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Challenges and Opportunities for Russian Higher Education amid COVID-19: Teachers' Perspective

Nadezhda Almazova, Elena Krylova, Anna Rubtsova  and Maria Odínokaya * 

Higher School of Linguodidactics and Translation, Peter the Great St. Petersburg Polytechnic University, Saint-Petersburg 195251, Russia; almazova_ni@spbstu.ru (N.A.); krylova_ea@spbstu.ru (E.K.); rubtsova_av@spbstu.ru (A.R.)

* Correspondence: odínokaya_ma@spbstu.ru

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Abstract: The COVID-19 pandemic has tremendously affected higher education systems in Russia and all over the world, forcing to transform curriculum into an online format, which is a challenge for all the educational process participants. The current study discusses the implementation of online learning amid the COVID-19 pandemic in the Russian higher education context and investigates the challenges experienced by university teachers during this period to define their readiness for online education. To address the above-mentioned issues, a study was conducted in Peter the Great St. Petersburg Polytechnic University. A variety of methods of scientific and pedagogical research were used including systematic structural analysis, synthesis, work with research papers, the generalization of experience and experimental work, observation, surveys, etc., with 87 university teachers asked to respond to several sets of questions describing their online teaching experience after the launch of online education amid the COVID-19 pandemic. The analysis of the participants' answers helped to identify the following main challenges experienced by university teachers: computer literacy level, the university electronic environment and support, academic staff readiness and students' readiness for online learning, the last two being the most important hindering the implementation of the efficient online education process. It was also underlined by most respondents that methodological work of a teacher in a digital educational environment differs from conventional teaching methods. Thus, psychological, technological, methodological support and teachers' professional development programs are of vital importance to minimize the negative impact of the rapid changes of the educational process and to ensure efficient online education.

Keywords: COVID-19 pandemic; electronic educational environment; online education; online teaching challenges

1. Introduction

The COVID-19 pandemic has affected the higher education system in Russia, which has led to a massive shift to online education, influencing students, teachers and educational establishments greatly. Higher educational institutions did their best to transform curriculum into an online format, trying to minimize the negative impact of the rapid changes on the educational process and to ensure nonstop teaching and learning. The transformation of all the existing courses online simultaneously within days literally is a test of organizational agility [1] and a challenge for all the educational process participants.

E-learning is not a new concept for Russian higher education. The Decree of the President of the Russian Federation dated 7 May 2018 No. 204 "On National Goals and Strategic Tasks of the Development of the Russian Federation for the Period until 2024" set the task of creating a modern digital educational environment by 2024, ensuring high quality and accessibility of all forms and levels of education. The priority goals of creating a digital educational environment are described in the federal

educational standards of higher education, at all levels of higher and postgraduate education, as the main priorities of the modernization of the institution of Russian national education. Several leading universities took part in the development of academic educational projects, national open education platforms relying on mass open online courses (MOOCs), learning management systems (LMS), etc.

Many scholars noted the positive impact of the electronic educational environment on improving the quality of the educational process. Thus, it enhances the efficacy of knowledge, fosters critical thinking and an aptitude for life-long learning, develops self-education and information processing skills, making the process of learning more active, interesting and enjoyable [2–6] and enabling a higher degree of interactivity and collaboration among teachers and students [6–9].

However, it should be underlined that the above-mentioned studies were conducted in normal circumstances describing the implementation of online courses with lesson plans, teaching materials and technology support teams designed in advance.

Moreover, despite the constant development of technologies and the emergence of new educational web services, as well as many years of state policy on the formation of a digital educational environment, its potential has not been used at its full capacity by Russian universities. Only a third of university students study using e-learning technologies.

The outbreak of COVID-19 forced universities to transform curriculum into an online format that resulted in many challenges with the most important question remaining unanswered—is higher education prepared for the forthcoming digital era of learning [10]?

The implementation of online learning is closely connected with teacher's readiness to work in a digital educational environment [8,11,12]. According to Mtebe and Raphael [13], instructor quality has been found to have a significant effect on learners' satisfaction with an e-learning system.

Despite the widespread use of information communication technologies (ICTs) in the educational space, teachers' lack of skill to work in the new digital educational environment is an acute problem [14–17]. Some scholars underline a lack of “pedagogical digital competence” that is defined by J. From [18] as “the ability to facilitate students' learning in the best possible way by regularly applying the knowledge and skills in preparing and implementing ICT supported teaching based on theory, best-validated experiences”. Thus, a teacher in the current situation should be able to organize his own teaching activities by making effective use of modern technologies, i.e., understanding pedagogical issues of organizing an online lesson, discussions during a webinar, etc. That is why it is of vital importance to study teachers' readiness to work in a digital educational environment.

The current study will focus on the problems mentioned above, discuss the implementation of online teaching and learning amid the COVID-19 pandemic in the Russian higher education context, and investigate the challenges experienced by university teachers during this period to define their readiness for online teaching and learning.

2. Study Background

It should be mentioned that Peter the Great St. Petersburg Polytechnic University has gained extensive experience in organizing educational activities in an electronic format. The digital educational environment of the university includes electronic information resources, electronic educational resources, a combination of information technologies and telecommunication technologies, ensuring the successful mastering of educational programs by students online. The university took part in the creation of the national portal “Open Education”—a modern educational platform that offers online courses in basic disciplines studied at Russian universities. At the beginning of 2016, the university received the status of partner of Coursera, the largest international project in the field of education. It also offers a number of MOOCs. There are a number of training programs offered for teachers, such as “Tools and services for digital content development and e-learning organization”, “The design of educational materials for an online course”, etc.

The outbreak of COVID-19 forced Peter the Great St. Petersburg Polytechnic University to transform all the existing courses for bachelor and master degree students online. Online learning

and teaching are implemented on several platforms, including LMS Moodle. Several MOOCs are also offered. For all disciplines (modules) of the current term, online courses have been created. To ensure interaction between students and teachers, MS Teams platform is used, where webinar rooms for each discipline were created with automatic generation of webinar sessions.

To facilitate the transition to online teaching, step-by-step instructions (teaching materials, including videos) were developed to help the teachers. Additionally, training webinars are held on a regular basis, and a helpline and IT support teams were organized.

The effectiveness of the educational process in a given format is enhanced by productive use of teaching materials (electronic textbooks, study guides, tests, methodological recommendations, etc.) of the university's electronic document base, which is open to students, teachers and university staff. The academic staff work is aimed at adapting the basic approaches of education and teaching methods to the existing realities of online learning and interaction with students during the COVID-19 pandemic.

3. Materials and Methods

The objective of our study is to empirically identify and study the challenges experienced by teachers in Peter the Great St. Petersburg Polytechnic University after the launch of online programs amid the COVID-19 pandemic in order to define teachers' readiness to implement e-learning efficiently. Methods of scientific and pedagogical research are widely used in this paper: systematic structural analysis, synthesis, work with papers, generalization of experience and experimental work, observation, surveys, etc. The authors of this article, as actors included in new forms of organization of the educational process, have received and are gaining experience, which can be defined as *participant observation* of the development and consequences of the radical introduction of online education.

In this study, 87 university teachers took part. The present study targeted respondents who belonged to different generations: 20 young scientists aged under 35, 52 teachers aged 36–55 years old and 15 teachers 55+. The study started in March 2020 when the lockdown in Russia began and finished in May 2020, including several stages of experimental research.

The first step of the research dealt with studying the respondents' background and working out several sets of questions to assess university teachers' readiness to teach online efficiently. The choice of the questions was based on literature review describing online teaching challenges and barriers during the COVID-19 pandemic and personal teaching experience of the authors [19–24].

The next step of the study included a number of online individual interviews with the participants of the study to define their perceptions of online teaching advantages and disadvantages. Microsoft Teams was used to conduct the interviews.

The third stage dealt with the results' analysis. The obtained results were summarized using descriptive statistics, as appropriate.

4. Results

This section describes the results of the study conducted in Peter the Great St. Petersburg Polytechnic University to define teachers' perceptions of online teaching and learning during COVID-19, the challenges they faced and the Russian higher education readiness level to implement online teaching.

In this study, 87 university teachers aged 25 to 65 with teaching experience from 3 to 35 years took part; 75% of respondents have a degree ("candidate/doctor of sciences"); most conduct classes for both bachelor and master students majoring in Engineering and Humanitarian Sciences. The details of the background of the participants are presented in Table 1.

Table 1. Summary of participants' characteristics.

		Number of Participants	Percentage
Age	25–35	20	23%
	36–45	30	35%
	46–55	22	25%
	56–65	15	17%
Education	Postgraduate degree	15	17%
	Candidate of sciences	50	58%
	Doctor of sciences	22	25%
Teaching Experience	3–10	15	17%
	11–20	25	29%
	21–30	32	37%
	31–40	15	17%
Gender	Male	37	42%
	Female	50	58%

The teachers' readiness for online teaching and learning is largely determined by computer literacy skills and the ability to use ICTs in the educational process efficiently. The questionnaire included a self-assessment task, according to which the teachers were able to assess the level of their computer literacy on a 5-point scale which ranged from 1 (poor) to 5 (excellent) (Table 2).

Table 2. The assessment of teachers' computer literacy level.

	Skills	N	Mean	St. Dev.
1	Ability to use search engines	87	4.30	0.70
2	Ability to install software	87	4.30	0.80
3	Access to high-speed internet at home	87	4.80	0.70
4	Ability to use the internet for academic research purposes	87	4.20	0.70
5	Word Processing	87	4.60	0.50
6	PowerPoint Processing	87	4.50	0.60
7	Ability to use the network to communicate and share data with others	87	4.30	0.80
8	Familiarity with Learning Management System (LMS)	87	4.10	1.09

Computer literacy skills level received a high evaluation from the participants—ability to use search engines (mean = 4.3), word processing (mean = 4.6), ability to use the network to communicate and share data with others (mean = 4.3). Regarding familiarity with Learning Management Systems (mean = 4.1), most respondents had experience working with LMS Moodle only. Cronbach's Alpha scored 0.78 which shows that the questionnaire was reliable.

Evaluating teachers' readiness to implement online teaching and learning during the COVID-19 pandemic and their attitudes to it, participants of the study were asked to respond to several questions (Table 3). The 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree) was used.

Table 3. Teacher's readiness to implement e-learning.

	Questions	N	Mean	St. Dev.
1	I have sufficient knowledge and skill to use e-teaching during the COVID-19 pandemic	87	3.70	0.70
2	I have experience in using e-learning	87	3.80	0.90
3	I prefer conventional learning than e-learning	87	4.30	0.80
4	I need to learn how to use my computer for e-learning	87	2.60	1.07
5	The use of e-learning during this pandemic is not convenient for me	87	4.30	0.80
6	My discipline is suitable for e-learning	87	3.80	0.80
7	E-learning is a waste of time during this pandemic	87	1.90	1.13
8	Teaching online differs greatly from conventional teaching	87	4.70	0.50
9	I have troubles designing learning materials for an electronic environment	87	4.10	0.90
10	I lack skills of efficient communication with my students online	87	3.50	1.14
11	The University provides technical support for e-learning	87	4.30	0.50
12	The platforms chosen by the University to support e-learning are easy to use	87	3.50	1.04
13	The platforms chosen by the University include the necessary features and functions I need	87	3.30	1.07
14	There are enough and clear instructions/training about how to organize a digital educational process	87	3.80	0.80
15	I receive a satisfactory and timely response from the IT services staff	87	4.20	0.80
16	I feel the lack of computer literacy skills	87	3.60	1.01
17	The preparation of electronic education content is very time-consuming	87	4.70	0.30
18	It is difficult to adopt new teaching methods within days	87	4.60	0.40
19	I feel the need to be taught how to work in a digital educational environment	87	3.90	1.04
20	E-teaching and learning during the coronavirus outbreak brings more advantages than disadvantages	87	2.20	1.17

The respondents were almost unanimous in stating that teaching online differs greatly from conventional teaching (mean = 4.7) and that preparation of electronic education content is very time-consuming (mean = 4.7). The participants were positive about their knowledge and skill to use e-learning and teaching during the COVID-19 pandemic (mean = 3.7). Most of them have some experience in using e-learning in their background (mean = 3.8). The need to be taught how to work in a digital educational environment was also expressed by most of the respondents (mean = 3.9). The Cronbach's Alpha was 0.82, showing the reliability of the results.

According to Almazova et al. [25], "e-learning implementation into the educational process entails not only the development of new interactive methods of teaching, but also changes pedagogical process

concerning students who are accustomed to the traditional full-time education system. The lack of students' skills for the intensive use of information technology in the educational process can be one of the obstacles to the successful application of e-learning". That is why participants of the study were asked to evaluate their students' performance in a digital educational environment on a 5-point scale—from 1 (completely disagree) to 5 (completely agree) (Table 4).

Table 4. Students' performance online during the COVID-19 pandemic.

	Questions	N	Mean	St Dev.
1	My students have sufficient knowledge and skill in the use of e-learning during the COVID-19 pandemic	87	3.80	1.15
2	My students are able to perform tasks in the platforms chosen for e-learning	87	4.40	0.60
3	My students face some technological problems when taking part in the electronic educational process	87	4.30	1.04
4	My students lack motivation to study online	87	4.10	0.70
5	My students are enthusiastic to take part in webinars and online discussions	87	3.00	0.90
6	My students fail to meet deadlines	87	4.30	0.60
7	My students experience psychological discomfort studying online during the COVID-19 pandemic	87	3.00	0.90
8	My students do not have devices/high-speed Internet connection for the use of e-learning	87	2.30	0.50
9	I feel that my communication with the students online is not productive	87	2.40	1.23

Describing students' performance online during the COVID-19 pandemic, the participants underlined the following issues: the students have sufficient knowledge and IT skills in the use of e-learning (mean = 3.8), most students fail to meet deadlines (mean = 4.3) and lack motivation to study online (mean = 4.1). Cronbach's Alpha scored 0.89 which shows that the questionnaire was reliable.

The final part of the survey was connected with the identification of the problems, challenges and general perceptions of the teachers concerning online learning during the COVID-19 pandemic. The participants responded to open-ended questions during online individual interviews organized in Microsoft Teams. Summarizing their answers, it should be noted that teachers were active and motivated to maintain students' interest in studying, to transform traditional curriculum so that conducting classes was not just a formality, but a productive process of knowledge acquisition. Among the factors that motivate teachers to participate in online learning are the intellectual challenge, and personal motivation to master online technologies.

At the same time, the analysis has shown that the participants are almost unanimous in the opinion that conventional teaching competencies and skills do not guarantee the success of the online educational process. Thus, one of the respondents, describing the advantages of online teaching, mentioned the following: "A teacher's role is changing. A teacher becomes a facilitator who has an opportunity to use different online platforms to upload study material, multimedia resources, set deadlines, conduct different kinds of activities and communicate with students 24/7". As for the disadvantages, one of the respondents underlined the following: "When teaching humanitarian disciplines and foreign languages, there is a strong need for collaborative tasks for students—pair work, small group discussions, etc. Given the fact that we use LMS Moodle and Microsoft Teams to conduct online classes, it seems next to impossible to organize this face-to-face productive communication". One more opinion deals with the following: "To teach online efficiently, one should be ready to

use a great number of online applications to organize a productive lesson, including different LMSs, web applications, etc. We have a lot to explore, which take much time and effort”. Describing advantages, disadvantages, and their perceptions of online teaching and learning, the following issues were named by respondents (Table 5).

Table 5. Advantages and disadvantages of online teaching.

Advantages	Disadvantages
Educational process flexibility (68%)	Inability to use a number of educational methods available in an offline class (discussion in small groups, group discussions, etc.) (77%)
An opportunity to reuse recorded educational material (videos, presentations, etc.) (46%)	Limited communication with students (71%)
Professional development (46%)	Online/video classes are not an effective alternative to the conventional educational process (61%)
Interactive format (32%)	
An opportunity to try new technologies (15%)	

However, as the results of the survey have shown, when implementing online teaching, most respondents experienced certain difficulties which become a serious obstacle to the efficient digital learning process:

- Lack of digital literacy;
- Lack of time for self-education, for the creation of electronic educational materials, etc. Teachers emphasized the significant time spent on preparing online educational content. It was found that it takes twice as much time as to design traditional educational materials.

Several more issues underlined by the teachers included:

- Inability to organize productive interaction with students online;
- Inability to use active/collaborative teaching methods;
- Conservatism, lack of flexibility.

5. Discussion

The present study was undertaken to investigate the level of university teachers’ readiness to implement e-learning during the COVID-19 pandemic in Russia as well as the challenges they faced. Taking into consideration the above-mentioned, the following important points should be discussed.

The analysis of the survey answers shows that even having a fairly high level of computer literacy and IT support from the university, most teachers still encounter some difficulties that are relevant for the study case. The following challenges were identified—computer literacy level, the university electronic environment and support, academic staff readiness and students’ readiness for online learning. These findings are in line with previous studies that define a number of online teaching barriers. According to Rogers [26], the following barriers that prevent academic staff from implementing online education effectively are socio-cultural related factors (e.g., economics and location), personality-related factors (e.g., age, gender, attitudes and beliefs), and the extent of the exposure (including support and training) to new technologies. Jones [27], in his studies, differentiated teacher-level and institutional-level barriers. Hew and Brush [28], in their study, named several issues preventing effective online teaching implementation including resources, technology, time, and technical support; technology-based teaching knowledge and skills; institution barriers; staff attitude and beliefs, and subject culture.

As for computer literacy-level barriers, some issues were mentioned by the teachers who are older than 55 years old, including the need for more instruction and extra support from IT teams. This is

also in line with the findings from Al-Fadhli [29] and Al-Sarrini [30] who concluded that 45+ faculty members were less willing to employ e-learning in their teaching and learning practice.

Crucial challenges (barriers) experienced by teachers in Peter the Great St. Petersburg Polytechnic University, according to the study findings, were academic staff readiness and students' readiness for online learning and teaching during the COVID-19 pandemic. Most respondents underlined that the methodological work of a teacher in a digital educational environment is significantly different from conventional forms of teaching—87% of respondents agreed with this statement.

A teacher must practice active collaborative teaching methods and help students to form their own learning styles online; study the possibilities of online learning platforms and overcome difficulties and barriers of electronic communication. To manage an online course efficiently, teachers should know how to encourage students to learn independently, develop self-discipline and planning, provide timely assessment of student work and provide prompt feedback. In a digital educational environment, a teacher should ensure that students concentrate on learning tasks, develop critical thinking skills, reflect on achievements and failures, and encourage students to share their experience with peers online.

A teacher's role is of vital importance, influencing the quality of the online teaching and learning process [31]. With the introduction of modern technologies in the educational process, a teacher's work—its structure, content, etc., are changing. The methodological work of the teacher in a digital educational environment differs from conventional teaching methods [32]. It is noted that teachers traditionally have extensive knowledge in the field of their subjects and much less knowledge in the field of information technology and electronic pedagogy. This is an obstacle to effective online teaching and learning.

To be able to teach online successfully and efficiently, it is not enough to have computer literacy skills and excellent knowledge of one's subject. One should master online pedagogy involving a combination of knowledge and skills in providing the ability to design electronic educational courses; implementation of distance and online education; organization of efficient online interaction and collaboration between a teacher and a student. The importance of the development of online pedagogy skills with social interactions and online discussions is underlined by Cantamessa [33], Mandernach et al. [34], Steele et al. [35], Kilgour et al. [36] and Green et al. [37]. According to Houlden and Veletsianos [10], "the clear need for post-secondary online learning expertise in the COVID-19 pandemic crisis should serve as a reminder that institutions need to cultivate this competency".

Thus, a teacher's objectives when organizing online teaching and learning are the following:

- creating conditions for students to master online learning skills;
- providing methodological support for students working with electronic educational materials;
- formation of critical and creative thinking skills among students, and information processing skills;
- actualization of students' self-education needs and skills to use modern technologies to optimize the educational process;
- development of students' sustainable motivation to study.

As for students' readiness for online learning, it was noted by the respondents that due to general high technical literacy of modern "digital natives", it is not difficult for them to master the technical side of online education quickly. However, according to teachers' responses, most students face a lack of organizational and planning skills and face self-regulation challenges [38–40]. Inability to meet deadlines influences students' level of motivation [19,22]. At the same time, the teachers should not forget that this whole situation is new and challenging for students, too, and that they should be given time and help to become used to it [41].

Thus, efficient transformation of curriculum into an online format during the COVID-19 pandemic in Russia will be possible under the following conditions:

- assistance with coping with psychological barriers when implementing teaching activities online;

- a developed material and technical base, including both hardware (computers, high-speed Internet access, etc.) and software (LMS, electronic textbooks and educational materials, diagnostic and knowledge control systems, etc.);
- organizational and methodological support, including recommendations connected with implementing teaching activities in a digital educational environment;
- teachers' professional development programs;
- provision of regulatory support from the university focusing on determining the academic workload of a university teacher when working online.

The above-mentioned goes in line with Al-Oteawi [42] and Keengwe et al.'s [43] findings who stated that staff professional development programs are of high importance.

6. Conclusions

Today, higher education in Russia and all over the world is in a situation of a high degree of uncertainty, which makes it necessary to purposefully increase the level of technological and methodological readiness of university teachers for online teaching and learning.

The higher educational system in Russia faced great challenges that require the psychological, technological and methodological restructuring of conventional teaching. The organization of the educational process in a digital educational environment involves innovative teaching activities, based on collaboration among teachers and students, and efficient use of modern technologies.

Thus, during the COVID-19 pandemic, university teachers should be ready to organize and conduct the educational and scientific research activities of students remotely by applying LMS, ICT tools, etc.; to control and evaluate students' educational activities online, and to conduct online conferences, webinars, etc.

Potential problems with the transformation of the curriculum into an online format are connected both with pedagogical and university management issues. According to the findings of the current study, the most important included teachers' and students' readiness level to implement online education. There are many questions, and they have to be resolved quickly. In the context of the COVID-19 pandemic, online education becomes a way to protect the health and life of all participants of the educational process. If the Russian educational system is ready for this quick transformation online, only time will tell. This study is one of the first steps to analyze the situation and find possible solutions to the current problems.

The present study has several limitations, the most important concerning the participants of the study. Only the teachers were involved. We want to underline that it is crucial to know the challenges experienced by teachers when implementing online learning and teaching in order to be ready to deal with them. Further research should deal with students' perceptions of online learning as well.

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