DIGITALIZATION AND PROBLEMS OF THE EDUCATIONAL PROCESSES BASED ON UNIVERSITY IN THE PANDEMIC CONDITION

Julia Torkunova[1], *Milyausha* Khabrieva[2], *and Oleg* Torkunov[2]

[1]Kazan State Power Engineering University, Institute of digital technologies and economics, 420066, Kazan, Russia
[2]Russian International Academy of Tourism, Kazan Branch, 420061, Kazan, Russia

Abstract. The aim of the study is to analyze the problems that have arisen in connection with the country's universities shift to the remote mode of educational activities during the pandemic. The research objective is: to identify problems of ensuring educational process quality, to study the experience of organizing educational activities during the pandemic. Methods: collection of the studied data, based on a student and university professors survey using questionnaires, on their attitude to the learning process in the remote learning format during the coronavirus pandemic. Systematic analysis and synthesis of the survey results were given; revealed the quantitative and qualitative characteristics of the analysis subject; summarized the experience of educational activities in the revote mode, in the conditions of intensive launch for digital transformation of the educational process. Results: the experience of the educational process digital transformation in the context of the coronavirus pandemic, at a time when only remote educational technologies were used, was generalized. The most severe problems that appeared during the emergency transition of the university to the remote mode of educational activity were indentified. Conclusions: The pandemic has changed the system of higher education, accelerated the process of implementing digital technologies, education became mixed, and the requirements for the teaching staff of the university changed. Digitalization has great potential for educational environment integration. Through digital technologies, the efficiency of the university is increasing in accordance with the goals and objectives.

1 Introduction

Digital technologies are developed everywhere, and penetrate into all industries and spheres of modern society [1, 2]. The Covid-19 pandemic became kind of a challenge, testing the strength of the established education system both in Russia and around the globe [3, 4]. Obviously, it divided both students and teachers from a group of confident users and uncertain users, supporters and opponents of distance education, happy owners of computer technology and high-speed Internet, and people who do not have modern computers and Internet connection. The current situation has shown that the society stratification by income level has a significant impact on the provision of high-quality distance learning, for full-fledged learning, especially when parents work remotely in households, at least two modern units of modern computer technology exist in the household [5].

In our study, we analyzed the processes of adaptation to distance learning at the university of both - the students and the teachers. Furthermore summarized the results of the survey conducted among students and teachers.

Distance learning is a set of technologies that ensure the delivery of the study material to be taught, the interaction of students and teachers in the learning process, the provision of learning opportunities for independent work in mastering the study material, as well as in the learning process [6].

Distance learning technologies began to spread at the beginning of the twenty-first century [7].

The introduction of artificial intelligence technologies in electronic educational systems in the expansion makes it possible to increase the effectiveness of distance learning, at the same time, the range of its capabilities will be expanded [8, 9].

Currently, remote learning systems can provide users with many relevant opportunities and most of them have the following functionality:

- the possibility of centralized management of the learning process with remote access to educational resources and automation of key functions;
- timely publication of relevant educational content;
- availability of a single platform for solving key tasks with the management of training events in educational organizations;
- the possibility of its repeated use of educational content;

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- a wide range of tools for organizing interaction between participants in the educational process.

Despite the extensive functionality of distance learning systems, their use in the implementation of the curriculum does not provide the maximum efficiency that could be achieved [10,11].

2 Methods and materials

To understand the nature of adaptation processes to new conditions and learning technologies, we considered them in additional detail.

In modern conditions, adaptation issues play a significant role, i.e. time to adapt for teachers and students to the changed conditions of the organization and conduct of the educational process. In this regard, adaptation is considered as a purposeful systemic reaction of a single individual, providing the possibility of full-fledged life and adaptation to the changed factors of the external environment. In this case, we discuss adaptation of a significant social group of people - teaching staff and students to the new learning conditions [12].

Information technologies should efficiently provide a complex of both physiological and socio-psychological transformations of all members of this social group in which the changed environmental factors weaken or completely cease their negative impact. Thus, they must eliminate or minimize the negative factors of the transition to remote learning [13,14].

The necessity to isolate led to a surge in a negative background, a breakdown of the usual rhythm of life, the established daily routine, the need to spend time at home. The pandemic has put almost all universities in difficult conditions, forcing them to adapt to the ongoing processes as soon as possible. They faced them with the need to resolve many pressing issues during a limited set of time: in what forms to conduct distance learning, what technical means to use for this; how to assess the material assimilation by students; how to conduct exams and how to recruit for the next academic year [15,16].

Changing conditions led to a new social and psychological perception of the entire learning process. In particular, a new level of control and self-control has become one of the determining factors that have a negative impact on the perception of educational material. It became possible to avoid participation in the learning process by referring to objective external conditions - the lack of high quality Internet, the presence of old computer equipment, the presence of family members nearby, repairs, lack of electricity and many others. In addition, some of the teachers and students turned out to be psychologically unprepared for the lack of personal contacts. The teachers, who were unable to use educational equipment in classrooms and conduct practical exercises with students in laboratories, reacted extremely negatively to the new situation. All of the above has led to the need for a more detailed consideration of the aforementioned processes [17,18].

When conducting the research, we used the methods of questionnaires, correlation and variance analysis.

In December 2020 - January 2021, a survey of students of the Kazan State Power Engineering University (KSPEU) was conducted on issues related to distance learning. 468 Full-time students of 2 (sophomores), 3 (juniors) and 4 (seniors) courses attended it. The sample is representative and makes up about 25% of the general population. Of these, 57.9% are male students and 42.1% are female. About 50% of them are Kazan residents and cities of Tatarstan Republic and more than 22% are residents of other Russian cities. The distribution by specialization is presented in Fig. 1.

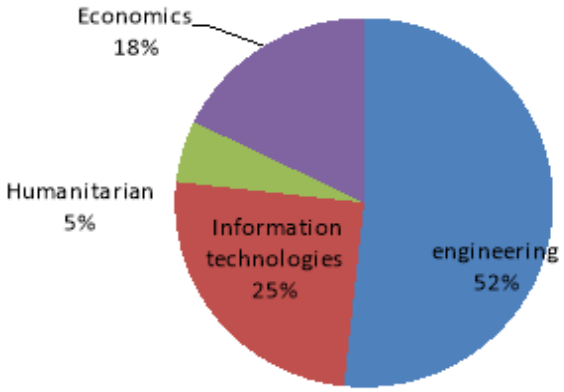

Fig. 1. Student distribution by specialization.

The study involved 2nd-year students - 39%, 3rd-year students - 25.1%, 4th year students - 39%. 58% were males, 41% were females.

3 Results

The results of the survey showed that almost 60% of the respondents in the period March - April 2020 had no previous experience of distance learning. Nevertheless, during this period, almost 85% of students had the technical ability for it. 61% noted a high level of readiness for the transition to new learning conditions (Fig. 2.). In general, students rated their readiness for distance learning significantly higher than teachers did, which is possibly because teachers needed to prepare for classes in new conditions.

It is important that 37% of the respondents immediately adapted to remote learning, after a week - 35%, after a month - 16.3%, and did not adapt - 6.8%.

However, in comparison with the teaching staff, these indicators are higher. Among the teachers, they immediately adapted - 34%, after a week -24%, after a month - 6.6%, and did not adapt - 3.3%

By the start of learning in the fall of 2020, 65% of students had no changes in technical support, and almost 28% had improved. For the most part, for distance learning, students used personal computers (90.2%) and phone devices (78.4%).

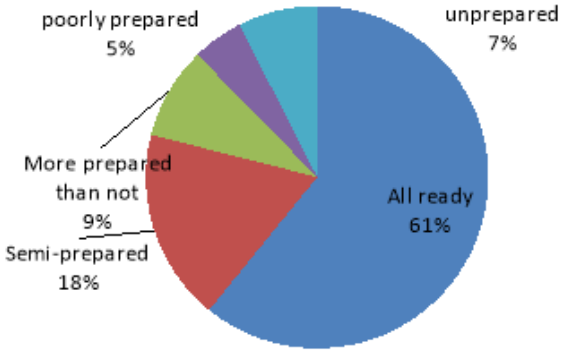

Fig. 2. Student readiness for remote learning.

It should be noted that more than half (51.2%) of students did not have trouble with remote learning. However, a significant part noted a large number of negative points. In particular, such as lack of communication with the teacher (13%), poor quality of connection (13%), poor quality of material presentation (12%).

However, the transition to distance learning had a number of positive aspects. It is worth mentioning that students, in particular, highlighted the following:

- reducing the risk of coronavirus infection;
- significant savings in money for transportation and food;
- saving time instead of traveling to the place of study;
- the opportunity to participate in classes in a comfortable home environment;
- an increase in free time.

Furthermore, in the period December 2020 - January 2021, a survey was conducted of KSPEU teachers equal to 122 people, which amounted to about 50% of the general population.

More than half of them (67.8%) were representatives of technical specialties and information technologies, and 32.2% were teachers of economics, natural sciences, and humanities (Fig. 3). 52.5% were female teachers and 47.5% were male. For the period of the survey, 62.8% of teachers had experience in distance learning.

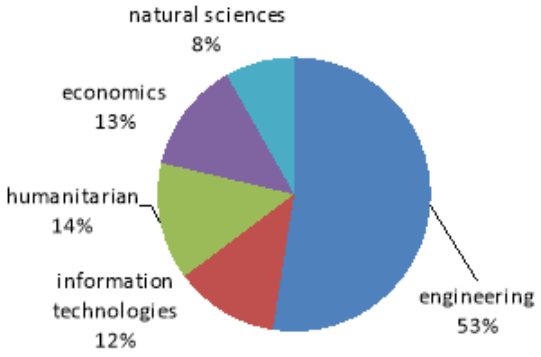

Fig. 3. Teacher distribution by specialization.

In the initial period of distance learning, 57.5% of them had the technical ability to conduct distance learning and about 16% - partially at the workplace. More than 90% of teachers could conduct classes at home.

Among the main difficulties during distance learning, teachers noted such as lack of communication with students (17%), low quality of connection (10%), the uneasiness of students for remote dialogue (17%). At the same time, the teachers, mainly highlighted the following positive aspects of distance learning:

- increasing the possibility of showing additional educational material using technical information tools;
- the use of new technologies for a larger number of students (watching videos, switching to interactive exercises, etc.);
- the ability to use free time more effectively;
- reduction of material and time costs for travel to the place of work.

An interesting fact is that 39% of the interviewed teachers believe that the quality of education did not change with the transition to distance learning, and about half (49%), which worsened. Of the surveyed students (45%) believe that the quality of education has not changed, 32% - that it has worsened, and 21% of students, which even improved, among teachers, only 5% of respondents noted an improvement in quality (Fig. 4, Fig.5). Perhaps this is because the teacher's function includes the assessment of the quality of knowledge, the independence of completing tasks, and 46% of the surveyed teachers noted that distance learning creates problems in assessing the material understanding.

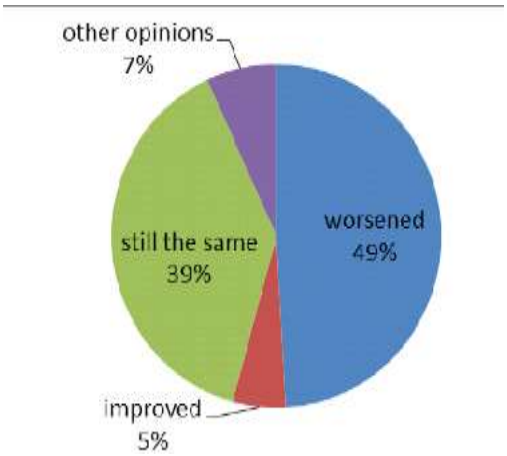

Fig. 4. Teachers' opinion on the quality of distance learning.

53.9% of students and 42% of teachers consider it expedient to continue distance learning outside of a pandemic.

As the recent months' practice has shown, distance learning depends not only on the quality of the Internet or the availability of modern computer technology. Adaptation processes play a significant role in the new learning environment. In addition, here it took some getting used to and adapting all the participants - both teachers and students.

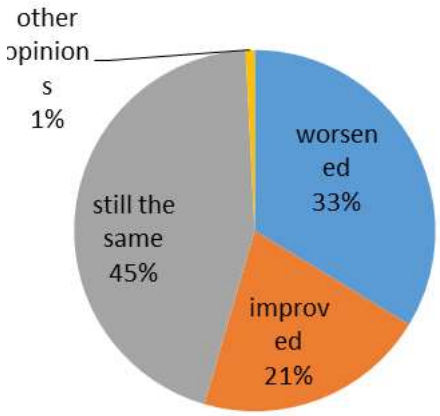

Fig. 5. Students' opinion on the quality of distance learning.

4 Discussion

As a guideline, the process of adaptation of an individual or a group of people to new living conditions includes the following stages.

Introduction stage. At this stage, its informational component plays a significant role to ensure comprehending of new conditions and requirements. In addition, the results of the coincidence of goals and expectations of both students and teachers from the use of distance learning will depend on the degree of awareness.

At the adaptation stage, which lasts from several weeks to a year, information technologies can significantly reduce this period and direct all participants in the learning process to new requirements for them.

At the final stage, assimilation is, an important role that will be played by the use of new technologies to develop sustainable interaction between students and teachers in order to obtain a positive result of assimilation of educational material.

In our study, we were interested in the following topic: what influences the adaptation success of teachers to new working conditions?

The age composition of the participants varied from 21 to 81 years, the median age value was 43.5 years old. The correlation analysis did not reveal any significant relationship between age and the duration and complexity of adaptation, so the correlation coefficient between age and the duration of the adaptation process to new conditions was 0.08, and between age and the difficulty of adaptation was -0.09.

We also carried out a one-way analysis of variance to identify the significance of the influence of the factor of specialization of teachers on the duration and complexity of adaptation (Tables 1,2).

With the critical value F = 2.44, the F-statistic is 10.47, which means that the specialization factor significantly affects the adaptation period.

The following analysis shows the influence of this factor on the adaptation complexity (Tables 3.4).

Table 1. Dependence on the adaptation period of the teacher specialization.

specialization	Adaptation period						
	immediately	1 week	2 weeks	3 weeks	4 weeks	Over a month	Did not manage to adapt
Humanitarian, %	26	11	21	16	11	5	11
natural sciences, %	30	30	0	10	10	10	10
Engineerin, %	25	35	25	7	2	4	4
Economics, %	44	13	19	13	13	0	0
Information technologies,%	47	20	20	13	0	0	0

Table 2. Variance analysis results.

Variance source	SS	df	MS	F	P-value	F critical
In-between groups	0.19	5	0.04	2.69	0.05	2.62
Inside groups	0.34	24	0.01			
Total	0.52	29				

Table 3. Dependence of the adaptation period on the specialization of teachers (Complexity).

specialization	Adaptation complexity (%)					
	Was done at ease	With no outstanding issues	Not difficult at large	Had some complications while adapting	Managed to adapt, but it came at a cost	Could not adapt completely, extremely difficult
Humanitarian,%	29	24	12	29	0	6
natural sciences,%	10	10	0	50	20	10
Engineering, %	21	22	19	21	13	5
Economics, %	33	27	20	13	7	0
Information technologies, %	36	21	43	0	0	0

The value of the F-statistic is 2.68, which means that the factor of specialization really affects the complexity of adaptation, although not as significantly as for the period of adaptation.

Table 4. Results of variance analysis.

Variance source	*SS*	*df*	*MS*	*F*	*P-value*	*F critical*
In-between groups	0.19	5	0.04	2.7	0.05	2.6
Inside groups	0.34	24	0.014			
Total	0.52	29				

5 Conclusions

Considering the aforementioned, we believe it is necessary to carry out the following measures to improve adaptation conditions:

- organization of training for faculty members on teaching the specifics of online teaching, functioning, and interaction of platforms and services (including Google Classroom, Microsoft 365 Group, WizLq Moodle, iSpring);
- organization of special platforms for the exchange of experience between teachers in the field of online teaching;
- providing methodological assistance in adapting programs to forms of online education;
- conducting technical, methodological, and psychological support for teachers and students;
- creating a system of motives and rewards for teachers who are actively involved in the design and use of digital resources and platforms.

In the future, we plan to continue the research on how gender can influence the processes of distance learning. As well as the study of student adaptation process to new technologies and the possibilities of improving the quality of distance learning.

References

1. J.V. Torkunova, M.N. Habrieva, L.V. Plotnikova, E3S Web of Conferences, **124**, 05049 (2019)
2. J.V. Torkunova, O.I. Bogomolova, I.R. Mukhamatzakieva, A.R. Fazilianova, Vestnik KSPEU, **36**, 22-28 (2017)
3. S.M. Kucenco, S.F. Malacion, Scientific notes ISGN, **1**, 89-98 (2020)
4. A. Segura, J.A. Agromayor, A. Conde, 14 INTED, 5614-5621 (2020)
5. V.S. Shcherbakov, S.I. Ashmarina, M.O. Suraeva, R.A. Kurbanov, A.M. Belyalova, R.A. Gurbanov, J.V. Torkunova, EJACIPS, 12 (2017)
6. S.V. Yushko, E.R. Khairullina, S.E. Matveeva, Y.O. Zubkova, V.I. Bogdanova, S.S. Vinogradova, L.L. Nikitina, J.V. Torkunova, MMGLTM, **8**, 326-336 (2018)
7. S.M. Kucenco, N.G. Bikeeeva, MRSP, **9**, 128-131 (2018)
8. J.V. Torkunova, D.M. Korosteleva, I.P. Alekseev, O.I. Bogomolova, N.K. Petrova, NSRBCPED, **131**, 616-621 (2019)
9. J.V. Torkunova, D.M. Korosteleva, A.E. Krivonogova, MPE, **5**, 107-110 (2020)
10. A.V. Lubkov1, O.V. Gordienko, A.A. Sokolova, Education and self-development, **15 (3)**, 89-96 (2020)
11. O.M. Chorosova, R.R. Aetdinova, G.S. Solomonova, G.Yu. Protodyakonova, Education and self-development, **15 (3)**, 189-200 (2020)
12. A. Gazizova, M. Siraeva, S. Skopkareva, 14 INTED, 1922-1929 (2020)
13. M. Usak, A.R. Masalimova, E.I. Cherdymova, A.R. Shaidullina, JBSE, **19 (2)**, 180-185 (2020)
14. A.R. Masalimova, M.O. Timofeev, S.A. Polevoy, R.I. Platonova, N.A. Zaitseva, A.R. Shaidullina, TDE, **12**, 119-126 (2020)
15. E.I. Cherdymova, A.R. Masalimova, E.R. Khairullina, D.G. Vasbieva, N.P. Ismailova, R.A. Kurbanov, A.A. Tyazhelnikov, EJMSTE, **16 (11)**, 1892 (2020)
16. G.M. Kvon, V.B. Vaks, A.R. Masalimova, N.I. Kryukova, Y.S. Rod, R.V. Shagieva, M.B. Khudzhatov, EJMSTE, **14 (3)**, 891-902 (2018)
17. N.A. Ivanenko, L.G. Akhmetov, S.Y. Lavrentiev, E.P. Kartashova, L.V. Lezhnina K.A. Tzaregorodtzeva, E.R. Khairullina, RES, **7 (3)**, 37-42 (2015)
18. A.S. Drovnikov, A.R. Vazieva, N.G. Khakimova., S.M. Konyushenko, A.S. Valeyev, E.V.Maksimova, A.M. Ishmuradova, E.R. Khairullina, **6 (2)**, 40-45 (2016)