COVID 19 Accelerator of Changes in the Readiness of University Teachers to Use Distant Learning Technologies[*]

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Abstract. The article describes the experience of the Belgorod State University (BelSU) in organizing the educational process during the forced transition to full distant learning due to COVID-19. The authors present the results of the study of changes in the readiness of the university faculty to use distant learning technologies. Many years of experience in the use of digital educational technologies, the availability of a well-developed distant learning system, and a high degree of provision of the educational process with electronic educational resources allowed BelSU to restructure the educational process in a short time. The results of the study show that the forced transition to distant learning had a beneficial effect on the readiness of teachers to use distant learning technologies, changed their attitude to new approaches in the organization of the educational process.

Keywords: Distant Learning Technologies, Distant Learning, Digital Educational Technologies, Distant Learning System, Moodle, Online Course, Video Conferencing Systems, Information and Educational Environment of the University, COVID-19.

1   Introduction

In March 2020, the Belgorod State National Research University (BelSU), was forced to switch to distant learning. Thanks to the accumulated experience of using distant learning technologies (DLT), the educational process at the university was rebuilt in the shortest possible time.

Distant learning technologies have been used at BelSU since 2004. During this time, the university has developed the Pegasus e-learning system based on LMS Moodle and created more than 4,500 internal online courses that meet the approved requirements. Since 2010, the Pegasus system has been used in the implementation of educational programs in all forms and at levels of education. 82.2% of the courses taught at the time of 16.03.2020 were provided with online courses of the "Pegasus" system. Until

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23.03.2020, temporary training courses were created in the "Pegasus" e-learning system for disciplines that were not provided with online courses, where teachers could create elements for the implementation of the educational process, interaction with students, including in the webinar mode and post electronic educational resources.

Since the 2016-2017 academic year during the implementation of educational programs in 13 areas of training in the educational process, the university began to use the model of organizing the educational process – "combined training" – which gives the student the choice to come to classes full-time or participate remotely in the video conferencing mode [1, 2, 3].

Since 2018, mass open online courses (MOOCs) have been used in the educational process at the Belgorod State University. An open education portal was created to host the MOOCs developed by the University. Currently, the portal of OpenBelSU is included in the resource "Modern digital educational environment of the Russian Federation" [4].

Thus, in the situation of transition to distance learning, the university only needed to scale already developed models of the implementation of the educational process. Of course, in the new conditions, as in other universities, there were difficulties in specific areas (the lack of readiness of the technical infrastructure for increased loads, the lack of training of some teachers, the low motivation of some students to study online, etc.) [5-12], but in general, BelSU was able to cope with the difficulties and rebuild the educational process.

2   Purpose and objectives of the research

The purpose of this study was to determine the changes in the degree of readiness of teaching staff for the use of digital educational technologies in the educational process. The authors of the study set out to find out the opinion of respondents about their attitude to work in the digital educational environment of the Belgorod State University, in which they closely interacted with students during distance learning, how the time labor costs of teachers changed in the mode of remote interaction, which features of the distant learning format most caused them difficulties in the process of interaction with students, which services during classes in the video conferencing mode caused them preference.

3   Literature review

The analysis of the literature sources showed that educational institutions faced some problems when switching to distant learning. The main technical problem is the unpreparedness of the network and server infrastructure of the information and educational environment [13,14]. A sharp surge in the number of users of information and educational systems available in universities (LMS, video conferencing systems) has led to failures in their work. The response to the problem was the modernization of the material infrastructure, the rental of additional capacity, the use of new services, etc.

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The problems of organizational and methodological nature include the lack of preparation of the teaching staff for the use of remote educational technologies, the difficulty in reformatting the traditional training course in a remote format, the increase in the implementation time of the educational process [15-18]. Not all teachers were ready to organize the educational process in a remote format. In the shortest possible time, universities had to determine the optimal distant learning technologies in the current conditions and prepare the teaching staff for the implementation of the educational process in a remote format [19-21].

The transfer of the educational process of universities to a remote format during the pandemic accelerated the processes of mastering remote educational technologies by teachers. Even those teachers who had not previously planned to use distant learning technologies in the educational process were forced to master new ways of organizing the educational process in a short time. This circumstance caused some of the teaching staff of universities to fear the decline in the quality of education. What the literature sources say [8,18,22,23] and are confirmed by the studies, the results of which are given in this article.

It is worth noting the growing interest of the teaching community in the use of digital educational technologies in the educational process, even though the use of distance learning technologies for some teachers was forced [21,24,25]. The analysis of search queries in the Scopus and Elibrary citation databases.RU showed that the number of studies related to distant learning technologies increased significantly in 2020 compared to 2019, and this trend continues in 2021 (see Fig. 1).

The presented data show a significant increase in publications in 2020 related to the queries: "online training", "distant learning", "Zoom". The number of publications in the Elibrary database, where mainly Russian-language publications are presented, has increased especially sharply for the following queries: "distant learning" (3.7 times), "Zoom"(3.4 times), and training in "WhatsApp" (5.1 times). There is an increase in the number of publications in 2020 compared to 2019, which are issued in the search list for queries related to the organization of distant learning, which indicates an increased interest of researchers in this issue.

4   Methodology

The determination of changes in the degree of readiness of teaching staff for the use of digital educational technologies in the educational process was based on the experience of using DLT by teachers of the Belgorod State University. The study was carried out based on observation and analysis of survey data. Observations and interviews with the faculty of the Belgorod State University showed that the transition to distant learning in conditions of an increased risk of the spread of coronavirus infection COVID-19 has become a kind of catalyst for a change in the attitude of teachers to the use of distance learning technologies and improving the level of digital skills (Fig. 1).
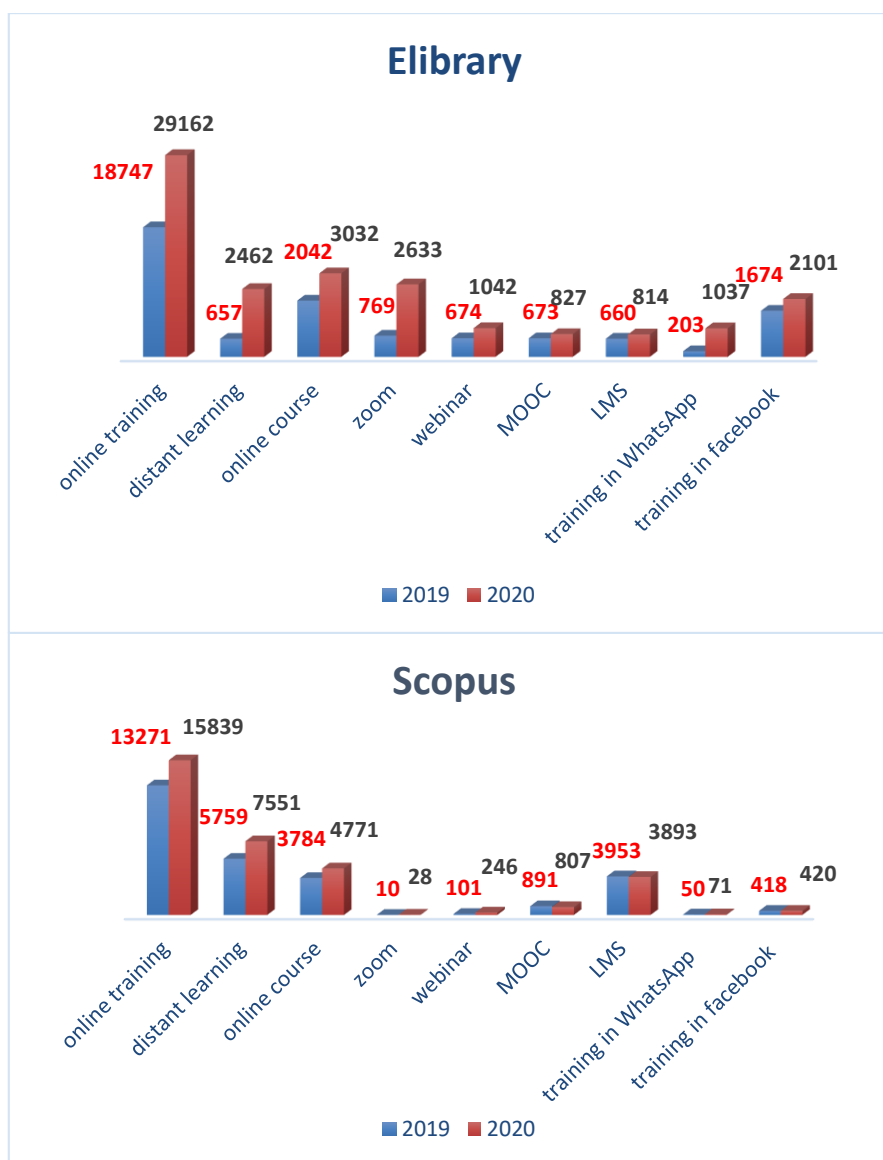
Fig. 1. Dynamics of publications on the subject of distant learning

5 Discussion

Since 2004, the Belgorod State University has been training teachers to use DLT and digital educational technologies both in the course of advanced training programs and in the course of regular training seminars. For 16 years, internal online courses in the

Pegasus e-learning system, instructions, and methodological materials have been developed for the training of teachers. Almost all teachers before the pandemic used the Pegasus system to some extent, had experience in developing materials for internal online courses, and some used MOOCs and video conferencing systems to organize the educational process. Therefore, in preparation for the transition to distance learning, only a few departments and faculties requested a training seminar. New instructional materials, including video instructions, were also updated and developed.

During the period of distance learning, the scheme of organizations of the educational process was used, as shown in Figure 2. The educational process was centralized. Classes were held in online courses of the Pegasus e-learning system in asynchronous and synchronous mode using the BigBlueButton and Zoom services integrated into the courses of the distance learning system. Some of the disciplines were implemented in the MOOC environment. Support for teachers during the period of universal distance learning was mostly targeted (consultations by e-mail and by phone). The digital educational environment of the university made it possible to organize a convenient and effective interaction of all participants in the educational process.

To automatize the processes of organization of educational activities, remote access of teachers, students, and administrative staff to electronic educational and information resources in the digital educational environment of the university, the previously created information system for managing the educational process – "Electronic Dean's Office" - was used. This system provides end-to-end support for training from the creation of electronic curricula, to the formation of a digital double of the document on education (electronic statements, credits, electronic schedule, digital services for students and teachers, a system for supporting the preparation of final qualification exams, etc.). During the full transition to distance learning, new services were developed (electronic statements, application for remote training, online selection of electives for physical education, etc.).

For the organization of the state final certification and the implementation of the educational process in the mode of combined training during the transition period, when some students could not attend real classes for one reason or another, specialized multimedia classrooms were used. This approach allowed teachers in heterogeneous study groups to conduct simultaneous classes for full-time and remote students.

The university administration, heads of educational departments, heads of departments have access to analytical information on educational tedium and the organization of the distant learning process.

The high degree of readiness of the information and educational environment of the university for the organization of distance learning during the period of complete isolation allowed us to rebuild the educational process on remote interaction without any problems.

Universities with developed information and educational environment and a high degree of readiness of teachers to use digital educational technologies, taking into account the experience of Belgorod State University, can be offered as a scheme for the organization of the educational process that contributes to the enhancement of the quality of training when using distance educational technologies (see Fig. 2).
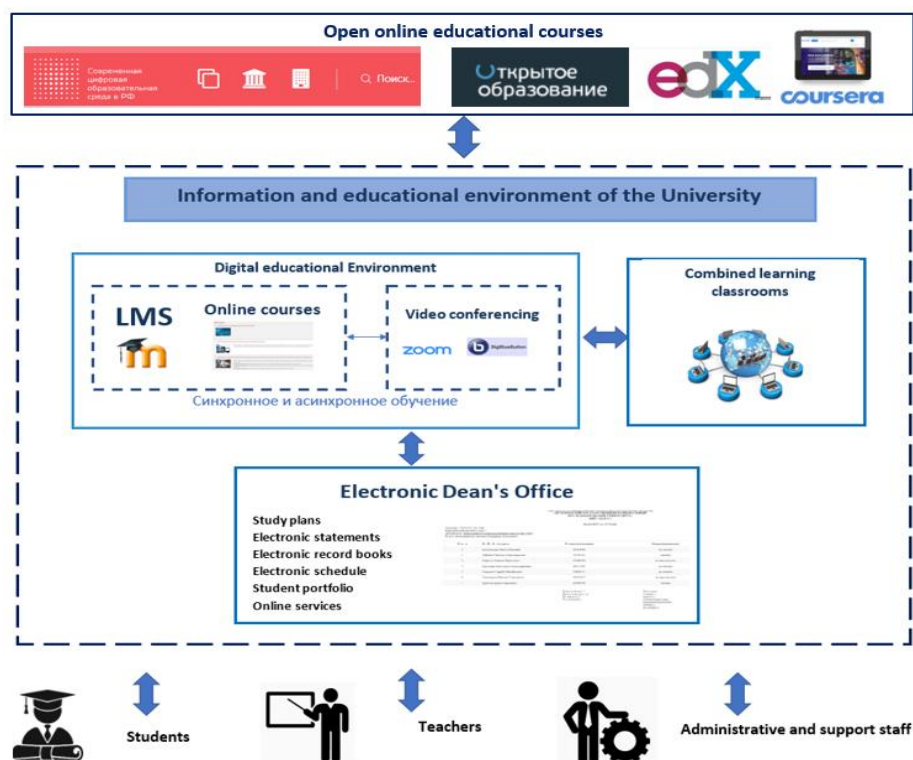
Fig. 2. Organization of the educational process using distance learning technologies.

6   Results

The study to determine changes in the degree of readiness of teachers to use digital educational technologies in the educational process was conducted in the period from April 2020 to April 2021. 497 teachers of the Belgorod State University participated in the survey.

At the beginning (March-April 2020), the transition to distant learning in conditions of an increased risk of the spread of COVID-19 coronavirus infection caused concern and excitement among most teachers about the implementation of the educational process in a remote format. According to the survey, 14.1% of respondents were concerned about the problem of personal unavailability of the teaching staff to use DLT; 24% of respondents were concerned about the insufficient level of readiness to use personal technical means in the conditions of online and offline interaction; 23% were concerned about the inability to reformat the traditional format of the academic discipline into a distant learning format; 29.7% were concerned about the low level of readiness of students to work in the distant learning mode; 53.1% of respondents were very concerned about the decline in the quality of the educational process. 45.9% calmly accepted the

forced transition to distance learning, which was justified by the long experience of the Belgorod State University using distant learning technologies (since 2004).

At the beginning of the study (March-April 2020), 16.2% of respondents did not use the online educational environment "Pegasus" ("Pegasus") at all, preferring face-to-face communication with students. 55.3% used "Pegasus" for testing students; 25.6% of respondents actively used the resources of "Pegasus" in the educational process in all forms of the educational process, 20.9% – only for interaction with students studying by correspondence, 0.2% used a similar e-learning system. According to the criteria of user satisfaction with the Pegasus e-learning system, the teachers ' assessment was generally satisfactory on a five-point scale. The average score for all criteria was 3.6. Ergonomics, ease of use, and reliability of operation received a low rating among the respondents (the average score was 3.5). There were also problems with the quality of the design, the presence of a clear interface, and the maintainability of the system – an average score of 3.6. Users rated the system's versatility the highest (an average score of 3.8). The low value of the average score for all criteria indicates that this system has problems in functioning. This is a signal for the need to carry out work on its improvement (see Fig. 3).

In their responses, teachers noted the difficulties they experienced during the period of remote interaction with students since April 2020: the lack of traditional face-to-face communication with students (50.3%); technical problems and interruptions to the Internet (48.3%); difficulties in organizing independent work with students (13.7%). Many respondents had to urgently develop electronic materials for "Pegasus" training courses (11.5%). It was noted that it is difficult to support students ' attention when conducting online lectures (14.3% of the surveyed teachers); insufficient methodological support for organizing and conducting distant learning (5.8%); insufficient knowledge of digital technologies (5%), low level of digital literacy for conducting classes in online and offline formats (2.4%); lack of necessary technical devices (webcam, microphone) on the home device (4.8% of the respondents). However, 32.2% of respondents said that the distance learning format did not cause difficulties.

During the period of remote interaction, the temporary labor costs of teachers have changed. Figure 3 shows that for 42.5% of teachers, they increased many times, increased slightly-42.3%, did not change - 10.7%, decreased - 4.6% of respondents.
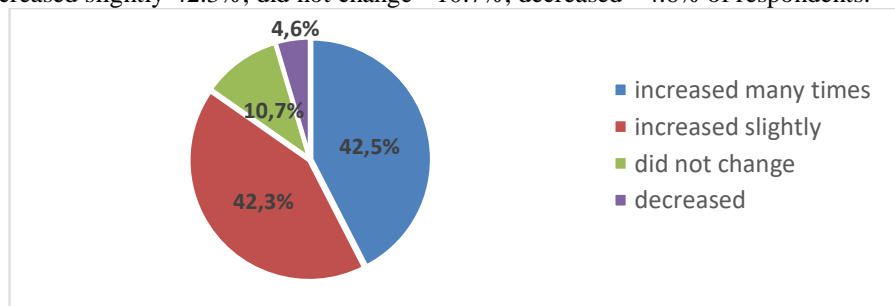

Fig. 3. Changing the time spent by teachers in the distant learning mode.

The main feature of the increase in the time spent by teachers was their direct work in the "Pegasus" during classes, as for 92.8% of respondents, the e-learning system "Pegasus" became the main educational environment for interaction with students. On the e-learning portal, they conducted online lectures in the video conference mode, checked students ' assignments posted in online courses, provided feedback to students, communicated both in the forum and in personal correspondence through the exchange of messages. In it, they could "pump" their digital skills. As a result of such activities, 37.6% wanted to modernize their online courses in the Pegasus system, add more educational information, interactive elements, and tools for interacting with students. 28.2% began to actively use various interactive elements of the "Pegasus" in the educational process for the collective and individual work of students. 59% conducted online classes in the "Pegasus" training course using video conferencing (BigBlueButton or ZOOM). 38% actively used and continue to use the point-rating system in the e-learning system "Pegasus". Only 5.4 % have not changed their attitude to working in the digital educational environment, but they understand that "Pegasus" provides an opportunity to effectively use the online format for training. To do this, first, it is necessary to carefully develop online courses in all disciplines; second, to increase confidence in the independent work of students; and third, to improve the level of qualification in the field of IT technologies

At the final stage of the study (April 2021), the authors conducted a second survey to determine the readiness of the teaching staff to use distant learning technologies (see Fig. 4). The survey showed that 44.9% of teachers have a positive attitude to distance learning, 37.0% have not changed their attitude, and 18.1% of respondents have a negative attitude to distant learning (see Fig. 4). Among the factors that positively influenced the dynamics of changes in the attitude of teachers to distant learning were the following: understanding the process of remote interaction with students (39.0%); acquisition of skills in using distant educational technologies (45.7%); stable operation of the Pegasus e-learning system (33.8%); the possibility of receiving feedback from students regardless of their activity (32.7%); the ability of teachers to work at home (54%). Teachers also positively noted the possibility of working in the classroom even in the case of a mild form of the disease, both students and teachers, since the format of remote educational technologies allow you to realize the effect of virtual presence.
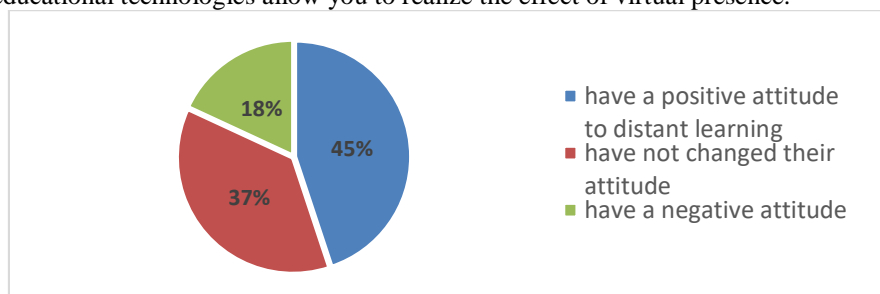

Fig. 4. Teachers ' attitude to distant learning (April 2021).

The distant learning regime has also made certain changes in the attitude of teachers to "Pegasus" (see Fig. 5). According to the survey, the assessment of the degree of satisfaction with the teachers and users of the e-learning system "Pegasus" in the final stage of the study was higher for all criteria (average score has increased from 3.6 to 3.9). The average score on the Pegasus system's "versatility" criterion (from 3.8 to 4.2) and the "practical utility" criterion (from 3.7 to 4.0) increased significantly. Users evaluated the system's capabilities for conducting online classes, for working with students in offline mode; they evaluated the system's controls and interactive capabilities when interacting with students (see Fig. 5). The average score on the system's "reliability" criterion remained virtually unchanged (from 3.5 to 3.6). However, there were negative opinions of the participants of the educational process about the failures in the work of the information and educational systems of the university due to a sharp increase in the load on the means of online communication and the number of online users. For teachers, the problem was also in the performance of their functions of monitoring independent work and the performance of certification tests by students in offline and online mode.
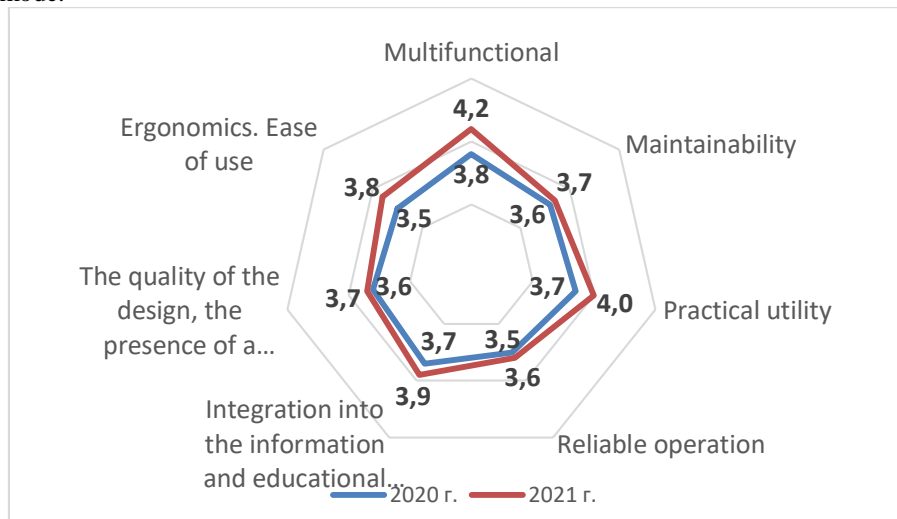

Fig. 5. The degree of user satisfaction with the Pegasus e-learning system at the initial and final stages of the study (average score).

A study of the readiness to use video conferencing systems during synchronous online classes showed that only 1.2 % of respondents are not ready to use video conferencing systems for organizing the educational process (see Fig. 6): 57.7% of respondents preferred using ZOOM, 18.5% – BigBlueButton, 21.1% of respondents are ready to work with any service, 1.5% use other video conferencing systems (MS Teams, Diskord).
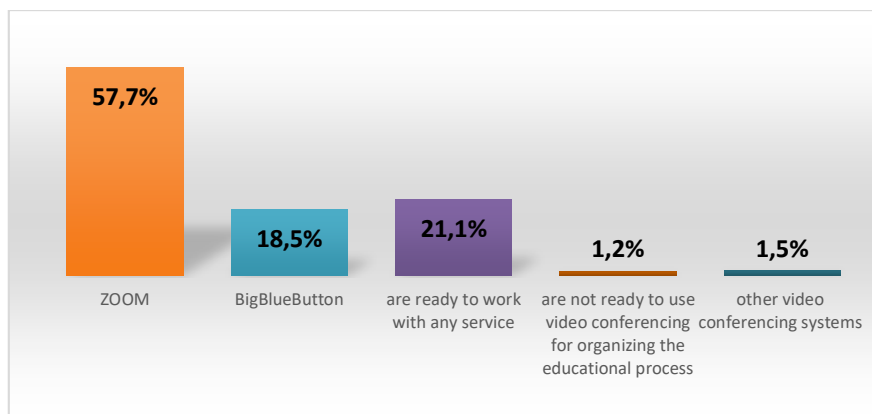
Fig. 6. Teachers ' preferences in using video conferencing systems when conducting online classes.

While before the pandemic, only a small part of teachers used online learning technologies in the educational process and most often in the correspondence form of training, then after the experience of organizing the distance learning process, a significant part of teachers considers it appropriate to use online learning technologies. Only 13.5 % believe that online learning cannot be used in any form of training. A significant number of respondents consider it appropriate to use online learning technologies to organize the distance learning process (47.5% of full-time and part-time students-43.1%). 37.6 % of teachers allow the use of a mixed format of full-time education (see Fig. 7). Most of the faculty of the Belgorod State University (89.0 %) believe that they are ready to implement the educational process in a mixed learning format (see Fig. 8).
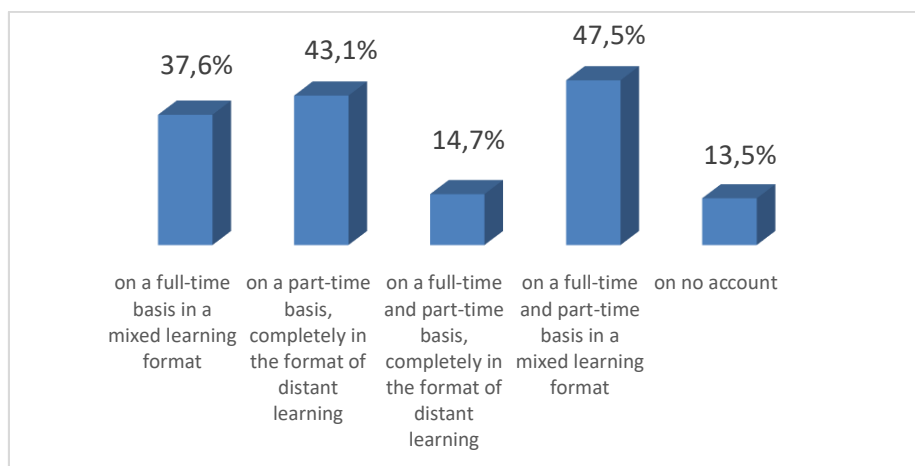

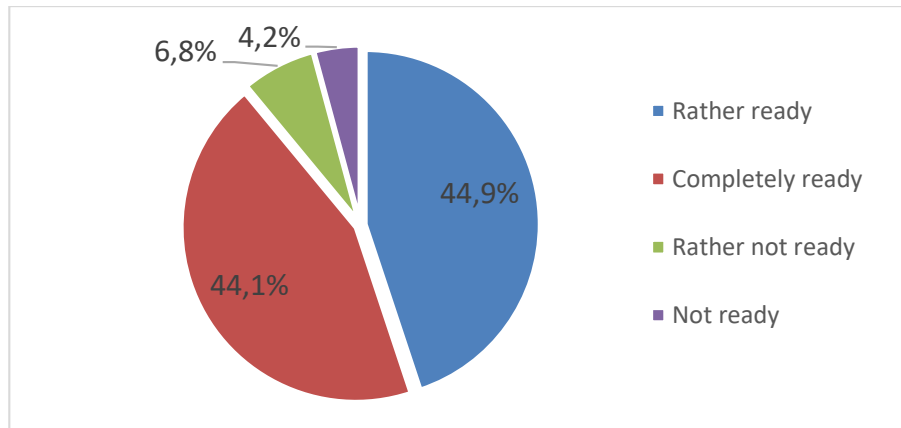Fig. 7. The feasibility of using online learning.

Fig. 8. Teachers ' readiness to use blended learning.

7   Conclusion

The COVID-19 pandemic has been a catalyst for changing the readiness of teachers to use distant learning technologies and improve their digital skills. The study showed that:

1. Increasing the interest and formation of a positive attitude of teachers to the use of digital educational technologies in the educational process. More than 75% wanted to modernize their online courses and began to actively use various interactive elements of the distance learning system in the educational process. 59% began to conduct online classes using video conferencing.

2. The positive dynamics of the faculty's readiness to use distant learning technologies. More than 85 % of the teachers of the Belgorod State University are ready to effectively use digital educational technologies to organize the educational process in all forms of education.

The results of the study showed a high degree of readiness of teachers to continue using distant learning technologies. The results obtained can be useful to the world educational community in the implementation of educational programs both in the distance and in the traditional format using online technologies.

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