

DIGITALIZING EDUCATION IN THE AGE OF PANDEMICS: A STUDY OF THE TRANSFORMATIONAL EFFECTS OF COVID-19

DIGITALIZAR A EDUCAÇÃO NA ERA DAS PANDEMIAS: UM ESTUDO DOS EFEITOS TRANSFORMADORES DA COVID-19

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ABSTRACT

The paper investigates the impact of the COVID-19 pandemic on the acceleration of digitalization processes in the field of education. Specifically, the study examines the development and improvement of online learning formats during this period, highlighting both the advantages and disadvantages, as well as identifying the bottlenecks and challenges that emerged. The paper presents the results of a survey conducted among Bachelor's and Master's degree students at the Faculty of Distance Learning at Plekhanov Russian University of Economics, categorized according to their areas of study, to determine the efficacy of remote learning processes and methods. Additionally, in-depth interviews were conducted to provide a more detailed analysis of the benefits and drawbacks of online learning, as well as potential solutions to improve remote learning processes. Overall, this paper offers valuable insights into the role of the pandemic as a catalyst for digital transformation in education, and provides recommendations for enhancing the effectiveness and efficiency of online learning.

Keywords: Digitalization of education. Online education. Remote learning. Questionnaires. Analysis of attitude towards online learning.

RESUMO

O artigo investiga o impacto da pandemia da COVID-19 na aceleração dos processos de digitalização no domínio da educação. Especificamente, o estudo examina o desenvolvimento e a melhoria dos formatos de aprendizagem em linha durante este período, destacando tanto as vantagens como as desvantagens, bem como identificando os estrangulamentos e os desafios que surgiram. O documento apresenta os resultados de um inquérito realizado entre os estudantes de licenciatura e mestrado da Faculdade de Ensino à Distância da Universidade Russa de Economia Plekhanov, categorizados de acordo com as suas áreas de estudo, para determinar a eficácia dos processos e métodos de aprendizagem à distância. Além disso, foram realizadas entrevistas aprofundadas para fornecer uma análise mais pormenorizada das vantagens e desvantagens da aprendizagem em linha, bem como potenciais soluções para melhorar os processos de aprendizagem à distância. De um modo geral, este documento oferece informações valiosas sobre o papel da pandemia como catalisador da transformação digital na educação e fornece recomendações para melhorar a eficácia e a eficiência da aprendizagem em linha.

Palavras-chave: Digitalização da educação. Educação em linha. Ensino à distância. Questionários. Análise da atitude em relação à aprendizagem em linha.

Introduction

The COVID-19 pandemic has undoubtedly changed. With the sudden shift to remote learning, traditional education systems have been forced to adapt quickly to keep up with the ever-evolving technological landscape. The incorporation of digital technologies in the educational process has been crucial in ensuring students' continued access to education, but it has also led to a comprehensive transformation of the education system. This transformation has gone beyond the mere integration of technology, requiring a fundamental shift in the traditional model to an updated one, suggesting new ways of knowledge transfer.

Driss Bouyahya, PhD, an Associate Professor in the English Studies Department at Moulay Ismail University, Morocco, in his article entitled "Reflective Pedagogy within the New Normal," delves deeper into the consequences of the pandemic on the education system and proposes a reflective pedagogy to improve the quality of education in the current and future situations. He says that "The coronavirus pandemic has shaken up almost all areas of our daily lives, including education and academia. ... eLearning has become the cornerstone of distance learning and one of the consequences of social and physical distance learning to

counteract the consequences of its destruction during complete isolation, the current situation and future prospects” (Bouyahya, 2021).

The problems connected with Covid-19 made educational organizations shift to either completely remote or mixed (hybrid) work combining synchronous and asynchronous learning. A move from classroom to remote learning is associated with certain technological challenges connected with accessibility and reliability of digital infrastructure, digital skills and qualifications of both teachers and students, as well as maintaining the high quality of education (Marinoni et al., 2020).

B. Kang (2021) indicates three problems of digital transformation in the educational sphere: (1) bad management of motivation, (2) negative impact of IT-devices in education, (3) inequality in education due to digital divide.

The research carried out by J. Reich and J.A. Ruipérez-Valiente (2019) and H. Ito et al. (2019), as well as earlier work by I. Chuang and A. Ho (2016), confirm that remote learning models and tools do not guarantee the required level of educational content assimilation. The speed-up of digital transformation due to Covid-19 pandemic became “the new normal in the educational services” (Kang, 2021). Appropriate measures have to be taken to enhance digital influence by changing the role of a teacher from a qualified instructor to a progress manager, investing in information and communications technology in the educational sphere and using remote learning benefits as much as possible (Kang, 2021).

R. Ribeiro (2020) says that the online format is actively developing and adapting while the pandemic made many teachers, administrators, and students change their attitude towards the value of online learning. Researchers from Bangladesh and Nepal L. Mishra, T. Gupta and A. Shree (2020) share this point of view making a conclusion about the change in the attitude towards online learning based on the surveys among Bachelor's Degree program students.

In Russia, digitalization of higher education has previously also been of particular interest at the national level. In September, 2018 The Presidential Council for Strategic Development and National Projects approved the Digital Education national project which focuses on the development of the Digital

educational environment (Government of the Russian Federation, 2017; Ministry of Education and Science of the Russian Federation, n.d.). This project, according to its founders, had to facilitate the development of a modern and safe educational environment by 2024 as well as to increase demand for online learning by integrating it smoothly into the current education system.

The shift of higher educational institutions to remote work with the onset of COVID-19 pandemic became a must. In education, it's necessary "...to use extensively where possible an online format including technology for person identification and control of entrance exams", said Minister of Science and Higher Education V. Falkov on May 21, 2020 (Agranovich, 2020), two months after the onset of the pandemic, at a meeting on the situation in the educational sphere amid the outbreak of Covid-19.

Education at universities and other educational institutions in Russia is massively moving to online education. There are numerous reasons for that: global scale of the pandemic, digitalization of economy (Kapranova, 2018) and the government sector, introduction of new technologies into all the spheres. Enough time has passed to assess the processes that have been launched as well as their intermediary and final results. Online education includes different areas, from schools to further vocational education with the market growth speed reaching up to 30% a year (Ministry of Education and Science of the Russian Federation, n.d.).

What are the prospects for the development of online education in Russia? A research published by HSE University (National Research University Higher School of Economics, 2020) indicates the education spending amounting to 4.3 trillion rubles in 2021. HSE University researchers analyzed the benefits of remote learning compared to traditional classroom learning and concluded that this study mode is equal in quality to the traditional one at the same time making it possible to educate 15-18% more students. The results of the experiment were published in Science Advances journal (Rambler, 2020).

The online education market is expected to grow significantly, in an interview to Rossiyskaya Gazeta CEO of Netology Group said, "The initial growth of

online education market in Russia was forecasted at 15-20% a year. However, Covid-19 accelerated this process. At year-end 2020, there was a 30-35% growth compared to pre-covid times...” (Kolesnikova, 2021). According to Smart Ranking and TalentTech, in 2020, 50 top Russian companies in online education had their revenue exceeding 25 billion rubles. In general, the Russian online education market in 2020 was potentially valued at 60 billion (Kolesnikova, 2021).

The online format is now being actively developed and improved, since the onset of the pandemic it has shown both benefits and drawbacks, bottlenecks in online learning and solved some problems while generating some other challenges.

The success of Plekhanov Russian University of Economics implementation of new digital technologies is just one example of how the education system has been forced to adapt to the new reality of online learning. However, as with any significant change, there have been both benefits and drawbacks to this shift. The aim of this research paper is to explore and analyze the challenges and opportunities that online learning presents, both for students and educators, in order to provide insights and recommendations for improving the effectiveness of remote learning. By examining the experiences of students and teachers in the context of the pandemic, we hope to gain a deeper understanding of how online learning can be optimized to enhance the educational experience and promote student success.

In the majority of Russian universities students were able to continue studying remotely. However, they faced certain challenges and some drawbacks of this learning format that had not been obvious before were revealed:

- Different capacities of higher educational institutions in terms of their ability to organize remote learning,
- Absence of learning platforms affected deeply small universities that hadn't had remote learning programs before these force-majeure circumstances.

While at big universities, such as Plekhanov Russian University of Economics, before the pandemic, around 1 thousand students out of 20 thousand students totally had studied remotely, then at universities with fewer students there were no ready-made online education models as well as no platforms that could be used right

away. A common online platform developed for universities would be able to help them adapt quickly, however, it was not done and external online platforms were not fully studied.

- After the delivery of knowledge to a student, the next logical step is knowledge control. There were also some challenges here since many universities did not have any education management systems for process automation, for example, to hold midterm and final assessment. Russian universities haven't yet solved the problem of holding final and state exams for graduation. However, some of the proposed methods included: remote tests, combination of tests and a talk and an oral exam (which is used, for example, by Financial University Under the Government of the Russian Federation). This solution also has a number of drawbacks, first of all, knowledge cannot be controlled properly without automated proctoring systems (for example, ProctorEdu); secondly, synchronous attestation does not allow for any technical issues.

- The fact that "teacher-student" communication services started to be used was an obvious achievement of remote learning, however, their stable work and user-friendliness were questioned. The main problems were connected with increasing numbers of technical errors on online platforms that turned out not to be ready for a big work load. Before a huge number of people moved to online learning, these services had been used by a little number of users which ensured their smooth operation. However, with a rapidly increasing work load, services need more time to process information which is slowing down the transfer of information from a teacher to a student and the other way around. This situation is also complicated by the quality of broadband connection that prevents fast exchange of information as well as by the Internet access. According to Digital 2020 (Kemp, 2020) annual public report on the situation in the online sphere published by We Are Social and Hootsuite, in Russia, 81% of the population have Internet access which means that students that are part of these 19% (most of them live in small towns or remote villages) will not have access to online platforms and remote learning. At the same

time, in case of classroom learning, this problem can be solved by having personal computers at universities.

An important drawback of remote learning revealed by COVID-19 is connected with social and psychological factors which reduce the effectiveness of remote learning.

The main social factor is different financial situation in different social groups. Not all families can provide a student with a personal computer or a laptop especially when all family members have moved to remote learning or work.

- Challenges due to psychological aspects were revealed at the very beginning of the online format of work. Before the COVID-19 pandemic, most teachers preferred delivering lectures in front of a live audience instead of using modern technology as it's the best way of presenting the information ensuring deeper assimilation of knowledge, direct contact with the audience, fast feedback, direct dialogue, etc. HSE University research showed in 2019 that this psychological aspect was the reason for every fourth teacher over the last three years not to participate in video conferences or webinars using online conference facilities. When assessing the level of online technical skills, teachers holding academic credentials rated themselves at 3.2 out of 5 points on average. Such low points indicate a need to organize courses on online technology to help teachers avoid stressful situations when holding online classes.

The spread of COVID-19 encouraged educational institutions to pull their resources together to go online. Virtual education was drastically different from classroom studies thanks to the use of new methods and ways of knowledge transfer. It took only a couple of months for the online education market to speed up its development tenfold while learning to use new technologies became a must.

At Plekhanov Russian University of Economics, the process of new digital technologies implementation was fast and successful. Lectures were held at the Russian Webinar platform while practical classes took place in an asynchronous mode in the Student-Teacher Messaging on Moodle platform and in a synchronous mode – on ZOOM conference platform, and starting from summer 2021 – Webinar.

Students got used to the new conditions quickly and appreciated the benefits of online learning. The success was proved by surveys held among students of remote learning departments.

Materials and Methods

The authors conducted a research to learn students' opinion on the impact of remote learning on the quality of education, the level of their qualification and knowledge. A specially designed questionnaire on Google Forms was used as a research method with further processing of the results, analysis and visualization of data.

Respondents' reviews regarding their attitude towards remote learning in terms of the qualifications and knowledge they receive were analyzed using quantitative and qualitative methods: analysis of statistical indicators calculation and SWOT-analysis which is presented in Table 1.

The survey was held among Bachelor's Degree program and Master's Degree program students. 1772 Bachelor's Degree program students were surveyed from year 1 to year 4 majoring in Hotel Business, Design, Management, Customs, Trade, Product Technology and Catering, Economics and Law as well as 93 Master's Degree program students in year 1 and 2 majoring in Legal Studies, specializing in Economic Law; Economics, specializing in Accounting and Tax Accounting in Commercial Organizations and Economics, specializing in Company Capital Management.

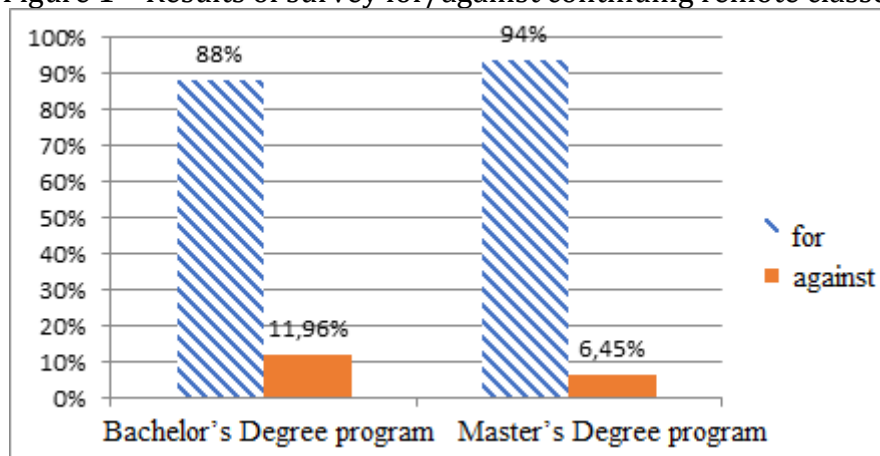
The survey was held on Google forms and featured questions connected with the area of studies, course, at the same time it did not feature any personal data.

Results and Discussion

The main question that the students were asked to answer was to choose one of the two options: to attend classes in the classroom in full volume according to the schedule or attend classes remotely using remote educational technologies.

Moreover, the respondents had a chance to explain their choice. The majority of the Bachelor's Degree program students (88%) and Master's Degree program students (94%) were in favor of having remote classes until the end of the academic year (Figure 1).

Figure 1 – Results of survey for/against continuing remote classes



The authors analyzed and visualized the survey results. We were especially interested in the reasons for the majority to choose online education.

The respondents could give reasons in any format, therefore, we chose several main groups of answers in favor of continuing remote education: “saves time”, “take care of your health”, “easier to combine with work”, “high level of teaching with no deterioration in quality”, and several answers from those who are against online learning: “tired of studying from home”, “interaction with teachers and groupmates, participation in university life” and “I had poorer grades due to remote learning”. The respondent was allowed to make several comments. Figures 2 and 3 show the main reasons for Bachelor's Degree and Master's Degree students to choose online learning.

Figure 2 – Main reasons for Bachelor’s Degree students to choose online learning

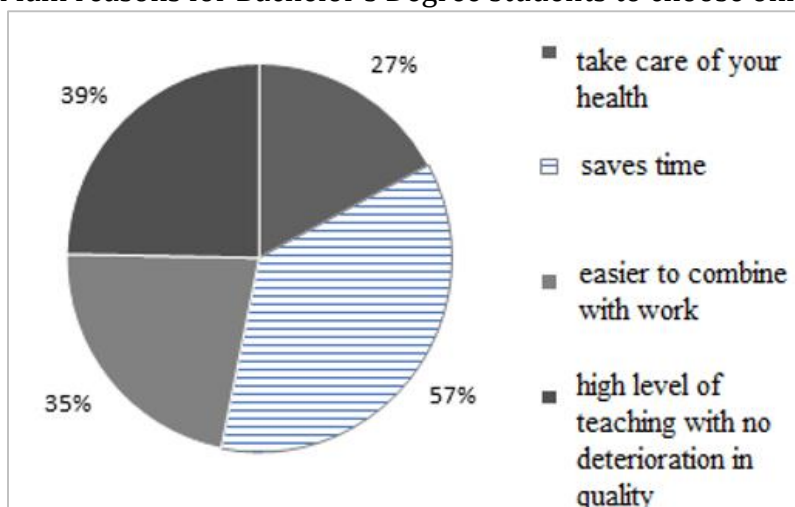
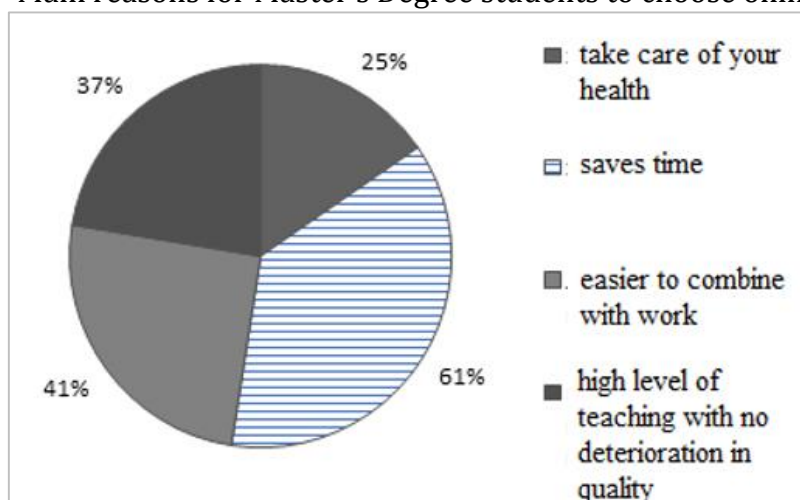


Figure 3 – Main reasons for Master’s Degree students to choose online learning



As the diagrams show, the distribution of answers by groups among Bachelor’s Degree and Master’s Degree students is similar. The biggest number of answers “in favor” of online learning are connected with saving time (57% Bachelor’s Degree and 61% Master’s Degree students), the share of the respondents who take care of their health and that of their family is also significant (39% and 37% respectively). It was noted with pleasure that today Plekhanov Russian University of Economics has “education at the highest level” and “with no deterioration in quality”.

Following the survey results, the management of the Faculty of Distance Learning decided to continue remote learning until the end of 2020/2021 academic year.

The aim of the additional in-depth survey of the respondents was to reveal:

1. Benefits and drawbacks of remote learning from the students' point of view.
2. Challenges that students faced when studying online and the reasons for them.
3. Transformation of work methods and challenges faced by teachers when moving to online learning.

The authors conducted a SWOT analysis of remote learning which is an actual tool that helps reveal strengths and weaknesses and make the right decisions, the results are presented in Table 1. The problem can be considered as a whole or its certain aspects can be reviewed, internal and external weaknesses and strengths can be assessed.

Table 1 – Swot analysis of online learning

	<i>Positive impact</i>	<i>Negative impact</i>
Internal environment	<i>Strengths</i>	<i>Weaknesses</i>
	Flexibility of the educational process	A large amount of material for preparing assignments
	Possibility to combine work with study	Remote learning site not user-friendly
	Technological aspect of the learning process	Difficulties with authorization and passwords
	Learning in a comfortable and familiar environment	Untimely presentation of materials and assignments by teachers
	Any educational material remains available for download	Difficulty in completing practical tasks

	Individualization of the educational process	Difficulties in adapting to the online format
	Possibility of learning beyond time and space constraints	Technical difficulties
		Weak motivation
		Ignorance of the basics of time management
External environment	<i>Opportunities</i>	<i>Threats</i>
	Individual learning pace	Lack of personal meetings with classmates and teachers
	Possibility to watch the video again	Absence or insufficient feedback
	Low risk of infection	Situation "alone in a crowd"
	Ability to download lecture materials	Lack of educational function among teachers
	A lot of free time	Inability to automate creative tasks
	Use of modern learning technologies	Lack of social interaction
	Self-education	Low computer literacy
	Additional volume of material on the subject	
	Improving the quality of education	
	Trend in lowering tuition fees	
	No transport costs (time waste and financial costs)	
	Environmentally friendly (reducing energy consumption and carbon dioxide emissions)	

Individual learning pace and low risk of viral infection (due to the current global situation) were ranked the highest: 32.4% and 40.5% respectively. At the same time, the possibility of downloading the lecture materials and watch the video

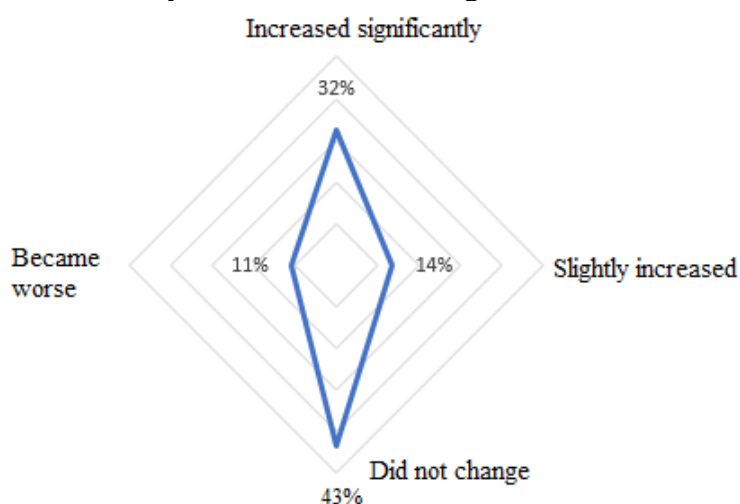
once again (for students to have theoretical and methodological materials with them) represent 33.6% and 35.6%. 72.9% of the respondents find some challenges in online learning connected with doing practical assignments and inconveniences due to the learning environment.

The following results were received when asked “how has your education level changed when you started studying online”: 51% – did not change; 27% – slightly improved; 11% – greatly improved; 11% – deteriorated. It is worth noting that stability is typical for those students who have a job which can be explained by higher motivation to study and good time management skills.

When asked if this study mode was convenient and if they liked it, the respondents were almost unanimous: 78.3% - yes, I like it, 10.8% - either I like it but it’s complicated or I don’t like it and it’s hard, 8.1% learning process is too easy, the remaining 2.8% - could not answer.

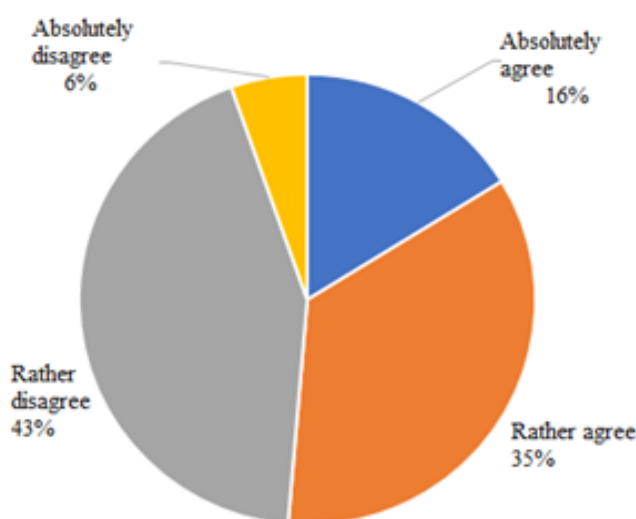
The question about the attendance of online classes (Figure 4) led to the conclusion that attendance was more frequent with 46% of the respondents, at the same time 43% did not feel any difference with the change of study mode.

Figure 4 – How has your attendance changed with the online format?



(source: drafted by the authors)

Figure 5 – Is information assimilated easier with online format? BI



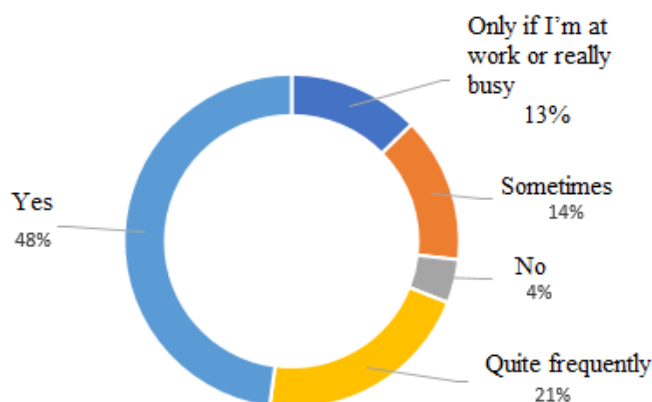
Source: drafted by the authors

When asked “Do you agree that information is assimilated easier with online format?” the opinion split almost in half: 51% answered it was easier, 49% - that it was harder (Figure 5) which gives food for thought and, may be, ground for additional research on the nature of challenges – whether it’s psychological issues, problems of materials presentation, its quality or structure, etc.

The majority of the students agreed that the work load increased with online learning: 56% – increased generally, 21% – reduced generally, 21% – did not change.

Online lectures are a traditional teaching element. In the survey, students were asked “Do you have a habit of listening to lectures in the background?” and, since the questionnaire was anonymous, sincere answers were received (Figure 6): 69% of students listen to lectures in the background and only 4% of them listen to the material without any distractions. Apparently, it is advisable for teachers to use different approaches to boost interest in the subject of the lecture by asking questions verbally or introducing written surveys in the course of the lecture that have to be sent by email or in a chat, the attachment of a video to the lecture asking students to watch it straight away and answer a question in the lecture, etc.

Figure 6 – Do you have a habit of listening to lectures in the background?



Source: drafted by the authors.

Using video lectures in the learning process has significant benefits such as: the possibility of sending out lectures from the best lecturer, centralized tools for professional recording of material, the possibility to watch it multiple times, download, etc. However, the authors believe that it is advisable to make video lectures for relatively stable courses or disciplines, such as mathematics, physics, chemistry, etc., where the role of the time factor is insignificant – over time, scientific provisions or methods do not change or do not change significantly. For dynamically developing areas – economics, finance, statistics, information technology, etc. – a pool of recorded lectures will soon become outdated. Lectures of this type are constantly updated from one class to another and it is advisable to deliver them “live” also using all possible technical means in the form of webinars, video conferences, etc.

In order to understand what main methods and technological tools teachers use online, the questionnaire featured a question about the forms of material delivery: issuing assignments for self-study; uploading of educational materials; conducting video classes; online testing; checking individual assignments, etc. In most cases, students noted that video classes and assignments for self-study, as well as testing were mainly used.

The problem of teaching various disciplines (and especially technological ones, such as, for example, IT or information systems by industry) when moving

from full-time to remote learning requires a restructuring of almost all methods (Nedelkin & Romanova, 2018). In online mode, practical tasks must be individual or have personalized elements.

The transformation of approaches to teaching online is a key and relevant element, suggesting not only a change in the methods of presenting material, but also the mastering of new technologies by teachers for its delivery.

Another important aspect of online learning is the great role of technical and technological support, including both remote education platforms and online courses, as well as communications, video conferencing software, etc. (Zhenova, 2017).

About half of the respondents mentioned that technical problems are the main problem of online learning: problems of compatibility of learning platforms with operating systems, browsers or smartphones; low speed of Internet connection; local technical errors, the inability of students to handle technical problems on their own, etc.

A quarter of the respondents complained about the lack of social interaction, the lack of opportunities for interpersonal face-to-face contacts between students and with the teacher, to share experience, to establish non-verbal contact. For 13% of respondents, the move from traditional classes to an online format, or even a combination of these two modes, leads to adaptation difficulties and stress.

The online format requires discipline and dedication to independently complete tasks, achieve progress in learning. 7% of respondents mention the difficulty with time management: the freedom of online learning lead to a feeling of infinite time and mismanagement of it, which results in missed assignments.

Conclusion

The following conclusions can be made based on the research outcomes:

- for the majority of students, online learning is convenient and they are interested in it;

- to maintain a certain level of quality of the educational process, it is advisable to use mixed learning, when lectures can be delivered online, and practical classes can be held face-to-face (Bachelor's Degree students are more in favor of a classroom format, and Master's Degree students – of online format);
- students in general are not ready to perceive a large amount of material on their own – a lot of them have weak motivation and a low level of self-organization;
- teachers need to update the teaching methods, taking into account the peculiarities of remote learning;

Online education has become an important direction in the development of education in the digital world and no changes are expected in this trend.

After the end of the pandemic, the education system will never be the same although it will not fully switch to the online format. However, now both students and teachers have appreciated its benefits and all the identified drawbacks will encourage continuous improvement and development.

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