

Foresight as an Innovative Technology for Researching the Future Development of Universities in Uzbekistan: First Steps towards Foresight

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ABSTRACT

The article discusses foresight research in the field of education of foreign universities, considers the issues of the need for foresight research to determine the future development of education and priority directions in the development and improvement of the quality of education in the long term in Uzbekistan. The object of research is the Karshi engineering-economic institute (KEEI), a general description of the object of research is given. The strategic goal of KEEI is to develop the institute as a modern educational, scientific, expert-analytical and cultural center in the southern region of Uzbekistan, providing high-quality training of competitive specialists capable of ensuring sustainable development of the region. The aim of the study is to predict the trajectory of innovative development in the use of digital technologies in the educational process of KEEI and, based on a long-term forecast using Foresight, to develop a "Technological roadmap for innovative development" Electronic education "until 2030. To develop a development strategy for KEEI, the task was set to determine the optimal portfolio of educational programs and promising areas of education and specialties. To solve the set task, we used the "Box of the Future" and "Highlighting Key Technologies" method. At the next stage of the study, the task was set to determine the impact of the widespread use of digital technology on the quality of education and their negative factors at this stage of the reform of society in Uzbekistan, since digitalization has become an integral part and one of the important directions in the development of education. For this, methods of brainstorming and peer review used. The results of primary foresight research, conclusions and conclusions presented.

Keywords

development concept, foresight, foresight methods, digital technology, factors of digitalization, positive and negative, distance education.

Introduction

In recent years, large-scale work carried out in Uzbekistan to modernize the system of higher and secondary specialized education, develop science, and introduce modern forms and technologies of education.

Based on the needs of the real sector of the economy and the social sphere, over the past period, new universities have been established in the regions of the country, including branches of leading foreign higher educational institutions, modern levels of education have been introduced, personnel training has been established in the demanded areas of undergraduate education and magistracy specialties.

To date, within the framework of the implementation of the Action Strategy for the five

priority areas of development of the Republic of Uzbekistan in 2017-2021, special attention is paid to expanding the coverage of youth in higher education, improving the quality of education, strengthening the material and technical base of higher educational institutions. Expanding cooperation with foreign universities plays an important role in achieving the set goals. Currently, more than 100 universities operating in our country train highly qualified personnel. Branches of leading universities of the USA, Great Britain, Italy, South Korea, Russia, Singapore, India carry out effective activities in Uzbekistan. Moreover, a number of projects in the field of higher education are being successfully implemented in cooperation with financial institutions and developed countries of the world.

For the successful implementation of reforms in the field, as well as in order to determine the

priority areas of systemic reform of higher education in the Republic of Uzbekistan, to raise the process of training independently-minded highly qualified personnel with modern knowledge and high spiritual and moral qualities to a qualitatively new level, to modernize higher education, and develop the social sphere. and sectors of the economy on the basis of advanced educational technologies in 2019 adopted the "Concept for the development of the higher education system of the Republic of Uzbekistan until 2030" [1]. A phased transition of the educational process to a credit-modular system and the transformation of the Uzbek higher education system into a hub for the implementation of international educational programs in Central Asia are envisaged. The task is set that by 2030 at least 10 universities of Uzbekistan should enter the first 1000 positions of the list of higher educational institutions in the rating of internationally recognized organizations. It was noted that techno parks, foresight centers, transfer technologies, start-ups and accelerators will be created in the country's universities in 2030. It is envisaged to ensure the publication of articles of teaching staff, applicants, graduate students, doctoral students, undergraduate and graduate students in international journals with a high impact factor, as well as the gradual inclusion of republican journals in the international database. To achieve this goal, it is necessary to accelerate the processes of studying and introducing into practice the best foreign experience aimed at improving the educational process, i.e. strive to enter the free competitive environment of international educational services and abandon directive centralized state planning and management. Recently, however, the current situation of development in the educational sphere requires not only making timely decisions, but also a certain degree of forecasting future development.

Currently, new, non-traditional technologies are required to determine the future development of education and priority areas in the development and improvement of the quality of education in the long term in Uzbekistan. Foresight research is just such a technology today. Foresight studies are aimed at identifying options for scientific and technical, socio-economic, political or environmental development of the objects of

application in the long term. Foresight research can be organized in various ways. A long-term forecast in the field of education and in the development of a new educational policy of the country with the help of Foresight makes it possible correctly develop strategies according to which "only high-quality public education can become a condition for the development of the workforce in the future. It should become more globally competitive with higher education, knowledge in the field of science and innovation management, which is necessary to ensure future prosperity"[2].

Foresight analysis of research conducted by developed countries in the field of education shows the capabilities of Foresight in terms of forecasting and shaping the future of universities. Example: A.Guraj [3] presents and analyzes foresight projects aimed at forecasting the future of universities in Ireland, Malaysia, Turkey, Canada and the United States [4]. Indicates the possibilities of Foresight at the level of the university and individual faculties. In addition, in the works of J. Jozwiak et al. "Akademickie Mazowsze 2030" highlights the results of foresight research on forecasting the development of the future of higher education institutions in Warsaw and the Mazovia region [5]. A striking example of Foresight research in education and science is MBA in Strategic Foresight (California College of the Arts, USA), Master of Futures Studies (Freie University Berlin, Germany), Alternative Futures (University of Hawaii, USA), Regional Foresight (Lodz University, Poland), Foresight Knowledge and Methods, (Swinburne University of Technology, Australia).

The history of foresight research in Russia goes back almost 25 years. Foresight research aimed at predicting the future development of education and science is a long-term forecast of the scientific and technological development of the Russian Federation for the period up to 2025, prepared by the Ministry of Education and Science of the Russian Federation in 2007-2008 [6].

Foresight is a relatively new technology in Uzbekistan, including in the field of education. Foresight is a well-established area of practice, it is an effective policy tool aimed at developing a collaborative learning platform with constant

communication between business, academic, government and other public figures [7,8,9].

In order to develop in the new conditions, each higher educational institution of Uzbekistan will have to develop its own long-term development strategy or roadmaps until 2030, i.e. radically revise our own strategies, taking into account the tasks set in the Address of the President of the Republic of Uzbekistan to the Oliy Majlis (Supreme Council) and the "Concept for the development of the higher education system of the Republic of Uzbekistan until 2030", as well as based on the above pressing problems and shortcomings. To achieve this goal, it is necessary to accelerate the processes of studying and introducing into practice the best foreign experience aimed at improving the educational process, i.e. strive to enter the free competitive environment of international educational services and abandon directive centralized state planning and management [10,11]

When creating a development strategy until 2030 for each higher educational institution of Uzbekistan, it is necessary to pay special attention to improving the organization of the educational process in accordance with international practice of introducing new pedagogical educational technologies and teaching methods, improving curricula and subject programs, qualitatively updating the educational process with the introduction of modern forms of education and means of information and communication technologies, as well as optimization of areas of education and specialties, taking into account the needs of the development of economic sectors, scientific and social spheres, organization of students' practice at industrial enterprises. In the new decade (2010-2018), corporate and organizational foresight turns into a discussion about the elements of foresight that create a strategic advantage [12].

Currently, the draft Resolution of the President of the Republic of Uzbekistan (ID-3800) "On the creation of Foresight centers in the leading higher educational institutions of the Republic of Uzbekistan" has been developed.

Materials and methods of the research.

To conduct foresight research, more than 30 foresight methods have been studied and deeply

analyzed, including delphi, brainstorming, reverse scripting, bibliographic analysis, public panels, interaction analysis, source scanning, trials, expert panels, future development, games, highlighting key technologies, review of sources, analysis of global trends, modeling and simulations, multicriteria analysis, staging, SWOT analysis, technology mapping [13]. Foresight methods can be divided into 3 categories: [14].

1. Methods allowing to comprehend and evaluate events from the point of view of subjective perception

2. Methods to measure variables and apply statistical analysis. Reliable and valid data is used or generated (ideally).

3. Methods for applying mathematical principles to quantify subjective opinions, logical constructions and points of view of experts and commentators (ie weighing opinions or probabilities).

For further research we have chosen the following foresight methods: study and analysis of foreign foresight studies on the future development of universities, delphi methods, box of the future, brainstorming, scenario development, generalization of the results; empirical - description, observation, comparison, analysis of the dynamics of changes in the development of educational activities of the Karshi engineering-economic institute.

Object of the research

Karshi engineering-economic institute (KEEI)

General characteristics of the research object.

Based on the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (TIAME). in 1975 the Karshi branch of TIAME was organized, in 1993 the Karshi Agrarian and Economic Institute was organized and in 1995 as a result of the merger of the institute with the Karshi branch of the Tashkent State Technical University the Karshi engineering-economic institute (KEEI) was organized.

Currently, the institute trains over 11,000 students in 30 areas of undergraduate studies and 14 specialties of magistracy. The teaching staff is 650 people, including 20 doctors and 150 candidates of sciences, associate professors. There are 6 faculties: economic, technological, engineering and technical, mining and geological,

energy and oil and gas, as well as 31 departments. A resource and information center with a fund of 161 thousand books was created, 6100 of their electronic versions were prepared. IRC annually receives more than 6 specialized magazines from Russia. Electronic versions of educational and methodological complexes of 600 titles have been entered into the database of the electronic library, more than 550 educational resources are placed in the electronic portal Ziyonet. Over the past 3 years, about 150 textbooks and teaching aids have been published. A school of promising young scientists has been organized; over 60 young teachers study there according to a special program. Branches of producing departments are organized at industrial enterprises. 80% of the topics of master's theses, 30% of the topics of graduation qualified works are aimed at solving technological and economic problems of industrial enterprises and organizations.

The institute carries out fundamental, applied and innovative projects on 7 state grants in the amount of 419 million soums, as well as research work on the basis of business contracts in the amount of 424 million soums. The Institute is the executor of 2 International grants of the TEMPUS and ERASMUS-MUNDUS programs. Currently, the institute is a partner in the implementation of the MATCHES project: Modernization of higher educational institutions in Uzbekistan and the TIMUR project. The institute has organized doctoral studies in 7 specialties. Over the past 3 years, 40 doctoral dissertations (PhD) and 10 doctoral dissertations (Doctor of Science) have been defended.

More than 60 foreign universities have been connected. In 2019-2021, more than 20 professors and teachers of the institute improved their qualifications at universities in Russia, the USA, Germany, Belgium, Slovakia, Sweden, Holland, Austria and Spain. 5 students studied at the universities of Belgium, Germany, Italy, Hungary, the Netherlands and Lithuania, 4 teachers underwent training at the universities of the PRC.

The institute publishes a scientific and technical journal "Innovative Technologies" on a quarterly basis, a school of promising young scientists, a center for modern education,

science and production. Over the past 3 years, more than 25 monographs have been published, more than 400 articles in the journals of the Higher Attestation Commission and 600 in foreign publications have been published. In 2017, 10 patents for inventions and utility models were received.

The Institute in 2018 won a grant competition for the project "Improvement of the system of research institutions and higher education in developing countries" of the German Academic Exchange Program (DAAD), received modern equipment worth about 20 thousand euros, thanks to which the educational and scientific laboratory "Renewable energy sources". The Department of Environmental Protection and Ecology is the winner of the international competition of the prestigious European Ecological Fund "ENERGY GLOBE" and is a representative in Uzbekistan.

In 2019, the institute became the winner of the grant competition "Modernization of Higher Education in the Republic of Uzbekistan" financed by the World Bank. At the present time, a grant subproject is being carried out on the theme "Development of a model and technology of distance education in universities of Uzbekistan based on modern information and communication technologies."

The objectives of the project are to create a foresight center for long-term forecasting, as well as to determine the strategy and development path for the introduction of modern information and communication technologies and "Electronic education" in the universities of Uzbekistan, to analyze the current state of the use of modern information and communication technologies and "Electronic education" in the higher education system. education of Uzbekistan, on the basis of foresight technologies to develop a trajectory of future innovative development, as well as a technological roadmap for the introduction of modern information and communication technologies and "Electronic education" into the educational process in the universities of Uzbekistan for 2025-2030.

Within the framework of the project, the activities of International Foresight Centers, including the Foresight Center at the National Research University Higher School of Economics of Russia, were studied and analyzed. Data on the

mission, direction of activity, main tasks of foresight centers were obtained (Institute for Science and Technology Policy, University of Manchester, UK; Institute for Advanced Technological Research (IPTs), Seville, Spain; Institute for System and Innovation Research (ISI-FhG), Karlsruhe, Germany Science Policy Research Center (SPRU), University of Sussex, UK; Science and Technology Policy Institute (STEPI), Republic of Korea; Helsinki University of Technology, Finland; Monitor Group Industrial Development Company, United Nations Organization (UNIDO).

In 2019, a foresight center was organized at the institute, the mission, goal, objectives and direction of the center's activities were defined, and a "road map" for the foresight center was developed. The Institute organized a Republican scientific and practical conference on the topic: "Innovation policy and technology foresight in the higher education sector of the Republic of Uzbekistan."

Results and discussion of research.

The main task of the study was to predict the prospects for the development of the Karshi engineering-economic institute. The strategic goal of KEEI is to develop the institute as a modern educational, scientific, expert-analytical and cultural center in the southern region of Uzbekistan, providing high-quality training of competitive specialists capable of ensuring sustainable development of the region.

The aim of the study is to predict the trajectory of innovative development in the use of digital technologies in the educational process of KEEI and, based on a long-term forecast using Foresight, to develop a "Technological roadmap for innovative development" Electronic education "until 2030.

First Steps to Foresight.

To develop a development strategy for KEEI, the following tasks were set:

1. For the formation of an optimal portfolio of educational programs, ensuring the innovative development of the region, the task was set to determine which direction of education and specialties is promising for KEEI. To solve the set task, we used the "Box of the Future" and "Highlighting Key

Technologies" method. The expert groups include the faculty, administration, students of the institute and leading specialists of large companies in the region. A questionnaire was drawn up, which indicated the existing direction of the bachelor's and master's degrees at the institute and planned in the future to organize, taking into account the innovative development of the region. Questionnaires with answers were placed in a special box - "the box of the future". The opinions of over 100 experts were collected. At the same time, anonymity and freedom of expression were ensured.

The analysis of the results obtained showed that, in the future, the main areas of bachelor's and master's degrees are oil and gas business, chemical technology, energy, automation of technological processes and innovative management. Some of the responses indicated the potential risks of providing graduates with jobs for environmental, agricultural and land transport engineers. Thanks to this, the foresight group experts have drawn up a roadmap for the future development of the institute, which indicates which specialties need to gradually reduce the admission quota, in which specialties to increase admission and expand personnel training, and which specialties need to be opened in the future. On this basis, the future composition of specialties, faculties and departments of the institute was formulated.

2. At the next stage of the study, the task was set to determine the impact of the widespread use of digital technology on the quality of education and their negative factors at this stage of the reform of society in Uzbekistan, since digitalization has become an integral part and one of the important directions in the development of education. For this, the brainstorming method was initially used. The brainstorming method (brainstorming, brainstorming) is an operational method for solving problems, in which the participants in the discussion generate the maximum number of solutions to the problem, including the most fantastic and stupid ones. Then, from the obtained options, the best solutions are selected that can be used in practice [15]. Includes a peer review stage.

In our study of the method, brainstorming was divided into 3 stages:

1. Preliminary stage - problem statement: the impact of the widespread use of digital technology on the quality of education and their negative factors.

Three groups were created for brainstorming:

Roles of the 1st group: identification of positive factors of digitalization of education.

Roles of the 2nd group: identification of negative factors of digitalization of education.

Group 3 Roles: Process Proposed Solutions

2. The main stage is the generation of ideas. At this stage, options for solving the problem are generated. For maximum efficiency, the following rules were observed during the generation process:

- the main thing is the number of ideas, no limit.
- a complete ban on criticism and any assessment of ideas, including positive ones, since

- assessment distracts from the main task and distracts the rhythm of work and creativity.

- unusual and even absurd ideas are welcome.

- any ideas can be combined, supplemented and improved.

3. Expert stage - grouping, selection and evaluation of ideas. This stage is the task of the 3rd group. At this stage, classifications of factors affecting the quality of education, taking into account the digitalization of the educational process, were developed, analyzed and evaluated. Highlighted the most valuable ideas and formulated the final result of the brainstorming session. The quality of the expert stage directly depends on the rigor and uniformity of the criteria for selecting ideas from participants. As a result of an unlimited exchange of opinions and refusal of criticism, the process of collective decision-making is being improved [16].

Table-1 Classification of factors of digitalization of education

Positive factors	Negative factors
Improves the quality of life,	Social inequality, inequality in Internet access
Improves user well-being	Cyberbullying, behavioral risks
Facilitates access to information	Sexting, distribution of porn and intimate messages
Reduces the cost of services	Malicious content
The ability to work remotely (online training, online shopping, online work, etc.)	Theft and misuse of personal data
Makes activities more efficient	Cyber fraud
Will open up new markets	Financial fraud
Creates additional employment opportunities	Fake news and false information
Simplifies money transfers	Effects on health, primarily on vision, sleep, physical activity, diet, emotional state
Get information about health protection, safety and your rights faster	Decreases psychological well-being, mental attachment, psychological ill-health, reduces mental activity
Promotes the development of intelligence and creativity	Low life satisfaction
Increases interest in obtaining and consolidating knowledge	Risk of deformations in thinking, speech and cognitive abilities
Convenient to carry	Cognitive processes are impaired
Practical, won't tear like textbooks and never forget	Impairs memory
Physical comfort (do not carry heavy books)	Shows anxiety, low self-control

Mobility (access at any time)	Difficulty managing your wine
High speed of information retrieval	The problem of infecting an electronic carrier with a virus, losing it, forgetting a password, hacking a computer system
Publicity and visibility - access to information from anywhere in the world	Negatively affects the formation of speech, weakly forms his thoughts
Economically beneficial	Lack of real communication between the teacher and students. Does not contain an educational element

Table-2

Classification of key factors constraining and limiting the digitalization of education in KEEI

Legal and regulatory factors	<ol style="list-style-type: none"> 1.The Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan has not given financial and academic independence to KarIEI 2. Legal and regulatory restrictions: lack of provision on distance education, standards for the use of digital technologies; 3.Lack of special measures of state support for the use of digital technologies in education 4.When assessing the quality of education, attestation and accreditation of universities, the degree of application of digitalization of education was not taken into account
Economical factors	<ol style="list-style-type: none"> 1. Insufficient budgetary funds for projects using digital technologies; 2. The introduction of digital technologies requires costs from the extra-budgetary funds of the university, and this is associated with the financial independence of the university 3. The high cost of projects on the use of digital technologies in the educational process; 4. High operating costs of systems using digital technologies; 5. There is no information about successful experience or negative experience of using digital technologies at other universities in Uzbekistan
Factors related to software and information security	<ol style="list-style-type: none"> 1.Lack of software for the use of digital technologies, there are no domestic analogues of software for distance education 2.Low bandwidth of communication channels and low speed of the Internet 3.The data center is not organized 4. Weak protection of digital technologies from hacker attacks
Resource factors	<ol style="list-style-type: none"> 1.Oddated technical equipment of laboratory classes complicating the introduction of digital technologies 2.Lack of didactic provision of distance education: incomplete filling of distance education system "Moodle" with educational materials from KarIEI 3. Open educational sites, network learning, individual educational trajectory are disorganized. 4. The portal of distance education has not been developed
Personnel factors	<ol style="list-style-type: none"> 1.Lack of awareness of the benefits of digital technology among faculty and students 2. Misunderstanding of the essence of digital transformation and its effects on the part of decision-makers; 3. Reluctance of participants in education to change their usual, similar forms of education

	<p>4. Insufficient qualifications of technical personnel (laboratory assistants, heads of laboratory assistants and heads of department offices), using digital technologies;</p> <p>5. Lack of qualifications among the personnel of the information technology department of the university that implements and maintains digital technologies</p> <p>6. The appropriate teaching methodology in online learning has not been developed, new models and roles of the student and teacher</p>
Organizational factors	<p>1. Lack of sufficient personal experience in the use of digital technologies.</p> <p>2. Possibility of successful implementation of the Institute's activities without the use of digital technologies;</p> <p>3. Maintaining and maintaining information security, maintaining confidentiality</p> <p>4. The need to integrate technology into an existing, similar form of education</p> <p>5. Connectedness of the change in the organizational structure of the university to the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan, which causes the complexity of changing internal processes, regulations, workflow, approaches to receiving and processing information</p>

The presented results are obtained on the basis of a multidimensional analysis of data put forward by various experts, as well as taking into account the current situation of readiness for digitalization of education and the organization of distance education in the future KEEI. This requires further foresight research on the widespread use of digital technology and the organization of distance learning at KEEI and a detailed study of the impact of digitalization of education on health, including on the vision and nervous system of youth, the creative and scientific ability of students.

Conclusion and future scope

Despite all of the above positive and negative factors, the problem of training specialists should be carried out using modern and innovative technology and with the help of digital technologies, which will allow him to defeat the competitive personnel market [17]. Because, at the present stage of development of the industry of the economy, robots and virtual systems will gradually replace cadres, and this requires digital technologies with their capabilities to gradually introduce in universities with a combination of traditional occupations. The computer cannot completely replace the teacher, since it is not capable of converting information into

knowledge. E-learning is impossible to organize problematic and modern live lectures [18,19], interactive teaching methods [20], taking into account the qualifications of listeners.

Considering the above, we suggest the following:

1. To develop management models of KEEI from planned-target to software-predictive,
2. Transition to mandatory digitalized technical documentation and electronic document management (paperless technologies);
3. Transition to information storage and data processing from own capacities to distributed resources (cloud technologies);
4. Development of the material and technical base of the institute, the organization of data centers, the emergence of new communication channels and devices for the use of digital educational and methodological materials.
5. To develop guidelines for the formation of digital literacy skills and practices of safe online environment among teachers and students. Improving the digital skills of teachers.
6. Organize courses on ethics and safe user behavior, legislation governing online crimes.
7. Development of the work of the IT center of the Institute, organized in 2021.
8. Implementation of digital programs, creation, testing and application of educational

and methodological materials using machine-learning technologies, artificial intelligence.

9. Development of the MOODLE online learning system, a system of universal student identification.

10. Conduct an educational foresight study to develop a development strategy for KEEI until 2030.

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