Implementation of Modern Information Communication Technologies (ICT) in Higher Education Sector: International Experience and The Example of Uzbekistan

Solikha N. Allayarova

Abstract: The Information and Communication Technology (ICT) is the powerful tool for the successful delivery of quality education in higher institutions. A range of countries understanding the full benefit of it have already implemented and developing the usage of ICT in higher education sector, though in Uzbekistan still can be faced some challenges on this regard. The purpose of this study is therefore to contribute to the growing evidence on the use and acceptance of ICT by higher institutions of learning in Uzbekistan. The paper critically analyzes the current students' and teachers' perceptions on ICT usage, involving 23 higher educational institutions in Uzbekistan and provides some recommendations on improvement through studying international experience.

Keywords: Information communication technology (ICT), e-resources, e-learning, distance learning systems, cloud technologies.

I. INTRODUCTION

Information communication technologies have already become an inalienable part of modern education. They are effectively used for knowledge distribution, construction and reconstruction[1]. The widespread availability of information and communication technologies (ICT) has also transformed higher education institutions (HEIs) into multi-choice learning environments that increase learning based on individual preferences, where time and place are not important. The effective integration of ICT tools at any teaching and learning situation, on a continuum from face to face to online learning[2] or Blended learning contributes to the creation of a successful learning environment. Therefore, this issue is always in the centre of a public concern. International forum "Education – 2030", organized by UNESCO, held in China, 2017, July, was a platform for heated discussions on perspectives of ICT implementation.

It was also noted that, the increase of quality and level of education depends on several factors, such as financial matters of open online courses and resources, secondly, comfortable ICT structure and platform to get education and administer it, thirdly, academic staff with the capability of using modern pedagogical and ICT tools and etc. Furthermore, in the "Mobile learning week", held in Paris, 2019, it was comprehensively discussed the gradual development of artificial intelligence in the context of education. On this regard a range of countries, including Uzbekistan are increasingly conducting reforms to enhance the HE sector, as the modernization and development of a country start from education. Particularly, according to the Decree of the President of the Republic of Uzbekistan, issued 17th June, 2019, the measures on developing high qualified personnel preparation system and increasing scientific capability, integrating the educational process with new pedagogic technologies and international practice in teaching methods were highlighted. It is also stated to create a single informational platform for educational, scientific and administrative activities. Furthermore, "The conception of informatization of higher education system in 2017-2021" emphasizes the automatization of educational process, its administration and implementation of distance learning. These acts serve as a foundation to work out a new mechanism of effective use of pedagogic and information communication technologies in HEIs. The present research is also dedicated to study above mentioned issues, emphasizing social readiness of academics and students.

II. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

It has been conducted a lot of researches on implementation of ICT in various stages of education. Ibrahim and Nat examined the blended online learning models for HEIs. McLachlan, Buabeng Andoh Charlez and Yidana[3] analyzed students' perceptions of ICT at schools, whereas Tezci[4] studied the influencing factors of teachers' ICT usage. Other studies on the usage of digital technologies such as video conferencing, teleworking, distance learning[5], mobile learning[6], E-learning[7], Massive Open Online Courses (MOOCs)[8], Blended learning[9], cloud technologies[10]

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make an enormous contribution to the development of modern educational process. The importance of increasing modern pedagogic and ICT usage in educational process in HEIs can be justified based on the followings:

Firstly, XXI century is the period of obvious dominance of ICT. At the end of 2018, 51,2% of individuals, or in other word, 3.9 billion people were using ICT[11] for different purposes.

The usage of ICT for educational purposes is the driving force to increase effectiveness of educational process.

Secondly, higher education is an independent part of a continues education, which prepares professional specialists for the labor market. The rating of it is evaluated based on the achievements of graduates. This trend is interlinked with the creation of a successful learning environment with effective establishment of all necessary conditions.

Thirdly, the implementation of ICT provides effective results in organizing, administering and monitoring the educational process. Moreover, it serves to create neutral environment for students to acquire knowledge and for teachers to develop and design modules, to prepare assignments, to share materials, to assess and provide feedback and etc.

Therefore, this study sought to investigate, first of all, the state of usage of ICT by students and teachers in HEIs and to identify existing problems. Subsequently learning the international experience and provide suggestions at the end.

III. METHODOLOGY

In the present study, the object of evaluation was the state of ICT usage in the teaching and learning in HE institutions in Uzbekistan. The main objective of research was to study teaching and learning experience of HEIs of Uzbekistan for further improvement of the educational process and to work out guidelines on enhancing the educational process in Uzbekistan. To achieve the main objective and aims of the study a mix-methods design research was conducted which included both quantitative and qualitative (focus group interviews/discussions and a questionnaire) data collection methods. The questionnaire was completed by respondents on the college campus, and later it was deleted.

The following methods were used: 1) PAPI (pen-and-paper personal interview) – respondents filled in printed versions of

the questionnaire; 2) CAPI (computer-assisted personal interviewing) – respondents used the computer to complete the electronic survey and sent it via the Internet/Web sites. The present study has employed the Google online platform.

The questionnaire based survey has been complemented by data from the qualitative method – focused group interview/discussions that determined the main limitations of the educational process and focus areas in strengthening the capacities.

In this study, overall 23 higher education institutions from Tashkent city and other regions were involved. Total number of questionnaires constitutes 1553, excluding unusable and incomplete data, 632 out of respondents were academics, and the rest 921 were students. The study is carried out in two stages. In the first stage the attitude of academics towards ICT usage in teaching process was analyzed. The categorization of academic staff was according to their specialization and positions. Based on the data, 9.4% of respondent academics were professors, 19.2% of them were docents, the rest 24% and 47.4% were senior teachers and teachers respectively. Academic respondents were selected from various specialization, majority respondents (30.4%) were from social humanitarian sphere, whereas medicine faculty members showed the least participance with 0.6%. The second stage of the study focused on the students' perception on ICT integration into learning. Student were selected from different levels. However, majority student respondents were second year students (48.2%). In terms of program of study, 33.2% offer Technical and Engineering, 27.2% study Social Humanitarian and pedagogy, 13.9% study IT, and 10.3% study Natural Science, 7.4% study Business and Economics, 5.2% study Medicine and 2.8% study other Philology and Foreign languages.

IV. RESULTS

In the frame of the research teachers were asked several questions some of them are to be illustrated in this paper. Fig. 1. indicates the rates of teachers' reflection for the first question. And the Fig. 2 summarizes the overall result of the first questionnaire.
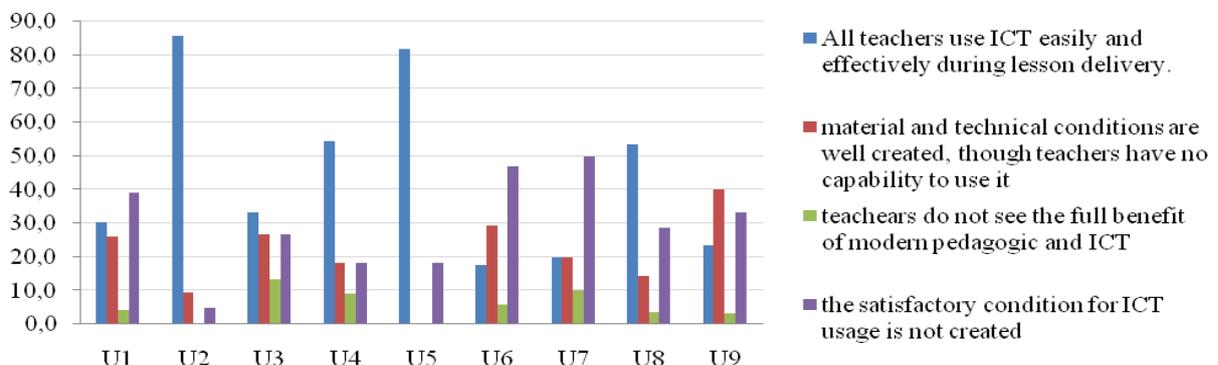

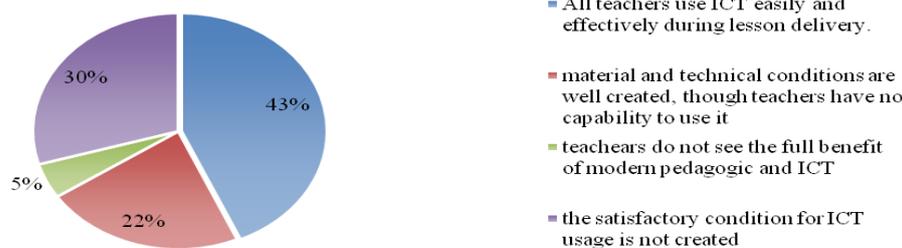**Fig 1. The rates of teachers' reflection for the first question.**

Fig 2. The overall result of the first questionnaire.

As it is demonstrated, there is a dramatic difference in various universities. Most of the Universities where academics answered positively are the HEIs which are located in the capital city and most probably, well equipped with modern ICT tools. However, in the universities located in regions the state of ICT usage is obviously low. Looking at the Fig. 2. it can be seen that 43% teachers use ICT independently and effectively, however almost every one third respondents think that it is not properly created a satisfactory condition for ICT usage in HEIs.

Fig. 3. indicates the percentage of the process in which teachers use ICT mostly. It is worth to note that majority teachers use them during lesson delivery (56.8%) and while preparation for lessons (34.9%), on the other hand, surprisingly, 1,2% academics admitted that they do not apply ICT at all, which is unfortunately the painful point of Higher educational system.
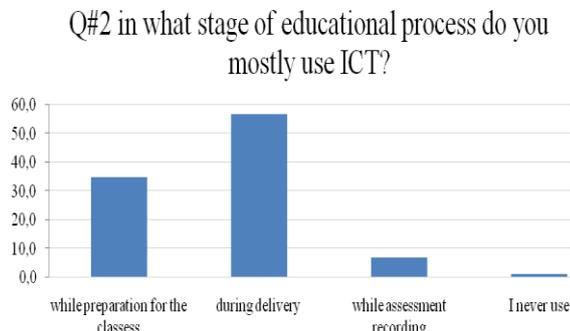

Fig 3. The percentage of the process in which teachers use ICT mostly

Another question given to teachers was asking their opinion on how the teaching and learning environment in HEIs can be improved. Fig. 4. shows the number of demands for increasing particular aspects of higher education.

As it is shown in Fig. 5. there is a significant necessity for expanding the library resources, inclusively with electronic books, online submission for international research databases. Also there is a great demand for creation Internet and social networking opportunities in HEIs.

The second part of the study was to identify students' attitude towards using ICT in their education.

As it is illustrated, some university teachers still abuse passive methods, continuing applying only lecturing methods during classes. The rate of application of interactive methods is significantly low in most HEIs, though some of them are effectively using these methods. This proves that majority do not apply modern pedagogical methods. Those ones with a high probability do not use modern information communication technologies as well.
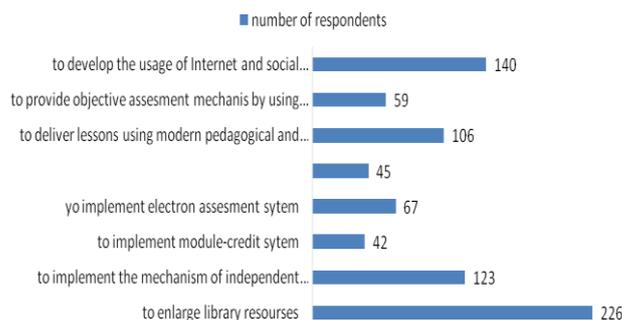

Fig. 4. Number of demands for increasing particular aspects of higher education

Fig. 6. shows the summarized result of the questionnaire where students answered the question of how often teachers apply modern pedagogical and information communication technologies. More than half of the respondents consider that they always use them, while some of them (9 %) admitted that they never use.

Subsequently, Fig. 7. shows the eagerness of students to integrate ICT into lesson delivery. Every second student maintained that more than a half of one session should contain ICT usage through visual aids, audio and video materials, e-quizzes, PPT presentations, which are simultaneously to be available in special e-platforms, such as intranet, cloud technologies and etc.

V. RESULT AND DISCUSSION

The research findings underline the significance of continuous improvement of higher educational system. It identified several barriers that are currently occurring in this sector.

Firstly, there is a lack of technological capacity which is the main obstacle for both teachers and students. This problem mostly occurs in HEIs located in regions. In order to tackle this problem, Government should invest for forming and developing the material and technical base of universities, which is actually being conducted through step by step reforms nowadays.

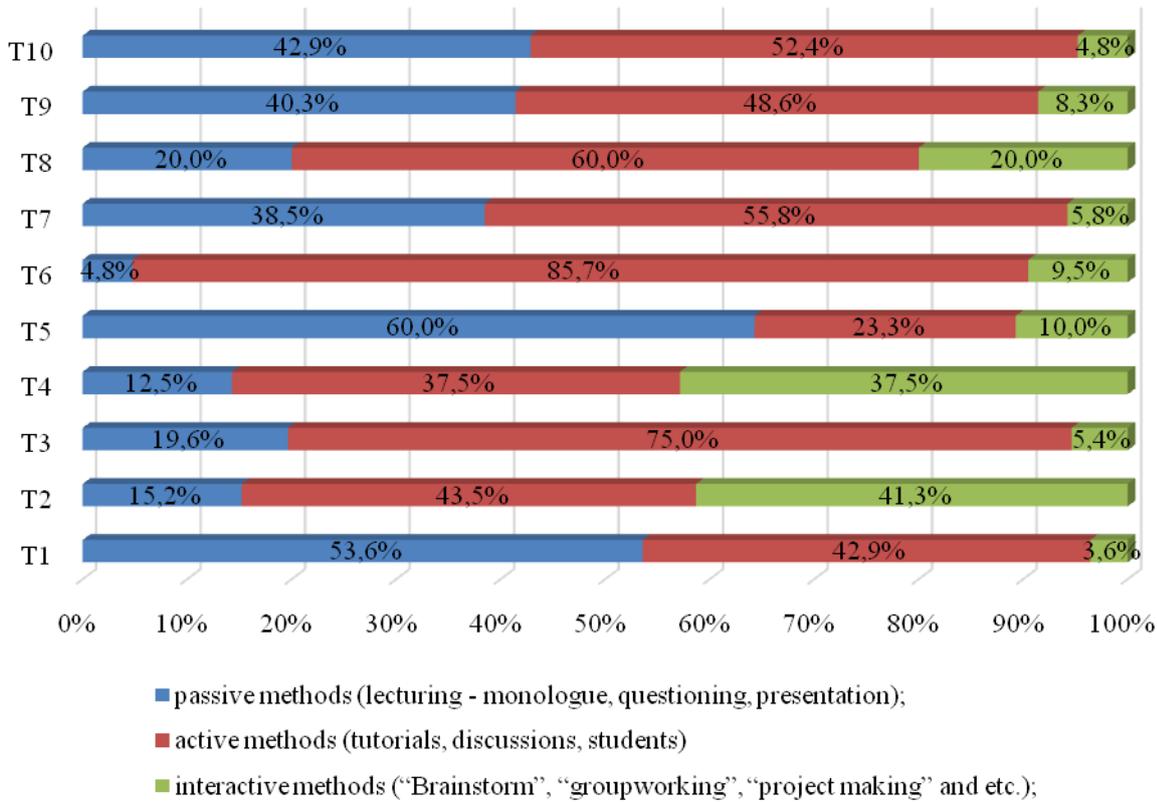# What methods are mostly used by teachers while lesson delivery?

Fig 5. Necessity for expanding the library resources, inclusively with electronic books, online submission for international research databases

Secondly, above mentioned problem subsequently leads to the next obstacle such as teachers' barriers that is inability to use modern technologies. This could be solved through organizing special trainings, seminars on how to effectively use and integrate ICT in teaching.
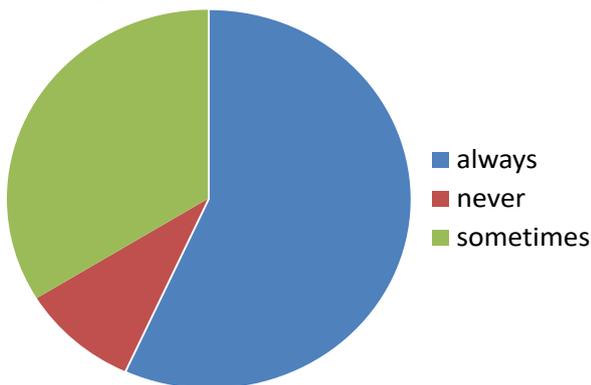

Fig 6. Summarized result of the questionnaire where students answered the question of how often teachers apply modern pedagogical and information communication technologies

Thirdly, the ICT implementation should not only cover teaching and learning process. Its enormous effectiveness can also be seen in its administration and monitoring process. Consequently, this helps to provide transparency, time management, creates a platform, and network environment for organizational, pedagogical and research discussions

(Natalia P et.al, 2019).

A comparative legal analysis always helps to detect prior tasks to develop particular area, educational sector is not an exclusion. A wide range of countries have already established a well-designed strategy to develop the educational sector through ICT. Some of them are described below.

Particularly in Denmark, the Danish Ministry of Education has identified the strategic objectives of the policy for introducing and using ICT in the education system:

1. The level of training in the education system should be adequate to the requirements of the information society;

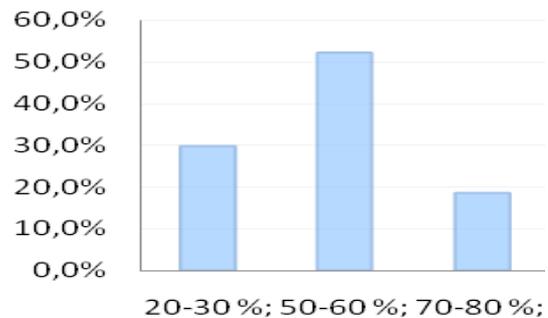2. It is necessary to develop and implement new pedagogical approaches based on ICT.

Fig 7. The eagerness of students to integrate ICT into lesson delivery

An integral part of the Danish Ministry of Education's ICT policy is the research, development, experimental verification and dissemination of pedagogical innovations, including the creation of structures for the exchange and dissemination of the most significant of them among pupils, students, teachers and the education sector as a whole. The above strategic goals are implemented in five main areas of activity of the Danish Ministry of Education:

1. Formation of basic skills in the field of ICT.
2. Formation of the attitude of managers to the implementation of ICT.
3. New principles for the organization of the educational process.
4. Creation of electronic infrastructure.
5. Development of training materials in electronic form.

In comparison in South Korea, which has become a leader in the use of ICTs and the development of e-learning, a systematic and consistent government policy is being implemented in the field of e-learning.

At the first stage (since 1998), the project "Cyber Home Learning System", thanks to which a high-tech modern infrastructure was created. At the next stage (since 2004), the political course was aimed at digitizing all textbooks, developing digital content and transferring Korean schoolchildren to fully electronic education by 2015. South Korea has already begun to introduce a new training system - electronic, which will take place in several stages. In 2014, elementary school was transferred to e-learning, over the next two years, the scheme gradually encompassed secondary and high school. Separate online classes have been held since 2013, so students who are unable to attend school due to weather conditions or due to illness will be able to continue their studies along with the rest.

- The following government departments support and develop e-learning in Korea:
- The Ministry of Labor is responsible for e-learning in vocational retraining and continuing education.
- The Ministry of Education, Science and Technology is responsible for e-learning in education.
- The Ministry of Knowledge Economics is responsible for the development of the e-learning industry.

At the government level, clusters of goods and services in the e-learning industry have been adopted. This industry shows record growth rates - up to 30% annually.

The market employs more than 700 companies-providers of e-learning, about 40 companies in this sector receive an annual profit of more than $ 10 million.

The development of the e-learning industry has identified new directions in the transformation of educational systems: virtual (network), geographically distributed, transcontinental (cross-border) universities are being intensively created.

The results of a study by the Organization for Economic Cooperation and Development (OECD) on digital learning showed that South Korean citizens (age group 15-19 years old) are able to study using computers and the Internet, much more effectively than their peers in 16 countries participating in the program PISA (and OECD). The OECD suggested that teachers should devote more time to computer training in the lesson schedule. In turn, the leadership of educational institutions should invest in training employees to work on a computer and a computer form of teaching. The Korea Communications Commission reported that by the end of the year, the expected number of smartphone users in the country will reach 20 million people - a number equal to approximately half of the total population of South Korea. According to the Seoul administration, in 2015, more than 80% of the capital's residents acquired smart gadgets.

In Sweden at the end of 2008, the Swedish government granted credentials to the National Education Agency to promote the development of ICT in kindergartens and schools. In September 2009, the budget amounted to about 2 million euros. The benchmark was aimed at the interaction between pupils, parents and students using ICT. The government has taken the initiative to create a European school network with the goal of applying innovation to the learning and education of its key supporters: ministries of education, teachers and researchers.

One of the important tasks was the development of teachers' skills and knowledge in the field of ICT. This is the largest ICT education project in Sweden in history, in which the Swedish Knowledge Fund has invested more than 10 million euros to increase the level of ICT in teacher training. The project was created in collaboration with universities, municipalities and industrial enterprises with the aim of training teachers competent in the field of digital technologies.

Great Britain government's strategy for the development of education for 2008-2014 proclaims a course for mastering the new "electronic" pedagogy (e - pedagogy). The result of such a strategy was the fact of reaching 1st place in Europe in ensuring teachers have access to ICTs, their level of professional competence in ICTs and their readiness to use ICTs in the educational process. The percentage of such teachers is 60.2%.

The UN study notes that Eastern Europe is distinguished not only by high rates of relative growth, but also one of the most significant increases in the value of the ICT Development Index, and therefore this region can be considered as the most dynamic in terms of ICT development over a specified period of time.

Looking at the experience of our neighbor state Kazakhstan, the introduction of the E-learning (E-learning) information system has been carried out in stages since 2011 in state organizations of secondary education as part of the implementation of the State Education Development Program in the Republic of Kazakhstan for 2011 - 2020.The aim of the e-Learning project is to develop educational resources, services and ensure equal access to them through the use of information and communication technologies. The system is designed for three main categories of users:

· Users of educational organizations - school administrators, teachers and students;

· Users of the Ministry of Education and Science of the Republic of Kazakhstan are structural divisions of the Ministry, as well as regional Education Departments,

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receiving educational statistics;

ᴢExternal users are the parents of students.

In the system, taking into account the role of the user, a personal account is implemented.

The platform of the e-learning information system automates the processes of managing the organization of education, planning and conducting the educational process, accounting for students and teachers, school records management and reporting in the organization of education. The e-learning platform creates the conditions for the transition to electronic intra-school document management and reporting in the country's education system.

Teachers got access to a platform for preparing lessons, to an electronic library with additional materials in the form of digital educational resources in school subjects and academic disciplines of colleges. Teachers form all working curricula and calendar-thematic plans in the e-learning system from standard curricula and programs centrally loaded into the system.

In order to automatically generate administrative reports of the Ministry of Educational Statistics, an educational database has been developed and introduced within the framework of the system, through which data are collected online for all schools and colleges in the country.

The components of the e-learning software solution were introduced into the trial operation as part of the subsystems:

- education management system;
- learning management system;
- portal of educational organizations;
- national educational database;
- corporate portal of the Ministry of Education and Science;
- information system administration system.

VI. CONCLUSION

In summary, it is necessary to state that the state policy in the field of education informatization, as well as modern world trends, is characterized by ICT development. This development is mostly seen as the e-learning system. Investments in the e-learning system are considered as strategically important, improving the quality of human capital. Thus, the analysis of international experience and the current state of education in the Republic of Uzbekistan allow us to highlight the following trends:

1. E-learning is recognized worldwide as an effective tool for the development of national educational systems and providing access to quality education regardless of the geographic location of students.

2. The integration of e-learning and traditional learning is a prerequisite for the transition to a new learning paradigm. Creation of a mobile educational space for teaching people throughout life and shaping the personality of a new generation with planetary thinking and readiness for distance professional interaction.

3. E-learning in many countries is part of e-government, designed to provide services, information and knowledge in a cost-effective and efficient way.

4. The emergence of e-learning in most countries was initially accompanied by the active creation of a modern infrastructure, and subsequently, e-learning has expanded significantly, as its vector was aimed at providing content with financing up to 80% of the total project cost.

The world experience in the development of digital content convinces us that e-learning is only as successful as it is included in a well-thought-out general functional, informative, didactic and organizational concept for the development of the country's education system as a whole. This led to the realization of the need to develop such a concept for the development of education in which e-learning should be integrated. Currently, the development of e-content is carried out in accordance with national state standards of education and upbringing, in line with national programs or projects with a focus on the state language. The rapid growth of training programs in the world has marked a gradual turn towards the realization of the need for investments in the development of methodological foundations of e-learning and the justification of virtual pedagogy, designed to develop scientific and pedagogical knowledge, both about the essence of e-learning and its system-forming components.

The decisive role of the teacher in the effective development of ICT implementation and the creation of digital educational content is universally recognized. However, their preparation requires mastery of the ICT methodology, e-learning system and digital educational content. In the world, teacher training by e-content developers themselves is practiced, which contributes to the maximum effectiveness of training and education courses. In all countries, issues of motivation for teachers to actively use ICT and digital content are being addressed.

As a final word, more modern pedagogical and information communication technologies are being implemented from now on, thanks to the governmental reforms in this sector in order to assure quality in education and meet the student satisfaction. The authors hope that this study can inspire researches and instructors of HEIs across Uzbekistan to go to a step ahead in developing teaching and learning environment.

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