

Problems and Perspectives of ICT in Higher Education Institutions of Kazakhstan

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Abstract—Contemporary teaching, learning and assessment processes involve more information and communication technologies. The main goal of using information technologies in the educational process is to improve the quality of education by individualization and strengthening intellectual capabilities of students in the information society. This research considered the information communication technology use in higher education institutions of Kazakhstan, exploring its benefits for students and suggesting possible solutions for the problems arising with ICT implementation.

For the purpose of this paper a small fragment of students' survey out of the ongoing research project was used. 558 students from various Kazakh universities were surveyed. One of the questions concerned IT development and digitalization level of the universities, because it enhances students' inclination for innovation and entrepreneurship. According to survey results forty three percent of students think that their universities have been sufficiently digitalized. Other forty percent remained neutral, and seventeen percent complained about the ICT equipment, which means that universities should address this issue to remain competitive.

The research contributes to previous studies by focusing on students' attitudes toward ICT implementation. It describes both advantages and disadvantages of the ICT in education, and tries to summarize the current conditions of Kazakhstani higher education. For the successful policy implementation, the suggestions should come from the bottom. Therefore, the students' hands-on knowledge and experience with ICT implementation should be taken into consideration and could be helpful for further integration into educational process.

Keywords—information communication technologies; higher education; teaching and learning; entrepreneurial universities.

I. INTRODUCTION

Education has played and still plays a significant role in creating a sustainable future for mankind. It has become evident that the educational system cannot develop outside of the global processes, tendencies and labor market demands. Therefore, the rapid development of latest information technologies, global informatization and

digitalization requires higher quality of university graduates and future specialists. In the modern educational system, learning is not limited to obtaining knowledge and skills anymore. Focus shifted to students' personality with increased self-development. Thus, modernization of the educational process involves transition from lecturing methods to active group and individual works for mastering learning material. This might be facilitated through the introduction of information and communication technologies (ICT) and digital educational resources into the teaching and learning process.

Furthermore, in-depth understanding of information and communication technologies by university tutors is the core for enhancing the quality of education. The use of information technologies to design educational and methodological support makes it possible to increase the efficiency of the academic process. Proficient use of information technologies by the teacher allows to increase the pedagogical impact on the formation of the student's innovative potential.

Digital transformation and capability of universities is one of the eight criteria of the entrepreneurial and innovative university. Therefore, the purpose of this paper is to determine the problems and prospective of applying ICT in higher education and to uncover the innovative potential of entrepreneurial universities with the help of survey of their students. The article is the part of the ongoing research project AP08052656 "Readiness assessment of Kazakhstani higher education institutions for transformation within the context of "Triple Helix"¹.

II. LITERATURE REVIEW

Information technologies forcibly affects the modern period of society's development, invades into all spheres of human activity and forms a global information space. An integral and important part of these processes is the informatization of education. The problem of the widespread use of information technologies in the field of

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education in the last twenty years has attracted increased interest of researchers. According to Lowther et al efficiency of using ICT in education can be determined by three main criteria, which are autonomy, capability and creativity [1]. Autonomy means that learners independently master the learning process with the help of ICT, either working alone or in groups. ICT stimulates teachers' autonomy, as well by providing them an opportunity to create content of the course and control it. In terms of capability, students become more confident in applying their knowledge effectively. Consequently, ICT enhances teaching and learning quality by broadening students' knowledge and ameliorating their skills.

Information technologies in education aim to shape an interactive environment for managing the process of educational activities and an access to modern information and educational resources. According to various scientists, information technologies comprise of computer, multimedia textbooks, various educational websites, applications, and many other sources [2]-[3]. Information technologies in the educational process notably influence the formation of a contemporary picture of the world. Therefore, applying information technologies in the educational process is conditioned by the need to improve the quality of education and mastering modern computer programs.

III. RESEARCH METHODS

This research work started with the problem identification, which is the implementation of information and communication technologies in higher educational institutions of Kazakhstan. In order to assess the effectiveness of ICT in education, the following research question was developed:

- Is the level of IT development (digitalization) at the university is high enough to create start-ups / business projects?

The students at the entrepreneurial universities were surveyed, since this paper is the part of the research project as mentioned before. The survey was self-administered, that is, all respondents filled them out themselves online. It consisted of Likert questions, rating scale questions, and open-ended question. Also, respondents were asked to identify their university and class standing. Sampling was purposive and composed of 558 students from different universities. This diversification and representativeness of different universities could make the findings more generalizable. Data from the survey was analyzed with the help of SPSS program.

IV. FINDINGS AND DISCUSSION

A. Advantages of ICT in higher education

Quality of education is the issue of the day for Kazakhstan. Higher educational institutions (HEIs) are facing the challenge of finding an optimal way to get to a new level of education quality. Kazakhstani HEIs can be called academies, institutions, or universities. There are 129 higher educational institutions in Kazakhstan, comprising of 33 state, 92 private, and 4 foreign universities [4]. Their teaching quality, in terms of well-

educated and experienced professors, academic supplies, such as textbooks, desks, library materials, projectors, and so forth, greatly vary, depending on the university status (national, state, and private) and its location (urban or rural area). These differences and university capabilities should be taken into consideration, while transforming the university into an entrepreneurial HEI and introducing ICT.

For the period of 2020–2025 Kazakhstan aims to modernize the system of education by improving the higher education institutions, top management of educational organizations as well as by defining new norms and enhancements. This, first of all, concerns the system of information technology development, which is mandatory for the highest educational needs of students in all levels of education. Moreover, knowledge of information technology is crucial for successful employment, since this aspect plays an important role to many companies.

Therefore, ICT in education is used for the following reasons:

1. to improve the teaching process and increase its quality and efficiency;
2. to development students' creative and critical thinking;
3. to automate the processes of control, correction, testing and psychodiagnostics;
4. to transfer and acquire pedagogical experience, methodological and educational literature;
5. to intensify and improve the management of the educational institution and the educational process.

Benefits of the ICT in education have been explored by myriad authors. The main merits are presented in the Table 1 below.

TABLE I. BENEFITS OF ICT IN EDUCATION

Author	Benefit
Brush et al	ICT expands access to knowledge acquisition, students are more motivated to discover new topics and solve problems.
Castro and Aleman	ICT assists students in self-directed learning
Chai et al	ICT forms a creative learning environment with the help of e-books, laptops, various applications and games.
Koc	ICT strengthens collaboration and communication skills by making them share and work together via teleconferencing.
Gee	ICT improves teaching and learning quality
Source – [5]-[9]	

Moreover, with the technological support and encouragement from university administration teachers can change format of their classes and create new assignments. Nevertheless, the possibilities of IT in the reorganization of the educational process are impressive and provide a wide range of activities for the teacher. Therefore, it largely depends on the preparedness of the teacher to work in the conditions of an increased flow of information. Willingness of the teacher to work in the new information space, the progressiveness of his/her views is a necessary condition for the development and implementation of new forms and technologies of education based on the active use of ICT. It is undeniable

that the subject teacher, being a key figure in the informatization of education, must not only understand the possibilities of IT, but pursue continuous professional development. Further we consider more obstacles of the ICT integration into the educational process.

B. Challenges of ICT in education

Along with the advantages of ICT in teaching and learning the students and educators determine the following challenges:

- Infrastructure, scarce of resources, including sufficient funding. ICT implementation requires high-speed connection to the Internet, appropriate hardware, software, audio and visual aids and other accessories. Educational institutions, especially those of rural area rarely can afford it. In turn, this problem impacts the technical literacy both of students and teachers.
- Specific knowledge about ICT and its application to the existing pedagogical content is required. Therefore, teachers need to be trained on technology integration into the curriculum, use applications, social networks, and other creative ways with the aim to motivate students' engagement to the class and have effective lessons. Moreover, teachers' belief and attitudes towards integrating ICT directly impacts its effective and appropriate use.
- Poor technical skills and knowledge of the students. This problem was acute during the distance learning due to COVID-19. Many students had no personal laptops or could not connect to the Internet. Well-designed curriculum, infrastructure and administrative support could solve this problem.
- Lack of recognition, motivation and support from university management for using ICT. OECD defines digitalization and technologically development as one of the eight main criteria of entrepreneurial university. Therefore, higher educational institutions should provide all types of information communication technologies necessary for teaching process. The research, conducted by Lim proved that accessibility of ICT, well defined educational principles and division of labor between teachers lead to an effective integration of information technologies into the educational process [10]. Moreover, Pelgrum and Law, argue that school's culture, leader's vision and perception effects successful ICT implementation more than teachers' technical skills [11].

There is the problem with understanding of a fairly large amount of information that a student cannot fully assimilate and comprehend (unlike a computer). However, the experts assert that a computer, on the other hand, is not able to think like a human being, therefore, personal communication cannot be replaced by it. Moreover, it should not be considered as a computer versus a teacher; instead, it might be used as a tool of supporting the professional activities of the teacher. Implementation of

ICT in the educational process provides both teachers and students with the opportunity to present their information efficiently, which in turn increases students' interest in research allowing them to analyze the influence of various factors on the process under study.

C. Level of IT development in Kazakhstani universities

In Kazakhstan, the use of information and communication technologies (ICT) in the system of education, including universities, is carried out within the framework of the state policy of informatization of society and education. An important direction of the state policy on informatization of society and education is the Digital Divide Reduction Program, aimed at shaping computer literacy of the general population and professional communities. Specific areas of informatization of education, including university education, are fixed in the "State Program for the Development of Education of the Republic of Kazakhstan in the period from 2005 to 2010":

- Development and improvement of regulatory and legal support;
- development of infocommunication infrastructure of educational organizations;
- technological and technical support of infrastructure;
- creation of an open distance learning system;
- creation of domestic digital educational resources;
- implementation of the education management information system (EMIS);
- training of pedagogical and management personnel [12].

According to the State program for the development of education until 2020 [13], the educational and laboratory facilities of the universities must be updated annually. Thus, it will increase the level of realizable scientific-research and educational projects.

Material-technical and social base of the universities are being modernized by updating the computers, office furniture, sports equipment, acquisition of multimedia and typographical equipment, current and capital repairs of educational buildings and dormitories.

Levin and Wadmany assert that ICT motivates students to concentrate on noble purpose [14]. Moreover, McMahon conclude that ICT develops students' critical thinking [15]. Therefore, we asked our respondents – entrepreneurial universities' students about the level of the information technologies integration into the teaching and learning process. Forty three percent of respondents replied that their universities have been sufficiently digitalized, which in turn, help them think creatively and to start a business. Other forty percent remained neutral, and 17% complained about the ICT equipment.

Our results indicate that the perception of the digitalization and creating an entrepreneurial climate affects students' willingness to start a business. While building a support infrastructure and offering entrepreneurship courses encourages students' interest in developing their own business. The survey showed that the most of the students do not know how their university supports entrepreneurial thinking and action. Therefore, universities aiming to have competitive graduates should

pay more attention to applying ICT in undergraduate as well as graduate educational programs and to create a favorable and positive entrepreneurial climate among all students.

The role of ICT in education is gaining more importance in 21st century, especially with the transition to the knowledge economy. It creates student-centered learning settings, covering the entire system of education, starting from early childhood up to the higher education.

In accordance with the Agency for Statistics' data, there is an insignificant increase in the level of equipment of the universities with interactive equipment and computer technology used in educational process. Moreover, analysis of statistical data shows that this indicator differs by regions. Higher educational institutions of Almaty, Nur-Sultan, Pavlodar, Eastern Kazakhstan, and Karaganda regions, are highly equipped with the computers connected to the internet (See Figure 1).

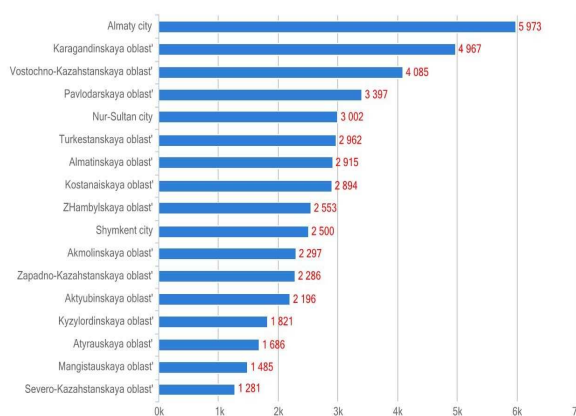


Figure 1. Number of computers in higher educational institutions with access to internet [16]

Comparative analysis of the computer/student ratio demonstrates the higher rate of higher educational institutions' equipment with the computer technology in comparison with other levels of education. At the same time, the given indicator in 2018 was 6 students per computer, which is still not enough as opposed to the international level. However, in some regions this indicator is even more. For example, in Zhambyl region the number of students per computer equals 13, in Atyrau Western Kazakhstan, Kyzylorda and Turkestan regions the ratio is 10 to 1. Data trends indicate the need of strengthening and updating the infocommunication infrastructure of higher education institutions, because the effectiveness of the educational process highly depends on the level of accessibility to modern digital image resources not only by teachers, but also by students.

The need to ensure a high level of ICT use in the system of higher and postgraduate education in the country is an important condition for the readiness of universities in Kazakhstan to intensify the educational process in order to develop the skills of new learning technologies among Kazakh youth. In this regard, it is necessary to speed up the development of the relevant normative legal base, regulating the organization of educational process, in the context of creation of national

digital educational resources, as well as computer measuring systems (mediapedagogic).

Developing of the educational research processes in universities requires better access for students and teaching staff to open information systems of the world scientific and pedagogical community. National license of such leading global brands in the field of information resources such as Thomson Reuters, Springer and Elsevier, received in 2011, allowed 72 universities and 162 research institutes to gain access to these scientific databases [16]. The leaders in this field of work are Nazarbayev University, Gumilyev Eurasian National University, and al-Farabi Kazakh National University.

V. CONCLUSION

Educational systems vary from a country to another country, but they share central characteristics. The systems should respond to the economic demands and to carry out necessary policies and reforms to meet those demands. In the information society, when information becomes the highest value, and the information culture of a person becomes the determining factor in professional activity, the requirements for the education system also change.

From the literature listed above, it can be stated that using ICT in education has both advantages and disadvantages. Therefore, it is important to consider ICT in education from every angle. The positive aspects of information technology are, first of all, facilitating the student's learning process, strengthening the intellectual capabilities of them and, undoubtedly, improving the quality of education at all levels. Also, as study showed there are problems from students', teachers' and administrative sides, therefore possible solutions for the effective use of ICT were recommended.

The research explored the level of digitalization of Kazakh universities through students' survey. One of the questions asked the students about information technologies integration into the teaching and learning process in their universities. Majority of respondents (43%) replied that their universities have been sufficiently digitalized, and as they assert, it helps them to think creatively and to start a business. Whilst, other forty percent remained neutral, and 17% complained about the ICT equipment. For in-depth analysis and further research, it is planned to include interview with teachers and administrative staff of universities. In knowledge-based economy, universities should bring forth favorable conditions for ICT implementation and provide every student with competitive education.

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