4}$	$y_{5.1}$	$y_{5.2}$

Table 1.3.
Pedagogical higher educational institutions of Uzbekistan

Theme №	1.1	1.2	2.1	2.2	3.1	3.2	3.3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	6.3
Element	$z_{1.1}$	$z_{1.2}$	$z_{2.1}$	$z_{2.2}$	$z_{3.1}$	$z_{3.2}$	$z_{3.3}$	$z_{4.1}$	$z_{4.2}$	$z_{4.3}$	$z_{5.1}$	$z_{5.2}$	$z_{6.1}$	$z_{6.2}$	$z_{6.3}$

A = {$x_{1.1}$, $x_{1.2}$, $x_{2.1}$, $x_{2.2}$, $x_{3.1}$, $x_{3.2}$, $x_{4.1}$, $x_{4.2}$, $x_{4.3}$, $x_{4.4}$, $x_{4.5}$, $x_{5.1}$, $x_{5.1}$, $x_{5.3}$, $x_{6.1}$, $_{6.2}$};

B = {$y_{1.1}$, $y_{1.2}$, $y_{1.3}$, $y_{1.4}$, $y_{1.5}$, $y_{1.6}$, $y_{2.1}$, $y_{2.2}$, $y_{2.3}$, $y_{2.4}$, $y_{2.5}$, $y_{2.6}$, $y_{3.1}$, $y_{3.2}$, $y_{3.3}$, $y_{3.4}$, $y_{3.5}$, $y_{4.1}$, $y_{4.2}$, $y_{4.3}$, $y_{4.4}$, $y_{5.1}$, $y_{5.2}$};

C = {$z_{1.1}$, $z_{1.2}$, $z_{2.1}$, $z_{2.2}$, $z_{3.1}$, $z_{3.2}$, $z_{3.3}$, $z_{4.1}$, $z_{4.2}$, $z_{4.3}$, $z_{5.1}$, $z_{5.2}$, $z_{6.1}$, $z_{6.2}$, $z_{6.3}$}.

We determine the intersection of the current sets:

A ∩ B = {$x_{2.2}$, $x_{3.1}$, $x_{4.1}$, $x_{4.4}$, $x_{5.2}$, $y_{1.6}$}

A ∩ C = {$x_{1.2}$, $x_{6.1}$, $z_{2.1}$, $z_{4.1}$}; B ∩ C = {$y_{2.4}$, $y_{3.5}$, $z_{3.2}$, $z_{6.1}$, $z_{6.3}$}

A ∩ B ∩ C = {$x_{1.1}$, $x_{2.1}$, $x_{3.2}$, $x_{4.2}$, $x_{4.3}$, $x_{4.5}$, $x_{5.1}$, $x_{5.3}$, $x_{6.2}$, $y_{1.1}$, $y_{1.2}$, $y_{1.3}$, $y_{1.4}$, $y_{2.1}$, $y_{2.2}$, $y_{3.1}$, $y_{3.2}$, $y_{3.3}$, $y_{4.1}$, $y_{4.3}$, $z_{1.2}$, $z_{2.2}$, $z_{3.1}$, $z_{4.2}$}

We find the differences of the sets:

A\B = {$x_{1.2}$, $x_{6.1}$}; A\C= {$x_{2.2}$, $x_{3.1}$, $x_{4.1}$, $x_{4.4}$, $x_{5.2}$};

B\A = {$y_{1.5}$, $y_{2.3}$, $y_{2.4}$, $y_{2.5}$, $y_{2.6}$, $y_{3.4}$, $y_{3.5}$, $y_{4.2}$, $y_{4.4}$, $y_{5.1}$, $y_{5.2}$};

B\C = {$y_{1.5}$, $y_{1.6}$, $y_{2.3}$, $y_{2.5}$, $y_{2.6}$, $y_{3.4}$, $y_{4.2}$, $y_{4.4}$, $y_{5.1}$, $y_{5.2}$};

C\A = { $z_{1.1}$, $z_{3.2}$, $z_{3.3}$,$z_{4.3}$, $z_{5.1}$, $z_{5.2}$, $z_{6.1}$, $z_{6.2}$, $z_{6.3}$};

C\B = {$z_{1.1}$, $z_{2.1}$, $z_{3.3}$, $z_{4.1}$, $z_{4.3}$, $z_{5.1}$, $z_{5.2}$, $z_{6.2}$};

A\B\C = A\C\B = ∅;

B\A\C = B\C\A = {$y_{1.5}$, $y_{2.3}$, $y_{2.5}$, $y_{2.6}$, $y_{3.4}$, $y_{4.2}$, $y_{4.4}$, $y_{5.1}$, $y_{5.2}$};

C\A\B = C\B\A = {$z_{1.1}$, $z_{3.3}$, $z_{4.3}$, $z_{5.1}$, $z_{5.2}$, $z_{6.2}$};

Analyzing the solution of the intersection of algebraic sets, we come to the following conclusions, focusing on the set C, i.e. the topics in the Science Program of pedagogical higher education institutions of Uzbekistan:

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1. The science program of the Altai State Pedagogical University and the science program of the Belarusian State Pedagogical University correspond to 6 topics, i.e. the intersection of sets A and B has 6 elements.

2. The intersection of sets A and C has 4 elements x1.2, x6.1, z2.1, z4.1, which corresponds to topics 1.2, 6.1 and 2.1, 4.1 in the subject program of Altai State Pedagogical University and higher pedagogical institutions of Uzbekistan. indicates that it has arrived. (See Table 1.4)

Table 1.4.
Compatibility table

№	Altai State Pedagogical University	Pedagogical higher educational institutions of Uzbekistan
1	1.2. The main components of the network. Network application. Network standardization.	2.1. Types of computer networks. Their classifications.
2	6.1. History of Internet networks.	4-module. Internet-global computer network.

1. The intersection of sets V and S has 5 elements (y2.4, y3.5, z3.2, z6.1, z6.3), ie topics 2.4, 3.5 in the science program of the Belarusian State Pedagogical University in pedagogical higher educational institutions of Uzbekistan Corresponds to topics 3.2, 6.1, 6.3. (See Table 1.5)

Table 1.5.
Compatibility table

№	Belarus State Pedagogical University	Pedagogical higher educational institutions of Uzbekistan
1	2.4. High speed local area network technologies.	3.2. Local area network topology. Local area network topology.
2	3.5. Quality of service and protection in IP networks. NAT technology. Secure channel service. Secure IPSec protocol. Virtual private networks. MPLS VPN technology.	**6-module.** Network security. Basics of network security. Types of threats in the network.
		6.3. Hardware and software for data security in the network. Secure email. Network-level security: IPses and virtual.

4. The intersection of sets A, B, and C has 24 elements (x1.1, x2.1, x3.2, x4.2, x4.3, x4.5, x5.1, x5.3, x6.2 , y1.1, y1.2, y1.3, y1.4, y2.1, y2.2, y3.1, y3.2, y3.3, y4.1, y4.3, z1.2, z2 .2, z3.1, z4.2), ie topics 1.2, 2.2, 3.1, 4.2 in the subject program of pedagogical higher educational institutions of Uzbekistan Altai State Pedagogical

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University 1.1, 2.1, 3.2, 4.2, 4.3, 4.5, 5.1, 5.3, 6.2 and Topics 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 3.1, 3.2, 4.1, 4.3 of the Belarusian State Pedagogical University.

Analyzing the solution of the differences of the current sets A, B and C, we come to the following conclusions:

1. The difference between sets A and B was 2 elements x1.2 and x6.1, i.e. topics 1.2 and 6.1 in the science program of Altai State Pedagogical University are topics that do not correspond to the Belarusian State Pedagogical University.

2. The difference between sets A and C was 5 elements (x2.2, x3.1, x4.1, x4.4, x5.2), ie 2.2, 3.1, 4.1, 4.4, 5.2 in the science program of Altai State Pedagogical University - Topics do not correspond to the science program of pedagogical higher education institutions of Uzbekistan.

1. The difference between sets B and A was 11 elements, i.e. these topics in the science program of the Belarusian State Pedagogical University are not available at the Altai State Pedagogical University.

2. The difference between sets B and S was 10 elements (y1.5, y1.6, y2.3, y2.5, y2.6, y3.4, y4.2, y4.4, y5.1, y5 .2), ie topics 1.5, 1.6, 2.3, 2.5, 2.6, 3.4, 4.2, 4.4, 5.1, 5.2 in the science program of the Belarusian State Pedagogical University do not correspond to the science program of pedagogical higher educational institutions of Uzbekistan. (See Appendix 1)

3. The difference between sets S and A was 9 elements z1.1, z3.2, z3.3, z4.3, z5.1, z5.2, z6.1, z6.2, z6.3, ie Uzbekistan these relevant topics in the science curriculum of pedagogical higher education institutions are not available at Altai State Pedagogical University.

4. The difference between sets S and B was 8 elements z1.1, z2.1, z3.3, z4.1, z4.3, z5.1, z5.2, z6.2, ie pedagogical higher educational institutions of Uzbekistan these topics in the science program are not relevant to the Belarusian State Pedagogical University.

5. The difference between sets A, B and C is equal to an empty set, ie all topics in the science program of the Altai State Pedagogical University correspond to the science programs of pedagogical higher educational institutions of Uzbekistan and the Belarusian State Pedagogical University. The topics are also structured according to the content, and the program is well designed.

6. The difference between sets B, A and C is equal to 9 elements, which means that the remaining educational institutions of the Belarusian State Pedagogical University do not correspond to the science program of the remaining educational institutions.

9. The difference between sets S, A and B is equal to 6 elements (z1.1, z3.3, z4.3, z5.1, z5.2, z6.2), which are the remaining topics in the science program of pedagogical higher education institutions of Uzbekistan. means that educational institutions do not fit into the science curriculum.

Based on the analysis, it was concluded that the pedagogical higher education institutions of Uzbekistan should integrate the science program "Network Technologies" in accordance with the topics of the science program of the Altai State Pedagogical University. It is also necessary to enrich modern concepts of network technologies by incorporating them into the content of topics on the basis of qualification requirements. it is necessary to take a

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systematic approach to the content of teaching materials and methodological methods of teaching in teaching the subject "Network Technology". The main problem is the choice of topics in the curriculum on a clear, logical and scientific basis, with the following requirements arising from various didactic issues: the relationship between production and science; interdisciplinary and intradisciplinary connections; distribution of study time; basic rules, laws and concepts in the systematic formation of knowledge; logical analysis of the study material.

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, working in network management systems [11, p.5].

Lectures on "Network Technologies" require more modern theoretical information, enriching its content. In the selection of training materials can be used in the following contexts: comprehensive development of the personality of the future specialist; high scientific and practicality; suitability of specialists for real training opportunities in terms of complexity; compliance with the established time and date available in the study of a given subject.

The content of professional competence in the new form of the content of the subject "Network Technology" studied during the study was developed in accordance with the learning objectives of the Blum taxonomy. (See Table 1.6).

Table 1.6.
The structure of professional competence in a new form of the subject "Network Technology"

Categories of B. Blum's taxonomy		Competencies
To know	B1	Knowledge of the principles of building computer networks
	B2	Know and differentiate the reference model 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 uses of modern network devices
	T2	Understanding the role of network technology in education.
Apply	Q1	Design and operation of computer networks using modern network technologies
	Q2	Application of modern network technologies in the organization of network partnerships in education

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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 given parts in order to create new components of network technologies
	C2	Develop a network creation project
Rating	BSH1	Feedback and summarization of network design
	BSH 2	Identify and justify the pros and cons of the network
	BSH 3	Provide and evaluate solutions based on specific criteria

Cloud technologies was enriched and systematized by introducing concepts such as, IoT-Internet of Things, NB-IoT technology, Smart Campus, LPWAN and LoRaWAN, wireless network technologies (Wibree, ZigBee, UWB, Wireless) on the principle of membership HD). At the same time, the topics were narrowed down, while maintaining the amount of classroom hours specified in the work plan. (See Table 1.7). The proposed new types, methods, tools and forms of lectures are based on scientific and practical analysis. conference program) based collaborative network has been improved through the introduction of educational resources and interactive multimedia tools.

Table 1.7.
New topics in the content of the subject "Network Technologies"

№	Themes	Competence	Total	Lecture	Lab	Practical	Independent
1	**1-Module. Introduction to network technologies. Information and communication technologies.** 1.2. Computer networks. Basic components and software 1.3. A reference model for the interaction of open systems	B1 B2 B3 T1 T2 TL1	18	6			12
2	**2-Module. Physical and channel levels.** 2.1. Theoretical foundations of data transmission. 2.2. Wireless network technologies (Wibree, ZigBee, UWB, Wireless HD). Bluetooth architecture. *	B2 B3 T1 TL1	20	4	2	2	12

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		Q1 C1					
3	**3-Module. Network level.** 3.1. Network layer. Methods of data transmission. Packet switching. 3.2. Modeling local area networks. 3.3. IP address and ways to allocate it. Classification of addresses	B2 T1 TL1 TL2 Q1 C1 BSH2	48	6	12	8	22

***** - Newly added topics

Laboratory and practical classes play an important role in strengthening the theoretical knowledge and developing practical skills of students in the field of "Network Technology". However, in most cases they do not give the expected result for 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; inability of students to make effective use of the allotted time due to the fact that some laboratory assignments take a long time to complete, and so on.

Analysis of some laboratory topics (separately identified) in the subject "Network Technologies" in pedagogical higher education institutions allowed to note the following shortcomings: the topics are not systematized by module (section); knowledge of the basic methods of technical design and construction, the basic laws of development of technical systems; use modern technical means in the process of technical design; does not meet the qualifications of the main methods of designing technical processes and systems, etc.; know the possibilities of using information technology in professional activities; development of technical design, creation and maintenance of relevant databases, preparation of electronic sources for the project process; partially responds to basic data search and compilation skills, etc.; some laboratory sessions do not meet the requirements of the time norms.

In order to overcome these shortcomings, systematized topics of practical and laboratory training in accordance with the new science program "Network Technologies" (see Table 1.7) on the basis of enrichment of higher education in accordance with the State Education Standards and Qualification Requirements [11, pp. 3-10]. was released. At the same time, the adaptation of the training to the instructions for implementation in the simulator programs was taken into account. We have highlighted some of the content in the current Science program that is outdated and does not meet the current trends and requirements of today's network technologies.

Analyzing the topics of independent study, new content was added to it. Assignments were prepared in an individual practical form, with each student taking a creative approach to independent work, for example, assignments on the essence of the topic, written

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abstracts, simulation models (simulators) and multimedia presentations.

CONCLUSION

1. Collaborative network educational resources based on SMART-technologies and interactive multimedia technologies serve as an important pedagogical tool in improving the didactic tools of teaching;

2. The use of modern methods of control and monitoring of the educational process in determining the criteria for assessing the knowledge, skills and professional competencies (motivational, intellectual and active) of students in the subject "Network Technology" allows to achieve priority results;

3. Improving the methodological basis of teaching the subject "Network Technology" on the basis of electronic didactic materials (media resources, web technology and network simulator) in an integrated learning environment and the application of the model "Flipped classroom" will increase the effectiveness of teaching the subject.

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