

Information Technologies Use in Higher Education Institutions under Digital Economy

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Abstract—The article deals with the issues of information technology support in higher education institutions in the context of the education process, institute management and research activities. The sociological research has been conducted using formalized interviews with teachers and students of Vladikavkaz Institute of Management. As a result of this research the main problems preventing the use of information technologies potential have been elicited. Proposals for the IT development process in higher education institutions are substantiated. A necessary prerequisite of IT development in higher education institutions is the inclusion of specific goals for informatization with definition of the educational process and institute management innovations into the institutes' strategy. That will systemize informatization processes institute and ensure its competitiveness in the context of scientific and technological breakthrough and digital economy development in Russia.

Keywords—*information technologies; higher education institutions; education; digital economy*

I. INTRODUCTION

The directions of the main program "Digital economy of the Russian Federation" is staff training for the digital economy. As this direction, the authors have chosen key objectives for the creation of the required conditions for the digital economy staff training and knowledge society formation in Russia. Education system modernization in terms of staff training for the digital economy is under consideration [1].

The Republic of North Ossetia-Alania ranks 79th out of 85 [2] in the digitalization level development rating of regions, and it is quite obvious that the acceleration of digitalization processes in the Republic requires education system improvement and more active use of information technologies in higher education institutes as well.

II. PROBLEM STATEMENT

The article is an attempt to study the state of the informatization process in higher education on the basis of the sociological research conducted by the authors at Vladikavkaz Institute of Management. It is known that IT innovations both in education process and institute management are becoming key mechanisms in providing competitive advantages of the institute [4] especially in the context of digital economy, as a system of social and economic and organizational and technical relations based on digital information telecommunication technologies [3].

The use of computers allows one to solve the main contradiction of education process associated with the necessity of providing individual education in the context of universality is an indisputable advantage of IT education [5].

The positive potential of modern information technologies is expressed in the development of communication skills, the ability of analytical thinking and independent decision-making [6]. The education process is upgraded due to IT didactic facilities - interactivity, computer data visualization and easy

access to it in particular. To improve the efficiency of University management, the IT use in the processes of information and methodological support and educational activities management is quite significant [7].

The subject of the research of the article is informatization process in high school in the context of digital economy by the example of Vladikavkaz Institute of Management.

III. PURPOSE OF THE STUDY

The purpose of the research is to study the informatization process in high school and identification of the key problems preventing more absolute use of information technology's potential in the educational process, University management and research activities of teachers and students. An important objective function of the study is to make proposals on the development of the informatization process in the high school.

The following composition of methods was used to solve the tasks: sociological research by means of formalized interviews with 20 teachers and 20 students and content analysis of the media.

IV. RESULTS AND DISCUSSIONS

Conducting a sociological research at the level of IT using in the University gave the following results. The results of lecturers' interviews are as follows. A third of the respondents chose the position "above average", another third – "below average", a little more than a third – "average". The answers of the respondents who assessed the level of IT use as low are quite predictable.

According to the respondents, the lack of financial resources for the acquisition and implementation of IT at the University and the lack of IT skills of teachers make it difficult to use modern technologies more actively in high school, despite the fact that the majority of respondents noted the presence of the necessary conditions for progress in this direction in high school (Fig. 1).

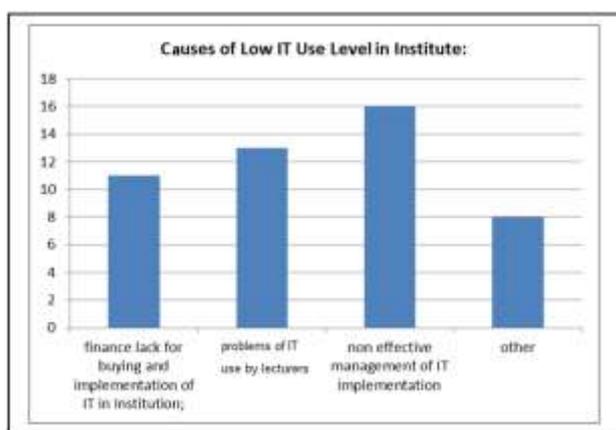


Fig. 1. Causes of low level of IT use in institute.

Practically all the respondents use various software products in their work including text editors, electronic worksheets, programs and Internet. Besides, more than half of the respondents use special application programs (Fig. 2).

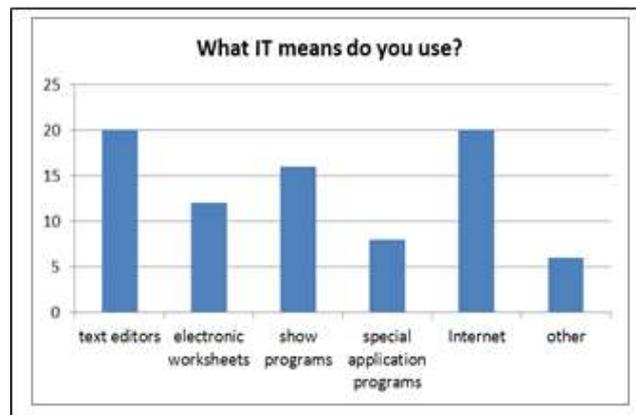


Fig. 2. Types of IT used by respondents.

Almost all respondents answering the question on IT usage marked "everyday" and noted that IT usage in educational activity significantly facilitates preparation for classes and diversifies them. The IT advantage in the education process is efficiency, visualization, accessibility of any information and mutual exchange.

Answers on the IT use ranged from preparation and application of electronic books, test systems and multimedia support of the education process to the type of recognition of "average achievement" and "no achievement".

Lack of computer programs knowledge, abundance of information of various confidence grade, the Internet connection speed, technical bugs, insufficient skills of special programs' application were mentioned among the respondents' problems while using IT.

The training using IT application in professional activity has its peculiarities and difficulties since IT is one of the dynamic fields of science and technology. According to respondents, the main task is to teach not the shell of the software product, but the principles of work in a particular application, to inure self-training and self-education. Culture formation in the process of training is, of course, of great importance as we get plenty of "junk mail" in addition to useful information via the Internet.

Analysis of the answers showed that teachers' development is the main issue when solving the problems of IT application in the context of digital economy. The next points are extension of state programs of higher education financing and teachers' motivation to more active IT usage, application of additional incentives, etc.

The respondents attributed scrapbook, multimedia resources, static and dynamic models, electronic information and educational environment on the whole as a set of electronic information and educational resources to frequently used digital educational resources.

Two thirds of the respondents associate the perspectives of high school development with the spread of distance learning, while one third regards conferences and Web.2.0. to be a perspective information technology.

When questioned on the optimum combination of traditional education and information technologies, three fourth of the respondents answered that IT had to be subsidiary, while the rest believe that both traditional methods and modern IT are equal in the education process and the optimum is 50/50. One of the problems of IT introducing into education is that some lectures consider electronics to be subsidiary means of learning. It is quite obvious that adequate IT development in high school is not in contest with traditional forms and means of teaching but in their natural correlation. The mixed model of teaching allows combining traditional education, e.g. lectures with tutorials in electronic form [9].

As practice of IT application in high school shows, students as a rule are interested in innovations. For example, students highly appreciated platform Open Source LMS Moodle, its system of education management, possibilities of teaching the material network, the system of students 'estimation and lecturer-student interaction [10].

Besides, we must agree with those researchers who mark that IT should not be seen in absolute terms as a main means of education. The risk of IT absolutizing is in the absence of direct communication with a teacher, and this deprives students of necessary intercourse and skills of professional language development. Nonetheless, these risks do not deny the idea of informatization as it is [11].

In the respondents' opinion, the pace of education process informatization exceeds the one of high school management, though it is known that innovations in both the education process and management can give informatization a system implication, thus making the institute competitive.

Introduction of specific informatization goals in the high school strategy is a necessary prerequisite.

The strategic program of Vladikavkaz Institute of Management's contains a provision on establishing a net of training centers, involving the entire Republic of North Ossetia-Alania, on the grounds of institute. The mission of new training centers is to conduct distance learning in mathematics, computer science and their applications in the modeling of natural science and socio-economic processes. The implementation of the strategic development plan provides the modernization of the electronic information, educational environment and qualitative improvement of scientific, educational and management activities.

In 2016 the Institute actuated the Regulations on the electronic information and educational environment of Vladikavkaz Institute of Management which determines the formation procedure of the electronic information and educational environment. It contains the purposes, goals, objectives, structure and functionality of EIOS [12].

Electronic information and educational environment in Vladikavkaz Institute of Management is developed on the Moodle platform. In accordance with the Federal state educational standard on "State and Municipal Management", "Law", "Management", "Economy" electronic information and educational environment of the organization provides access to curricula and disciplines' working programs, and electronic library as well as. Due to EIOS, it is possible to

track the educational process and results of programs' mastering, to form students' electronic portfolio and to provide interaction between all participants of the educational process.

The introduction of digital economy elements into the educational process is associated with the development of programs for processing large databases in the economy based on neural networks and teaching university teachers the basic concepts of the digital economy and new tools for economic analysis.

An important strategic direction of the University development is the extension and development of scientific research using information technologies and tools of the digital economy.

It must be mentioned that institute teachers actively imply information technology in their scientific research and conduct various research using special computer programs. In particular, one of our co-authors, being a linguist, believes that IT use in linguistics under the digital economy is an absolute imperative of the time.

The most part of the phonetics research of any language is being carried out using the achievements of other sciences and first of all those of computer technologies. Active development of this field of knowledge allowed appearing new opportunities in objectification processes of scientific data and extension of practical use of theoretical statements. Such modern software as Speech analyzer, Sound Forge, Praat, Win Cecil, etc. gives chance to work with difficult phonetic phenomena, which were not clear until now [14, 15]. One of these complex issues is intonation, which due to its own difficulty and absence of theoretical transparency needs instruments allowing analysis of speech signals maximally precisely including all possible nuances and deviations. During the experimental phonetic research of Ossetian intonation, it was found out that there is not much information in scientific literature and that all this information is based only on own language experience of scientists. To confirm or refute the data, the experimental material has been prepared (simple statements and general questions both with the same lexical composition). With the help of national professional radio and television announcers, the digital audio of the material was made. Developed in the Amsterdam phonetic researches Institute, software Praat helped in the data analysis and interpretation. First, the sentences were divided into syllables indicating its borders. Then pitch, intensity, duration, pausation relative characteristics were calculated. Description of these components formed a conclusion about Ossetian simple statement and general question intonation type, melody in such sentences, pitch frequency range, type of phrase stress, etc. [13]. Working up with the same language material but in performance of different announcers, computer software shows differences which need the extra attention of specialists.

Modern computer technologies allow one to set more global purposes in developing speech recognition and synthesis, increasing information transfer efficiency, creating language corps and learning programs. It became relevant

especially for such languages as Ossetian due to the threat of disappearance.

Thus, it is quite obvious that IT research becomes an integral part of various fields of science, economics and business on the basis of data intensive tools [16].

To develop a strategy of high school informatization as a complex of the educational process, research activities and the actual management of the university, it makes sense to allocate three levels of new IT integration from the point of view of the action algorithm. The first level is the solution of traditional educational tasks at a new qualitative level, the creation of electronic textbooks and workshops, in particular, etc. The second level is distance learning and open learning in the global network. The third level implies the use of information technologies as means of information resources access, on which the educational process is based [17].

The results of students' survey revealed the expected understanding of young people of the IT role in the modern world, their interest in widespread IT use in the educational process. Two thirds of the respondents estimated the use of IT education in high school as "above the average", one third of students answered "below average". And in this case, a question arises. What is the average level according to the respondents? Nearly everybody defined the average level rather subjectively based on their knowledge about the level of IT usage in other higher education institutes of the republic. Taking into account the fact that the republic has one of the lowest ranking among other regions of "Digital Russia", it must be mentioned that the parameters of comparison are somewhat underestimated.

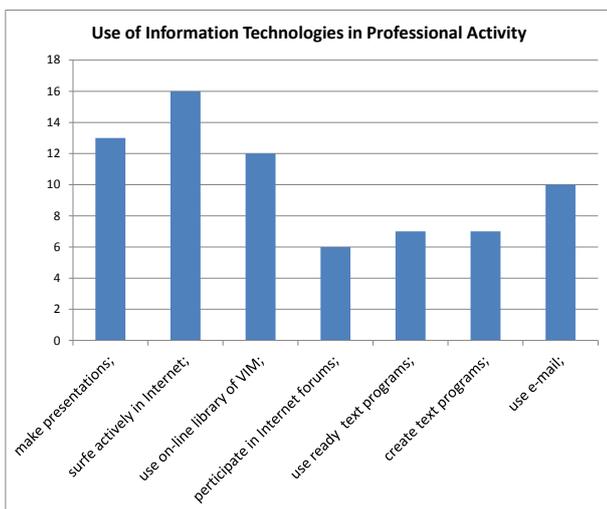


Fig. 3. Use of Information Technologies in professional activity.

The most popular IT application among students is: active information search on the Internet (four-fifths of the respondents); the use of the University's electronic library - more than a half of the respondents; the creation of presentations - two-thirds of the respondents; the use of ready-made text programs - a third of the respondents; the creation of text programs - a third of the respondents; the use of e-mail - half of the respondents; the creation of a website - a third of the respondents (Fig. 3).

A certain marker of students' activity is the fact that four-fifths of students use about three or more types of information resources in the learning process, and thus demonstrate their understanding of the importance of work in the digital environment. On the whole, students note that IT use certainly contributes to the development of creativity, professional skills, and more important forms an active position in the understanding of professionally significant educational information.

V. CONCLUSION

Making conclusion about the above-mentioned IT use in the higher education institutions, the following statements can be noted.

1. Modern technological challenges and digital economy development require training of staff who are able to solve new industrialization issues creatively. The modernization of the educational system with relying on modern technologies – block-chain, artificial intelligence and on-line training – cardinally changes the usual educational environment. The effect of digital technologies humanization in high school appears owing to IT use in creation of equal possibilities for educational service consumers, who are living in remote populations or are handicapped.

2. The necessary IT development condition in high school is including of concrete purposes of educational process informatization into university strategies and university managing itself with the emphasizing of three levels integration of new information technologies. Innovations in the training process and in university managing can provide informatization of a higher education institution, its system character and provide its competitive ability.

3. A significant strategy direction in university development is the deepening and development of scientific research with IT use and instruments of digital economy. The task to replace a part of the lectures with on-line courses allows lecturers to conduct more actively scientific research and to support students in their research activity.

4. The issue of ideal combination of traditional training methods and high school digitalization stays open. Some high education institutes plan to replace lectures with on-line courses, in particular, at Higher School of Economics [18]. In our opinion, a variety of forms with more or less on-line courses is more reasonable. To keep a lecturer as the knowledge provider is not simply the question of traditional teaching style but a philosophical one, which is connected with humanistic content of education digitalization.

5. Very quick growth of technological innovations and obsolescence of knowledge due to the necessity of its high-speed transmission in the IT use context demand teaching of function principles, not the program shell, and working out of skills for self-education.

6. IT use in a high school gives an opportunity to choose individual educational technologies for students and obviously suggests closer cooperation of high school institutions in order to unify online courses' standards, etc. On

the other hand, spread of individual educational tracks will depend on the students' motivation when choosing between them. As practice shows, students are not keen enough on digital education technologies yet, thus their choice of individual education tracks is far from a wide scale.

7. The formation of electronic information and educational environment certainly contributes to digitalization of the high school institutions. As Vladikavkaz Institute of Management experience shows, integration of regional high school institutions into unified digital educational space will facilitate experience adoption of advanced high school institutions in the sphere of IT use and even the level of IT use on the whole.

8. One of the prior trends in digitalization of education is training a modern teacher, capable and ready for constant innovations in the educational process.

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