METHODOLOGY OF TEACHING THE DISCIPLINE "NETWORK TECHNOLOGIES" BASED ON SMART-TECHNOLOGIES

Begbutayev Azzam Eshpulatovich
Teacher of the Jizakh State Pedagogical Institute
UZBEKISTAN
azamb@mail.ru

ABSTRACT

The article presents a study on the problem of using SMART-technologies in higher education. The purpose of the article is methodological recommendations on the use of SMART-technologies and the Internet of Things (IoT-Internet of Things) in a pedagogical higher educational institution teaching the discipline "Network Technologies", the basic principles of their functioning and basic characteristics are formulated. As research methods, the author used interpretation, comparative analysis and generalization of the scientific literature on the problem; an example of tools of SMART-technologies and the Internet of Things (IoT-Internet of Things) analyzes the relevance and validity of their use from a didactic point of view, focuses on the need to constantly improve the learning process with their help.

Keywords: SMART technologies, IoT-Internet of Things, interactive whiteboard, higher education institution, electronic training systems, network technologies; SMART tutorial.

INTRODUCTION

The new concept of education, adopted by developed countries and international organizations, emphasizes that education is a key driver of community development and an important activity contributing to the achievement of sustainable development goals. Educational models are effectively used. The relevance of the application of new technologies in the vocational education system is closely related to changes in the needs of the labor market and in many respects the processes of modernization of production activities and the functioning of various organizations.

The need for highly qualified specialists who are able to freely navigate in rapidly changing socio-economic processes is growing. In various sectors of the economy, the demand for efficient labor resources is expanding, which can ensure the introduction of new technologies for the production of quality goods and the provision of services for which there is a demand from the public. In particular, it should be emphasized the increase in the range of areas of the IT sphere. There is a significant increase in the number of effective pedagogical technologies aimed at training and retraining specialists whose abilities form intellectual capital in the life of society. This necessitates the active use of modern information technologies using the capabilities of electronic networks, which allow developing, changing and correlating various scientific and methodological materials in an accelerated mode.

Statement of the Problem

In the traditional teaching methods, in the development of theoretical knowledge and practical skills in the field of network technologies taught in pedagogical higher educational institutions, laboratory and practical exercises play an important role. However, they often do not give the expected results for the following reasons:

– Existing laboratory rooms lack of equipment;
– many laboratory devices do not meet modern requirements and are outdated;
– inefficient use of time by students due to the fact that some laboratory tasks take too much time.

These problems can be solved through the use of SMART-technologies, electronic information and educational resources, multimedia systems and modeling programs (simulators).

LITERATURE REVIEW

The transfer of learning to the digital educational environment (DSP) is one of the key trends in modern education. Such a transfer creates both new opportunities and serious problems for educators. On the one hand, the transition to the "digit" allows us to significantly expand the range of educational programs, make them more accessible, and improve their quality. On the other hand, the effective use of various resources of the digital educational environment is hindered by the fact that many practices and concepts in this area are in the process of formation. The resulting disagreement of meanings that are embedded in key concepts for the field ("digital educational environment", "digital educational resource", "online education", "blended learning") leads to the absence of a shared vision of the key parameters of the DSP itself and the means design and implementation of educational activities in it. (Krasheninnikova, 2018)

"Digital educational resources are digitally presented photographs, video clips, static and dynamic models, virtual reality and interactive modeling objects, cartographic materials, sound recordings, symbolic objects and business graphics, text documents and other educational materials needed to organize the educational process" (Gorokhova, 2018). A digital educational resource is a complete interactive multimedia product aimed at achieving a didactic goal or solving certain educational problems.

"Smart" systems, "smart" environments and "smart" production are the trends of the post-industrial society, the concept of which arose due to the development of technologies that allow solving the problems of organizing and managing production and technological processes at a new, higher intellectual level. This is directly related to such characteristics as digitalization, autonomy, interactivity, remote control, solving complex problems, etc. (Mahotin, 2018)

A smart (intelligent) environment is defined as a physical infrastructure that allows the surrounding intelligence to function. (Nakashima, Agayan, 2010)

There is no doubt that the development of information technologies has increased the opportunities and needs of education, as a result of which all participants in the educational process need to be able to use and apply them in practice. (Borisova & Vaskieva, 2016)

A paradigm shift in the educational process has led to a rethinking of its structure and applied technologies, highlighting information technologies, including SMART technologies (computer programs and information technologies, SMART technologies and intelligent educational applications, SMART technologies based on multimedia), and also SMART devices and the Internet of things (IoT).

SMART is a well-known and effective technology for setting and formulating goals. The acronym SMART stands for smart goal and combines capital letters from English words indicating what the real goal should be: Specific - Measurable - Attainable - Relevant - Time-bounded. (Timinsky, 2015)

The main direction of the introduction of SMART - training is the formation of information, communication and technological competence of teachers in the electronic environment. In the wake of the rapid development of information and communication technologies at the end of the last century, the "digital generation" has grown, for which smart devices and gadgets using "advanced" technologies are essential elements of living space. The transition to a wireless

network, the spread of smart terminals, the progression of SMART devices, the expansion of a mobile office is a new quality of society in which the combination of the use of technical tools, services and the Internet by trained people leads to qualitative changes in the interaction of subjects, allowing to obtain new effects: social, economic, educational.

The emergence of SMART society is emerging as a global trend. The Netherlands, Australia, Korea declared SMART as a national idea and the main political task: the Netherlands adopted the Development Strategy until 2020 "Top Economy, SMART Society", in Australia - Strategy 2020 "Towards a Stronger SMART- a country through a revolution in education ", in the Republic of Korea -" SMART Education "- a basic system solution in building a SMART society and one of the main ways to strengthen the competitiveness of the national economy. Today, many other countries have embarked on the development of SMART education. The model of the new SMART society implies the creation of modern, information and organizational systems of an intelligent, high-tech, human-friendly environment. Every year a person gains more and more new knowledge that he is no longer able to reproduce without the help of information technology. One of the main tasks of education is the formation of a modern education system based on SMART technologies, the main purpose of which is to achieve quality education.

Through smart-training, conditions are created for implementing the leading principle of education of the 21st century "education for all" and "education through life" - Life Long Learning, proclaimed by UNESCO. Smart-training will increase the availability of education "always, everywhere and at any time" (By UNESCO Institute for Lifelong Learning- 2016) SMART-training will increase the availability of teacher education "always, everywhere and at any time", will provide an opportunity to independently develop the path of professional growth, equalize the level of education of teachers in urban and rural schools, and open the way to the international educational space.

The main goal of SMART-training is to create an environment that provides a high level of competitive education by developing students' knowledge and skills of the modern society of the 21st century: cooperation, communication, social responsibility, the ability to think critically, quickly and efficiently solve problems. Smart education is a concept for describing a new learning process in the information age. (Jinjiao Lin, Haitao Pu , Yibin Li, Jian Lian, 2018)

In recent decades, he has attracted great attention of experts from various fields of research. Since training can be carried out at any time and anywhere in the context of intellectual education using intellectual devices, and the number of courses within the framework of intellectual education has increased significantly, the question of choosing the appropriate course plays an important role in the process of modern education and went on to determine the curriculum that is suitable for students accurately and efficiently. (Babad & Tayeb, 2003) From Gil A. B. and Garciapenalvo F. J., there are many methods and algorithms for choosing a course to solve the problem of recommending a course.(Gil & Garciapenalvo, 2008)

However, none of them has been specifically designed for the requirements of smart education. With their development, electronic education is becoming a promising direction, meeting the needs of modern society as much as possible, the hallmarks of which are working with a large amount of information on a mobile / electronic medium, and analyzing it in a short period of time. There is no doubt that, thanks to a single informational intellectual educational environment, people interested in gaining knowledge are already virtually interacting (this is

not only about teachers exchanging their pedagogical findings and research results, but also about ordinary users of the network), stimulating the development of electronic, remote, mobile education.

According to A.V. Molotkova, V.G. Kostina, information technologies are modified into procedures based on the exchange of experience and interaction based on social services and web sites, and are a set of applications that provide almost any needs of a user of mobile devices: reading news, watching videos, live broadcasts, background information before network communication, sharing photos and videos. (Molotkova & Kostina, 2016)
In his research work "Smart Education: New Processes and New Opportunities" A.G. Pollack offers SMART for students a continuing education system (school, university, corporate education):
- flexible educational programs, portfolio;
- more information about student activities;
- collaborative learning technologies - knowledge creation;
- learning access independent device;
- transfer of many functions of human activity to computers;
- individualization of education to a new level. (Pollack, 2015)
Therefore, it becomes obvious that the teacher's task is to intensify the use of electronic resources, to ensure their reasonable and justified use, which in turn requires constant improvement of his qualifications. The main disadvantage is the lack of direct communication between the teacher and the student. (Panova, 2016)
The authors of one of the first SMART textbooks in Russia, L. A. Danchenok and P. Yu. Nevostruev, highlight such basic principles of SMART learning as:
– learning mobility;
– two-way integration with social media;
– self-completeness and self-actualization;
– online consultation with practitioners;
– content co-creation chain: student - creative course co-author;
– synchronous study of material and the implementation of skills in solving real business problems in a social environment. (Danchenok & Nevostruev, 2014)
According to Mitriyev's Smart-education also poses new challenges for teachers. They should not only be knowledgeable in their professional field, but also possess a lot of information, knowledge, resources, use various technologies to work with students. At the same time, smart education opens up new opportunities for teachers: share experience and ideas, do more research, personify the course depending on its objectives and the competencies of the listener, save time by refining existing content, and not create it from scratch. New requirements arise, such as facilitation skills, i.e. the teacher must combine the functions of not only the head of the educational process, but also his direct participant in the creation of new knowledge in the learning environment. (Dmitrievskaya, 2016)
The stated principles highlight the need to change the organizational structure, the selection and training of online teachers, the active development of e-learning content. What causes undoubted interest is the SMART textbooks, they will become the most optimal for training in the near future, leaving far behind not only textbooks on paper, but also electronic textbooks.
SMART textbooks are called learning content integrated into an interactive learning environment using the capabilities of the social environment: high-quality professional content, practical orientation, the availability of graphic, video and audio material, an individual learning path, interactive tools for interacting with a teacher, a testing system, a content commenting system, a content rating system, self-complementarity and self-actualization. SMART textbooks are characterized by "joint generation of new knowledge and self-

actualization with the participants in the learning process, the simultaneous study of material and the implementation of skills in solving real situations in a social environment."
The purpose of the article is methodological recommendations on the use of SMART-technologies and the Internet of Things (IoT-Internet of Things) in a higher educational institution teaching "Network Technologies", the basic principles of their functioning and basic characteristics are formulated.

Research methodology

As research methods, the author used interpretation, comparative analysis and generalization of the scientific literature on the problem; an example of tools of SMART-technologies and the Internet of Things (IoT-Internet of Things) analyzes the relevance and validity of their use from a didactic point of view, focuses on the need to constantly improve the learning process with their help; methodological recommendations, recommendations on the study, analysis of the state of creation of electronic information educational resources in foreign countries and republics and their use in higher education institutions; with the help of SMART-technologies an intelligent virtual learning environment was formed; development and implementation of electronic information and educational resources in the field of network technologies; Integration development of lessons on network technologies was developed to solve problems, choose alternatives, promote ideas that lead students to independent, creative work; methodological development of the content of educational materials, laboratory and practical tasks for the independent development of students; improving the interaction between students, the development and effective use of training programs developed by the Moodle LMS for collective and individual work on information in the learning environment; the methodological foundations of teaching network technologies of natural sciences using blended learning technologies have been tested.

The Technology Acceptance Model

Improving the effectiveness of teaching the discipline "Networking Technologies" in higher education institutions based on SMART technology and intellectually adaptive learning systems that determine the present and future distance learning based on web technologies, the importance of e-learning resources in intelligent virtual educational environments, technologies for creating electronic textbooks and their use in pedagogical activity is scientifically substantiated. In recent decades, more attention has been paid to the study of adaptive learning systems. This is an interdisciplinary field that unites various areas of computer science (software development, networking, modeling of knowledge and interactions), humanities (psychology, didactics, communication sciences and ergonomics). (Salma, Maach, Driss El Ghanami, 2018)

It is assumed that the ALS (Adaptive Learning System) - an adaptive learning system brings educational benefits, at least equal to that which would be obtained from a traditional device. Although several studies have been conducted, experiments have been conducted to measure the real impact that these environments can have on learning. Most researchers have roughly the same opinion. Some researchers claim that the computer allows the student to be involved in high-level thinking skills by providing memory support and measuring related variables. (Mellet-D'huart, D., Michel, G., 2006)
Introducing the model of teaching the discipline "Network Technologies" in an intellectual virtual learning system: (Picture 1)
This intelligent virtual learning system is characterized by its structure, a variety of teaching materials, interactive communication and the ability of students to choose their own educational paths, the presence of control and handouts, as well as the provision of

methodological support to teachers and their content. It includes various interactive tasks for the study of theoretical material on each topic contained in the electronic textbook system, the formation of skills based on knowledge gained, as well as the application of knowledge and skills. Learning using an intelligent virtual learning system is learning that takes into account the characteristics, abilities, motivation, intellectuals and abilities of the learner and is effectively used in the development of modern pedagogical and information technologies. An intelligent virtual training system consists of Smart devices, Smart Classroom - a smart class, Smart campus - a smart collaboration network, Smart Lab - an intelligent laboratory room and tools, Smart Cloud - an intelligent Internet service system, etc. Here are some of the features of teaching the discipline "Network Technologies" in the audience, which are controlled by the SMART system - Auditorium, which is an intelligent virtual learning environment. This method addresses the following issues:

– Modeling the classroom with elements of SMART-technology and IoT - Internet of Things;

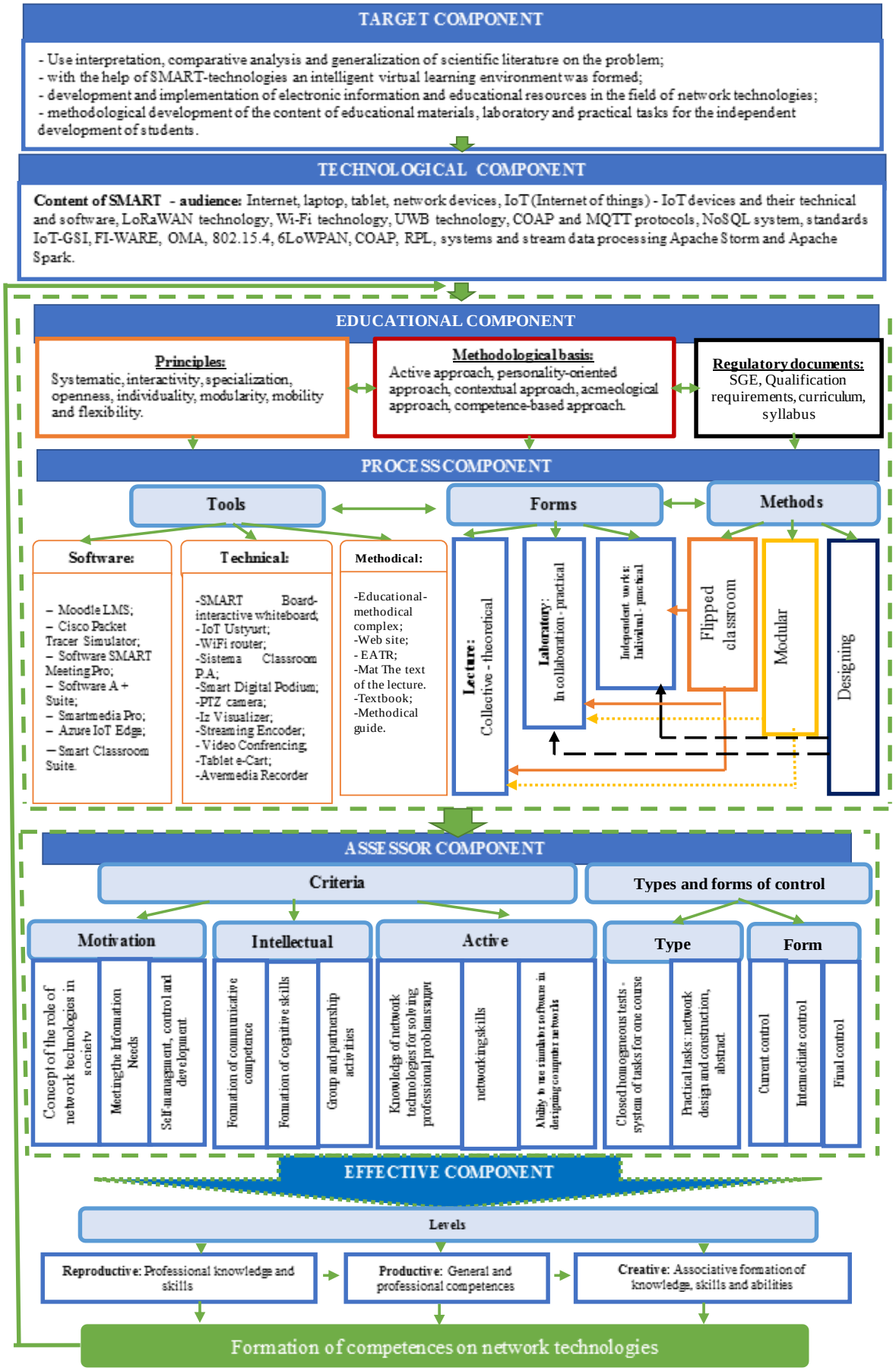
– Combining science with teaching methods;

– Development of a project for the implementation of the discipline "Network Technologies" training using electronic information and educational resources.

– Set the conditions and limitations of the effective application of this method.

Consider the model of the educational process of the discipline "Networking Technologies" which is organized on the basis of Smart - technology. (Picture 2)

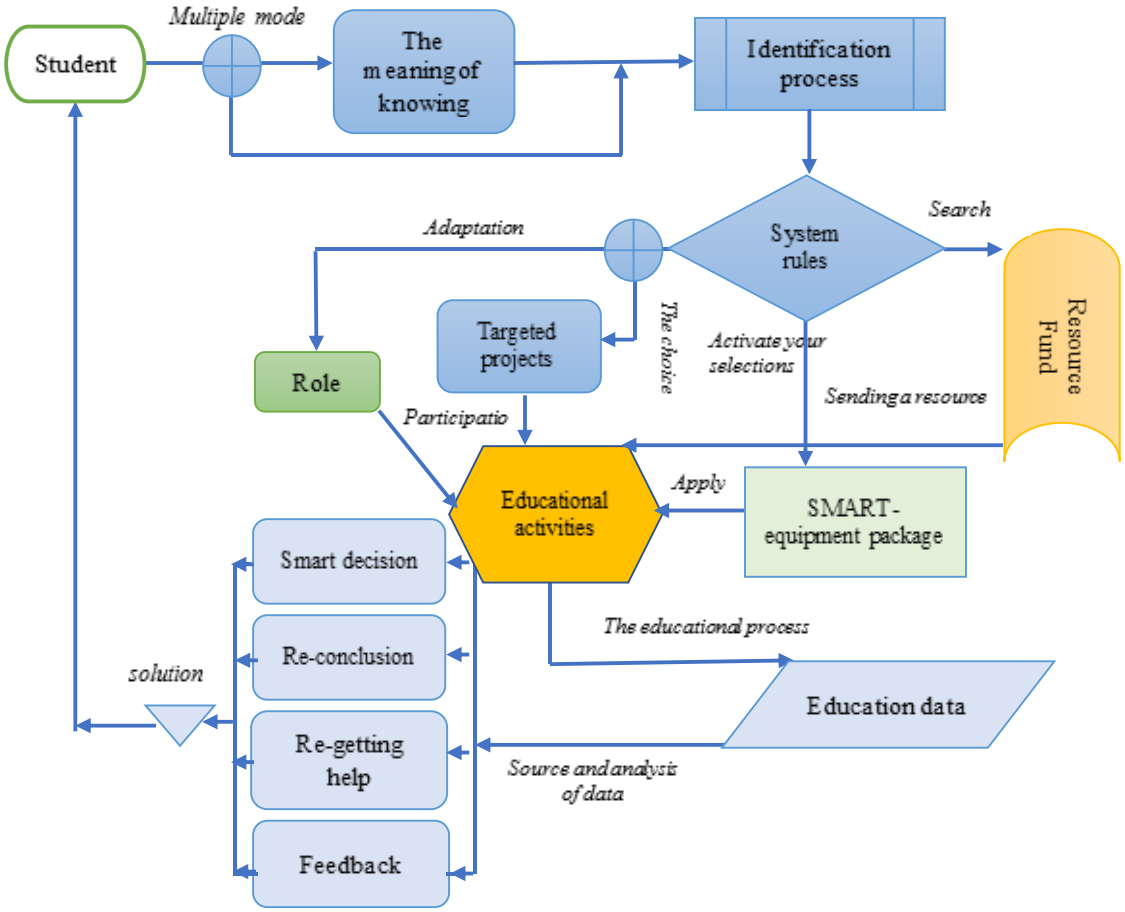
In this case, the student uses the Smart – «Multiple mode» method of accessing the education system. In the «Multiple mode» way, a student can go through the process of learning, that is, understanding the content of the knowledge or going directly into the process of identification. Identification - the user enters a user account (login).



Picture 1. Intellectual virtual learning system

All the necessary information about the user through his / her login on the system: his / her identity; access level in the system; system history and more. In addition, each student will be identified by an electronic concert. Electronic Concert is an Internet-based service that provides instant information in various areas, answers to queries, navigation and more. This system introduces students to the novelty of the system, the list of literature recommended by professors.

The next step is to get acquainted with the rules of Smart education system. "System Rules" is a conditional step that offers three areas: Customization, Search, Activation of Options.



Picture 2. A model of the educational process that is organized on the basis of Smart - technology (block-diagram)

In the area of "adaptation," the student role or the target projects are selected, and the transition to the stage of participation in educational activities is key. Flexibility involves adapting e-learning tools to individual learning opportunities. It means adapting the learning process to the cognitive, skills, and psychological characteristics of the learners. There are three levels of adaptation in e-learning tools. The first level gives students the opportunity to choose their individual pace of study material. The second level involves the diagnosis of a student's condition. Based on the results, the content and methodology of teaching will be offered. The third level is based on an open-ended approach that does not imply classification of qualified users, and authors of e-learning tools seek to develop a more accessible option for a large number of users. The role model of a smart-technology-based learning process is a system that

defines a student's role, place or role in the learning process. This system classifies users into guest and registered user categories. Depending on the user category, it may allow or prohibit certain actions in the information field. “Purposeful Projects” is the stage of selecting methods, techniques and technologies of education. Project activities are a gradual, coherent and complex student education system that has the knowledge and skills in the planning and implementation of projects.

Project Goals and Objectives:

- Control of knowledge and skills on the topics covered;
- the formation of an information image of the world in the mind of the student;
- ability to work with a computer;
- development of information search and processing skills;
- work on new technologies;
- Development of independent work;
- students' ability to listen and respect each other's ideas;
- ability to trust each participant of the project;
- developing research skills.

Project work promotes the creative activity of students, the ability to carry out research and analyze the work done. In modern education, much emphasis is placed on teaching personal orientation, student identity, the use of student experience, and research methods. A project is usually a collective activity. The collective discussion of the questionnaire, job assignments, the choice of research methods, and the presentation of the project will be done. At the same time, the individual role of each project participant in the overall task is determined.

During the project, students will develop the following skills:

- communication - ability to communicate;
- The problem is search - the ability to solve life issues;
- ability to analyze excellent activity.

Rules for project success:

1. There are no leaders on the team and all students are equal
2. There is no competition in the team
3. All team members should communicate with each other and work together as project partners
4. Each participant should be active and contribute to the common cause
5. All team members are responsible for the end result of the project.

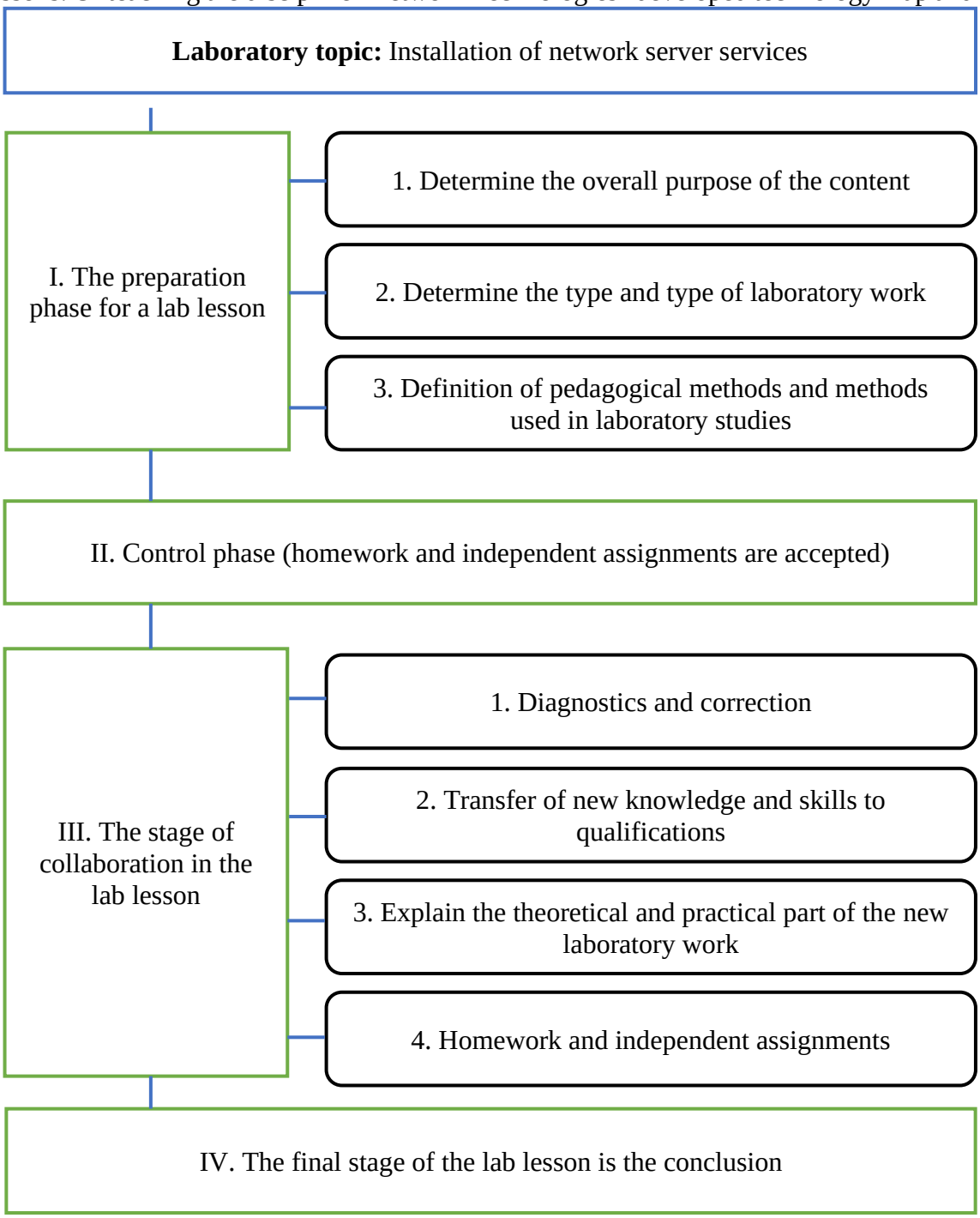
This method is a form of education that requires the use of research and research methods that allow for a deeper, deeper study of the topic or section of the student's learning.

It enters the Resource Fund in the direction of "Search" and sends the found resource to educational activities. It includes additional science-related resources, presentations, audio-video information and literature. The “Technology Activation” model of the smart-technology-based learning process model addresses the “Smart Equipment Kit” and applies them to educational activities. Smart equipment sets, that is technical maintenance, are the following.

In the SMART-technology-based learning model (**Picture 2**), 'Learning Activity' is a key step, which includes the methods and didactic means of implementing the learning process. SMART is a technology learning-based learning process that is important to the Education Data stage, where data is collected and analyzed. As a result of this process, the student can make intelligent decisions, re-integrate knowledge and skills, receive feedback and make feedback in the system. At the end of the system, the student will have a problem solution.

We provide information on the SMART - technology-based learning modeling process at the Learning Activity stage, with the aim of introducing science-based electronic information and educational resources and open source software Moodle LMS in an intellectual virtual learning environment equipped with SMART technologies.

We believe that the use of the Flipped classroom model of Blended learning - a mixed education technology in teaching network technology in higher education institutions - will be effective. Flipped classroom is a learning strategy. It is the transition to a typical model of "overthinking" the class, which means that students will gain new knowledge. In this case, students independently read a new topic before class, and then during the class discuss the discussions and problem-solving that will help them to update and learn new knowledge. Using the revised taxonomy of Blum (2001), the model proposes students to independently perform low-level cognitive tasks (learning) outside of classroom time and then engage them in high-level cognitive activities (applications, analyzes). They can use the help of peers and teachers during the lessons. Of teaching the discipline "Network Technologies" developed technology map and



SMART - methodology for using the learning-based learning system: (Picture 3.)

Picture 3. Algorithm of Study designing the lesson process

Technological passport for laboratory work

Table 1.

Theme	Installation of network server services
Training time - 2 hours	Number of students: 12
Form and type of training	Laboratory lesson
Lesson plan	1. Install DNS service on the server in Cisco Packet Tracer simulator 2. Set up a Web server service 3. Set up a DHCP service.
The purpose of the training: Provide students with practical information on setting up DNS, Web server and DHCP services on the server, and strengthening the way they work.	
1. Prepares and organizes laboratory work materials. 2. Explains theoretical part of laboratory work and gives instructions on performance of tasks. 3. Checks and evaluates the work done by students	***Learning outcomes:*** Students: 1. Reads laboratory work materials. 2. Understands the theoretical part of laboratory work, instructions on performance of tasks. 3. The laboratory performs the tasks given in the task section and creates a software application.
Teaching methods and techniques	Mind Attack, Modular, Designing
Training tools	SMART - devices, Web site - EATR, Moodle LMS system, Cisco Packet Tracer simulator software, SMART Meeting Pro software
Form of training	Collectively, collaboratively, individually
Training conditions	SMART - classroom, internet, LMS, virtual virtual learning environment
Control	Practical tasks

Technological map of laboratory classroom teaching

Table 2.

Stages and times of operation	**Content of activity**	
	Teacher	**Student**
Stage 1 Preparation. 5 minutes.	1.1. Organizational: The ID-card system continues, identifying the electronic resources and equipment required for the lesson. 1.2. The Smart Digital Podium announces the topic, purpose, planned outcome of the lab and plans for it.	1.1. Identified by ID-card system. 1.2. Launches your laptop or tablet.
Stage 2 Sign in. 5 minutes.	2.1. The procedure for logging in to the Moodle LMS is displayed	2.1. The Moodle LMS system name will be included in the browser string and will give you access to the login and password. (www.moodle.tartex,uz)

Step 3: Define the assignment and get directions. 5 minutes.	3.1. The Web system is loaded, it provides a sample of the instructions and examples given in the theoretical part of the laboratory.	3.1. The theoretical part of the Laboratory page will be opened, where you will see the laboratory work instructions and examples, and will review the results using a computer.
Step 4. Meet the Assignment. 10 minutes.	Demonstrates the procedure of completing the tasks specified in the laboratory. How to use the Cisco Packet Tracer simulator is explained.	They will be familiarized with the procedure of completing assignments in the laboratory.
Step 5. Working individually. 40 min.	Supervises the process of completing laboratory work tasks.	Complete the tasks of the given laboratory classes independently and creatively. Cisco Packet Tracer uses simulator software.
Step 6: Teamwork cooperation 10 minutes.	The individual work of each student is discussed and evaluated.	Students discuss individual work individually as a team.
Stage 7 Summary. 5 minutes	Summarizes the results	He listens, thinks independently and draws general conclusions

The system should provide the following functionality: registration of students; students have the opportunity to download assignments in the system, as well as materials (methodical instructions, study guides) or links to help them complete the task; the ability to set coefficients of complexity and significance for the different criteria of the assignment; Possibility of setting criteria (speed, number of correct connections, number of additional equipment, etc.); ability to download completed tasks into the system; Ability to obtain analytics on student and teacher assignments; the ability of the teacher to view the task performed by the student; the ability of the teacher to adjust system-based assessment. Since the main function of the simulation virtual simulator editor is to create, edit, and save objects, they must: Create and edit general lab data; creation and editing of laboratory work components; creating and editing links between components; creating and editing component parameters; Creating and editing significance coefficients for different criteria. The main function of the Virtual Simulators subsystem is to collect information about the training materials and user virtual virtual labs that perform the following tasks: Download the lab structure from the file; read laboratory resources (text and images); performing laboratory work; collecting and storing user lab data.

The following five main criteria for the evaluation of laboratory work: number of established connections; number of nodes; the ratio of the number of successful nodes to the total number of checks; Maximum network delays. For each of the criteria, the teacher can set a coefficient of significance from 0 to 1, where 0 is the criterion not taken into account, and 1 - all scores derived from this criterion. Based on this, the sum of all coefficients must always be equal to 1:

$$k_t + k_m + k_n + k_z + k_d = 1, \qquad (1)$$

where k_t - is the coefficient of importance for the criteria for performing laboratory work; k_m - coefficient for the number of connections established;

k_n - coefficient for criteria of number of nodes;
k_z - the ratio of the number of successful nodes to the total number of checks;
k_d - is the coefficient of the maximum time delay in the network.
The duration of laboratory work is measured in minutes and is determined by the instructor. The number of points a student can earn according to this criterion is defined as **T**:

$$\begin{cases} T = \left(1 - \frac{t_s}{t}\right) * k_t * 100 \\ t_s \leq t, \end{cases} \quad (2)$$

Here, t_s - is the time of the student's performance and t is the time that the teacher sets for the performance. If the network topology is in strict demand and the number of connections is known to the teacher beforehand, the number of connections can be checked. This also applies to the number of nodes in the topology. M and N scores for these criteria can be calculated using the following formulas:

$$\begin{cases} M = \left(1 - \frac{|m - m_s|}{m}\right) * k_m * 100 \\ m_s \leq 2m, \end{cases} \quad (3)$$

$$\begin{cases} N = \left(1 - \frac{|n - n_s|}{n}\right) * k_n * 100 \\ n_s \leq 2n, \end{cases} \quad (4)$$

where: m_s - is the number of connections defined by students, m - is the number of connections given by the teacher, n_s - is the number of student nodes, n is the number of nodes displayed by the teacher.
The standard of successful node validation checksum should be able to identify problems with knowledge quality control and understanding basic network settings. This criterion is set by the teacher as a percentage, and the number of points a student will receive can be calculated using the following formula:

$$\begin{cases} Z = \left(1 - \frac{|z - z_s|}{z}\right) * k_z * 100 \\ z_s \leq 2z, \end{cases} \quad (5)$$

where appropriate, z_s - is the percentage of successful student reviews, z is the percentage determined by the teacher.
Maximum network delay time allows packet transit time between nodes to be managed as long as possible. This criterion allows optimization of various topologies to maximize network performance:

$$\begin{cases} D = \left(1 - \frac{d_s}{d}\right) * k_d * 100 \\ d_s \leq d, \end{cases} \quad (6)$$

Here, d_s - is the delay time on the student network and d - is the maximum value specified by the teacher.

The total score for A is five criteria:

$$\mathbf{A = T + M + N + Z + D} \quad (7)$$

After successfully completing all stages of the virtual lab, the student can write a summary of the work received from the HTML editor and save the lab file. The teacher opens the stored laboratory work in the subsystem of the program editor. There is a case log to check the accuracy of work, to view student reports, to see the results of lab work, and to evaluate students' lab work and time.

CONCLUSION

In conclusion, one of the most important areas of education system reform is systematic integration and management of the educational process with information and telecommunication technologies. Priorities in the reform process include organization of the

learning process and radically re-creating its content, the pedagogical activity of the teacher in the computerized environment, and the organization of the student's learning process.
In the higher education system, training in the discipline "Network Technologies" on the basis of SMART technologies, the use of simulator software in the organization and evaluation of laboratory classes will increase the effectiveness of training.

REFERENCES

Babad E, Tayeb A. (2003) "Experimental analysis of students' course selection" British Journal of Educational Psychology 73(3): 373-393.

Begbutayev A.E. (2019). Using simulation models in the study of computer networks. Eastern European Scientific Journal (ISSN 2199-7977) DOI 10.12851/EESJ201805. AURIS Kommunikations-und Verlagsgesellschaft mbH Düsseldorf – Germany.

Borisova O. V., Vaskieva D. G. (2016). Transformation of teaching methods of students in universities of financial and economic profile: collective monograph / ed. O. V. Borisova, D. G. Vaskieva. M .: RUSAINS, 204 p.

By UNESCO Institute for Lifelong Learning- 2016/ Background paper prepared for the 2016 Global Education Monitoring Report Education for people and planet: Creating sustainable futures for al/https://unesdoc.unesco.org/ark:/48223/pf0000245626

Danchenok L. A., Nevostruev P. Yu. (2014). SMART-textbook as an element of the foundation of SMART-University // Economics, Statistics and Informatics. No. 4. P. 46-49.

Dmitrievskaya N.O. (2016). Smart-education. - www.mesi.ru/upload/events/presentations.

Gil A B, Garciapenalvo F J. (2008) "Learner Course Recommendation in e-Learning Based on Swarm Intelligence"Journal of Universal Computer Science: 2737-2755.

Gorokhova L.I. (2017). "The use of digital educational resources in mathematics lessons" // Pedagogical workshop "September 1. Public lesson". URL: Otkryturok.rf / articles / 411543 (Date of access 03.06.2018).

Jinjiao Lin, Haitao Pu , Yibin Li, Jian Lian (2018). Intelligent Recommendation System for Course Selection in Smart Education/ 2017 International Conference on Identification, Information and Knowledge in the Internet of Things/ Procedia Computer Science 129 (2018) 449–453 https://doi.org/10.1016/j.procs.2018.03.023

Krasheninnikova L.V. (2018). Digital educational resources: concept and types / Interactive education /Information and journalistic educational journal. No. 5 (9-11)

Mahotin D.A. (2018). SMART in education: a new approach or the impact of technology? / Interactive education / Information and journalistic educational journal. No. 5 (13-15)

Mellet-D'huart, D., Michel, G. (2006). "Réalité virtuelle et apprentissage". In GRANDBASTIEN M. & LABAT J.-M. (Eds.) "Les environnements Informatiques pour l'Apprentissage Humain. Editeur Hermes, Collection Traité IC2 Information Commande Communication".

Molotkova A.V., Kostina V.G. (2016). SMART-education - a modern strategy // Electronic Education: Prospects for Using SMART-Technologies: Materials of the III International Scientific and Practical Video Conference (Tyumen, November 26, 2015) / Ed. S. M. Moor. Tyumen: Tsogu, S. 107-109.

Nakashima H., Aghajan H., Augusto J. C. (2010). Handbook of Ambient Intelligence and Smart Environments. New York: Springer, – P. 4.

Panova A.V. (2016). Perspective methods of distance teaching of foreign languages // Electronic Education: Prospects for Using SMART Technologies: Materials of the III International Scientific and Practical Video Conference (Tyumen, November 26, 2015) / Ed. S. M. Moor. Tyumen: Tsogu,S. 118-120.

Pollack G.A. (2016). Smart-education: new challenges and new opportunities // Pedagogical and information technologies in education. № 14.

Salma El Janati, Abdelilah Maach, Driss El Ghanami (2018). SMART Education Framework for Adaptation Content Presentation/ The First International Conference On Intelligent Computing in Data Sciences/ Procedia Computer Science 127 436–443/ 2018 The Authors. Published by Elsevier B.V./ http://www.sciencedirect.com

Timinsky S.V. (2016). SMART technologies as a new step towards the rapid development of material // Electronic Education: Prospects for Using SMART Technologies (Tyumen Tsogu-2016): Collection of materials (Materials of the III International Scientific and Practical Video Conference Tyumen, November 26, 2015 .). p.144-145.