

Learning Foreign Languages in a Digital Environment: Learners' Perception of the Sudden Transition to e-Learning During COVID-19 Lockdown

Mona Kamal Ibrahim¹, Natalya Spitsyna² and Anastasia Isaeva³

¹Al Ain University, Al Ain, UAE; Helwan University, Helwan, Egypt

²Far Eastern Federal University, Vladivostok, Russian Federation

³Tula State University, Tula, Russian Federation

monakibrahim@yahoo.com

nataspitsyna@rambler.ru

anayisaeva@rambler.ru

Abstract: The research is devoted to the study of the forced and accelerated transition of education to an online environment on the example of learning a foreign language. Despite a large number of studies on e-learning, this study is one of the newest investigating recent education transformation trends. The ultimate goal of this paper was to study changes in students' assessments of the e-learning process, participation in online-based education, and academic success during the transition to virtual training. The study involved 600 students from 5 private specialized educational institutions located in Moscow (Russian Federation) who were forced to switch to e-learning during the lockdown. The examination was conducted by means of a survey assessing the usefulness, comfort, and acceptability of e-learning in three isolated questions formulated by the authors and measured on a five-point Likert scale. The comparison of its outcomes with the results of objective knowledge tests at the beginning and at the end of the three-month e-learning period revealed the following outcomes. First of all, a decrease in the assessment of the acceptability of continuing e-learning for both genders was noted. According to female respondents, the assessment of the comfort of e-learning decreased significantly (from 3.70 to 3.14 points). In the meantime, the usefulness score dropped notably for both male and female research participants (from 4.10 to 2.98 and from 3.80 to 2.26, respectively). Similar changes were found in four age categories ranging from 20 to 42 years old. Thus, the participants over 30 demonstrated lower final scores. Academic success also decreased in the group of men compared to the group of women. The findings of this study can be practically applied for the further transformation of educational programs and additional preparation of educators with the aim of facilitating learning transition to an online mode. Future research on the topic can be conducted in other regions of the world to obtain more comparative data and investigate different learners' perceptions.

Keywords: COVID-19, e-learning, foreign language learning, learning motivation, lockdown, online learning

1. Introduction

In order to reduce social interactions and maintain social distancing during the lockdown introduced across almost all countries worldwide, local authorities imposed temporary closure of educational institutions and thus encouraged the transition to distance learning. According to the United Nations report issued in August 2020, 98% of all educational institutions all over the world were closed (quoted accordingly to Bilawar, 2020). The UNESCO figures issued on September, 30th 2020, confirmed that as many as 132 countries shut their educational institutions, shifting the learning process of a total of 176 784 928 learners at different educational stages to the cloud. This form of education is based on the use of online tools and video conferencing software (e.g., Zoom, Skype), as well as cloud services with shared and ranked access (e.g., Google Class) providing educational content and the ability to track student progress (Bilawar, 2020; Bonal and González, 2020).

The issue of learning in a digital environment has been actively discussed and studied in academia for more than a decade. However, the introduced COVID-related measures made it even more urgent (Athreya and Mouza, 2016; Bennett and McWhorter, 2020). The most important factors determining the student position during the lockdown were represented by unequal digital environment accessing possibilities as well as social inequality and knowledge gap provoked by them (Krishnapatria, 2020; Opaluwah, 2020). This form of inequality is often called the digital divide (Ramsetty and Adams, 2020). Researchers note that many developing countries are characterized by acutely negative trends in the educational system, which turned out to be not ready for the transition to the digital environment due to unexpectedly low levels of digital literacy (Abdulai et al., 2021). The penetration of mobile communications and cloud services, including completely free e-learning methods, turned out to be much weaker than it was estimated (Opaluwah, 2020; Sanad and El-Sayyed, 2020).

The problem of the digital environment and distance learning was revealed in the fact that they require completely different teaching methods, tools, and sets of practical pedagogical and digital skills possessed by the teaching personnel (Nash, 2020). A significant number of educators, even in developed countries, are rather poorly prepared to regularly generate or find digital learning materials consistent with the curriculum and create engaging and motivating content to ensure learners' academic success (Fryer and Bovee, 2016; Godwin-Jones, 2019). For this reason, much research has focused on finding guidelines or sets of skills and competencies focused on the digital environment that teachers can effectively communicate to students to improve the situation (Buchholz, DeHart, and Moorman, 2020; Dzekoe, 2020; Rosen, 2020).

So far, the academic community has focused on the development of mechanisms to bring the digital environment into the regular face-to-face classroom or solving the problems of blended learning methods (Gergó, 2016; Fryer and Bovee, 2016). However, this approach turned out to be fundamentally inapplicable during the lockdown, which is now forcing students to learn distantly; the latter implies taking into account technological and methodological aspects (Godwin-Jones, 2019).

The most serious problem, which seems to be incompletely understood by researchers of pedagogy, is the position of a learner when they find themselves face to face with the digital environment without the control and support of the familiar social environment encouraging the learning process (Galla, 2016). The purpose of this study was to analyze changes in students' assessment of e-learning itself, of their participation in it, and of their academic achievements during three months of COVID-19, when the training completely switched to the online mode.

2. Literature review

Many researchers note that the problem of distance learning during the lockdown has three major dimensions (Bilawar, 2020; Lo Presti, 2020; Sanad and El-Sayyed, 2020). The first dimension is the socio-technological one. The digital environment is far from being deep enough in all countries of the world. This particularly applies to developing states, where not every family at all has the necessary electronic devices to connect with remote learning content and educators. What is more, this problem is exacerbated by the fact that the capacity of local networks, communications, and cloud services can hardly be called sufficient (Favale et al., 2020; World Bank, 2020). Low-socioeconomic status households and middle-class people with labor-intensive employment are just unable to help their children or control learning quality (Mafunda and Swart, 2020; Opaluwah, 2020).

The second aspect of the problem is methodological. Some works analyze the application of digital technologies and tools for teaching (Yu and Altunel, 2018). Teaching English as the main international language has long and closely been associated with e-learning that involves mobile-based education, the opportunity to contact and communicate with native speakers online, and other remote opportunities to improve language skills (Sheina and Grashchenkova, 2020; Vulchanova et al., 2017). Though, in many cases, there are no methodologies and frameworks for the implementation of all these tools to teach large groups of students. In most scenarios, despite the rapid proliferation of massive open online courses, they still cover a relatively small proportion of learners (Ivleva and Fibikh, 2016). Moreover, there are problems related to the certification of the knowledge gained and the recognition of such certificates by employers, which is a critical issue for most users when choosing a learning method (Langan et al., 2016).

The third aspect of the problem under consideration is psychological. One of the main challenges of the digital environment stems from the dehumanization of the information space. Most of the content offered and actively promoted on the Internet is either commercial or downright useless for a particular user (Santoso et al., 2016). It is mainly entertaining in one way or another and serves as a distraction mechanism. The separation of the learning process from the need for constant interaction with digital information sources and devices often creates conditions for deep learning, which is critical in forming deep knowledge and professionalism in any field (Ahmad, Farman, and Jan, 2019; Ravi et al., 2016). When the learning process takes place exclusively in a digital environment, the only factor in its success is students' deep motivation and involvement (Kurahila and Kotilainen, 2017; Luo et al., 2018).

At the same time, even in developed economies characterized by the well-established digital environment, a number of teachers are cautious about online-based learning and poor digital literacy (Chetty et al., 2018; Rosen, 2020). Accordingly, they face significant practical and psychological challenges when developing e-

learning content, scheduling classes, as well as monitoring the academic success of students online (Seedhouse, 2017). It should be emphasized that in this particular case, digital literacy should be considered not as the capability to use digital devices and technologies that have already become common but as the ability to master new technologies quickly, skipping the period of long psychological adaptation (Rosen, 2020). A large proportion of the world's population, especially over the age of 40, find it difficult to achieve this level of digital literacy (Chetty et al., 2018; Luo et al., 2018; Yeung and Lee, 2019).

A number of researchers point out that in terms of motivation, engagement, and distraction mechanisms, there is no significant difference between adults and children/adolescents in the process of e-learning (Bennett and McWhorter, 2020; Langan et al., 2016). Even though it is known that the lockdown has had almost the same effect on school, university, and post-secondary education, there is still little research on this topic (Bonaf and González, 2020; Krishnapatria, 2020; Sanad and El-Sayyed, 2020). The problem touched upon in this study lies in the investigation of changes in the quality of education and its assessment, usefulness, and acceptability in the context of the transition from exclusively or predominantly in-class education to e-learning.

In the modern research literature, there are many quantitative and qualitative studies reviewing the transition processes in education that arose due to the sudden implementation of distance learning and the engagement of the vast majority of school students and adult learners into the digital environment. However, relatively few works were devoted precisely to students' attitudes towards this transition and their self-assessment. The present paper aims to partially eliminate this gap by scrutinizing the Russian experience of teaching English as a foreign language in the context of the COVID-19 pandemic as an example.

Among the tasks of the current study are to identify the nature of the transition from classroom learning to e-learning, analyze changes in academic performance and student motivation, and explain the results obtained. The research question is: How much did students' e-learning assessment, e-learning participation, and academic performance change after three months of online learning because of COVID-19? The practical significance of the research is in the possibility of using its findings to improve all segments of education. Further development of the digital environment, its totalization, and possible future lockdowns of epidemiological, social, or technogenic nature require the readiness of the education system to ensure effective preparation in the context of distance education.

3. Methods and materials

3.1 Participants

The study involved 600 candidates from five private foreign language schools focused on teaching English to adults in the city of Moscow. The sample distribution ensured an even number of candidates from each educational institution participating in the study (120 participants from each school). The research sample was statistically significant for the described general population with the accuracy of $p = 3.90$. The change in the size of the general sample in connection with the change in the number of students during the lockdown was checked, and it did not affect the statistical reliability of the study.

The distribution of participants by gender and age was balanced in order to maximize the statistical reliability of the results. The study involved 296 male and 304 female learners aged 20 to 42 years. A more detailed description of participants' distribution by category is presented in Table 1.

Table 1: Distribution of research participants by gender and age

20-25		26-30		31-35		35-42	
male	female	male	female	male	female	male	female
73	76	73	74	76	77	74	77

The survey was conducted throughout November 2020. Given the fact that there was an active change in the number of students during the lockdown, the study involved only those participants who had already started learning at the time of transition to e-learning and continued to study in the same group for three months after the beginning of the study.

3.2 Research design

All the persons enrolled in the research process were asked to rate three statements on a five-point Likert scale in a short survey. Score (1) reflected a strong disagreement, while score (5) indicated complete agreement with the statement given. The survey was conducted twice; the first time was after one week of study, while the second time was after three months after complete switching to e-learning mode.

Validity and reliability, in this case, were not determined because instead of a questionnaire in which all items should achieve the overall goal of an adequate factor assessment of the measured parameter, three separate statements were used, each of which was independently measured as a separate variable. Correspondingly, the Likert scale is the most adequate method for measuring such variables.

The survey included the following three statements:

1. E-learning is useful for developing my English language skills and knowledge.
2. E-learning suits me in the process of developing my English language skills and acquiring knowledge.
3. I agree to continue e-learning in the future.

The obtained responses were averaged on the basis of the ordinary arithmetic mean method. For the sake of simplicity, the collected data were given with the accuracy of two decimal places. The means reflecting individual age and gender groups were calculated separately (Figures 1 and 2).

This survey method was chosen because it was possible to obtain immediate assessments of the most important variables from the participants. In this case, the subjectivity of the participants was not eliminated but, on the contrary, taken into account. This is important because the subjective assessment of the participants demonstrates the reasons for their motivation and involvement, for example, reasons for not continuing the course, as indicated further in the Results.

To obtain more reliable data, the assessment of student knowledge was also performed on the basis of the standard tests used in these educational institutions on a 100-point scale. This assessment was also carried out twice: one week and three months after the e-learning started. The distribution by age was not tackled in order not to overload the text as there were no correlations or significant features found in relation to this indicator.

To clarify and triangulate the data collected, another unstructured interview was conducted among the candidates from all study participants willing to participate. They were asked to describe the factors that led them to develop a negative perception of e-learning compared to traditional face-to-face instruction. Those study participants who wished to take part in this unstructured survey were asked to present the data in the form of concise and straightforward statements by e-mail after the experiment's completion. These responses were analyzed from a semantic point of view and brought into groups of the same type. Semantically similar or identical definitions or statements were reformulated to achieve maximum clarity and consistency. Then the resulting formulation was approved by the surveyed for a second time, who confirmed the adequacy of the presentation of their point of view. Hence, possible problems with the incorrect definition of the general semantics of the survey participants' comments were removed. Statistical processing of the results of this survey was not carried out due to its exclusively narrative and qualitative nature.

3.3 Statistical processing

All the averaged survey results and the outcomes of assessing objective knowledge through testing were analyzed to determine the standard deviation in the study group. This step was aimed at determining the acceptable statistical error when comparing the values obtained. The Pearson correlation coefficient was established between all data groups. All correlation values below $r = 0.35$ were discarded as insignificant. In addition, correlations between the values that showed no statistical discrepancy (if they were within the statistical error) were not considered as significant.

3.4 Research instruments

The statistical data were processed and visualized in Microsoft Excel 2017.

3.5 Ethical issues

The study aim, procedure, and objectives were explained to the persons enrolled in the fullest manner possible. Therefore, their participation was completely voluntary. Among those who agreed to take part in the experiment, a limited number of individuals that met the requirements of statistical sample homogeneity (see above) were selected. No personal data of the persons involved were collected, processed, or stored during the study or after it. Each participant had his/her own unique e-mail address with a unique identification number; this guaranteed complete anonymity and, at the same time, the reliability of the obtained results.

3.6 Research limitation

The study is representative only of selected educational institutions. It was conducted in one large city (Moscow, the Russian Federation), whereas the level of education, its quality, as well as other socio-economic factors vary significantly across regions and may also differ from similar indicators obtained in other countries. In addition, the study is dealing only with the shift of learning English as a foreign language to online mode.

4. Results

The results of the survey designed to reveal changes in learners’ attitude towards e-learning during the COVID-19 are presented in Figures 1 and 2. Hence, Figure 1 shows that the assessment of e-learning comfort by female respondents decreased greatly (from 3.70 up to 3.14 on a five-point Likert scale), while the assessment by male participants remained virtually unchanged. On the other hand, the usefulness score dropped significantly in the case of both male and female research participants (from 4.10 to 2.98 and from 3.80 to 2.26, respectively). Due to the fact that the learning content, curriculum, and instructional materials did not virtually change, the assessment of their usefulness was subject to variations mainly because of e-learning introduction and the shift from the traditional classroom environment guided by a teacher to the exclusively digital one. It can also be assumed that the initial high positive impression largely reflected respondents’ overestimated expectations concerning e-learning. The assessment could be affected by the possibility of continuing education despite the lockdown.

No less important observation was the critical decrease in the perception of continuing e-learning acceptability. It reduced from 4.72 and 4.29 to 3.01 and 2.61 for male and female research participants, respectively. It should be noted that in both cases, female respondents’ points of view concerning the usefulness of e-learning and the acceptability of its continuation were much more critical – according to their answers, this learning method lacks convenience.

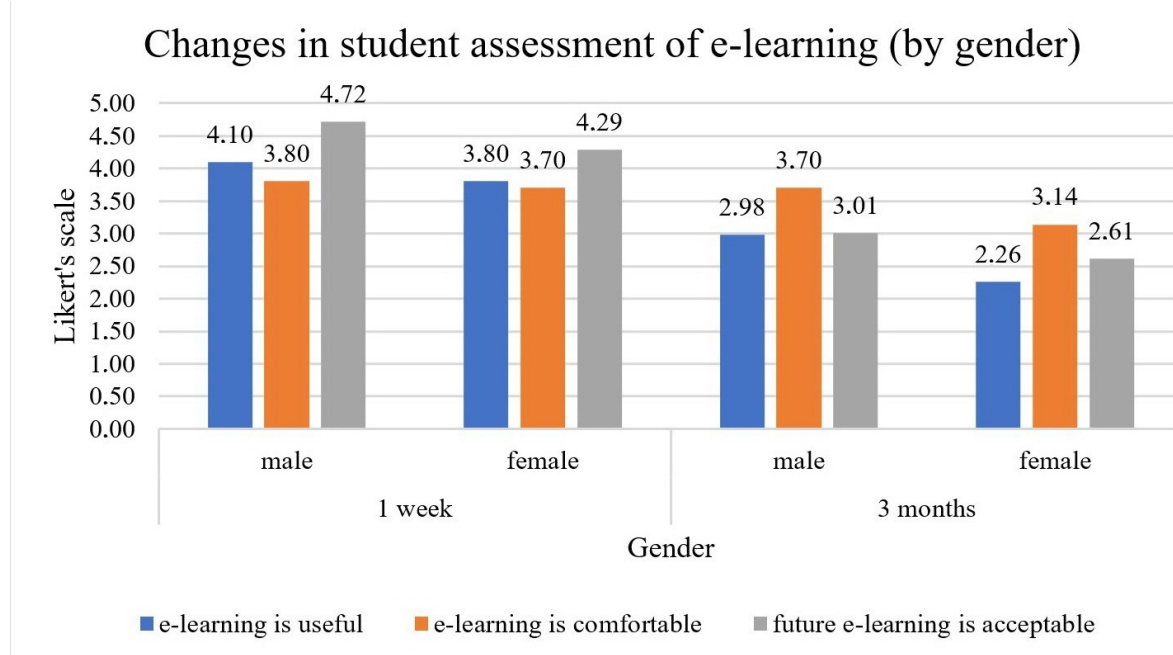


Figure 1: Changes in learners’ perception of e-learning (by gender)

Figure 2 visualizes changes in the learners' stance towards online-based education (by gender). As can be seen, there was a critical decrease in their perception of continuing online study acceptability. Table 2 gives these data in numerical terms.

Table 2: Changes in student assessment of e-learning (by gender)

	1 week		3 months	
	male	female	male	female
e-learning is useful	4.10	3.80	2.98	2.26
e-learning is comfortable	3.80	3.70	3.70	3.14
future e-learning is acceptable	4.72	4.29	3.01	2.61

On average, there was a decline in e-learning assessment from 4.74 to its minimum value of 2.37 (in the group of participants aged 26-30). In parallel, in all age groups, except 20-25 years old individuals, a statistically significant decrease in their outlook of e-learning usefulness was observed (from the maximum value of 4.39 to the minimum value of 3.39). A reduction in this indicator in the group of individuals aged 20-25 was also notable. However, provided that it fell within the statistical error, it could not be taken into account.

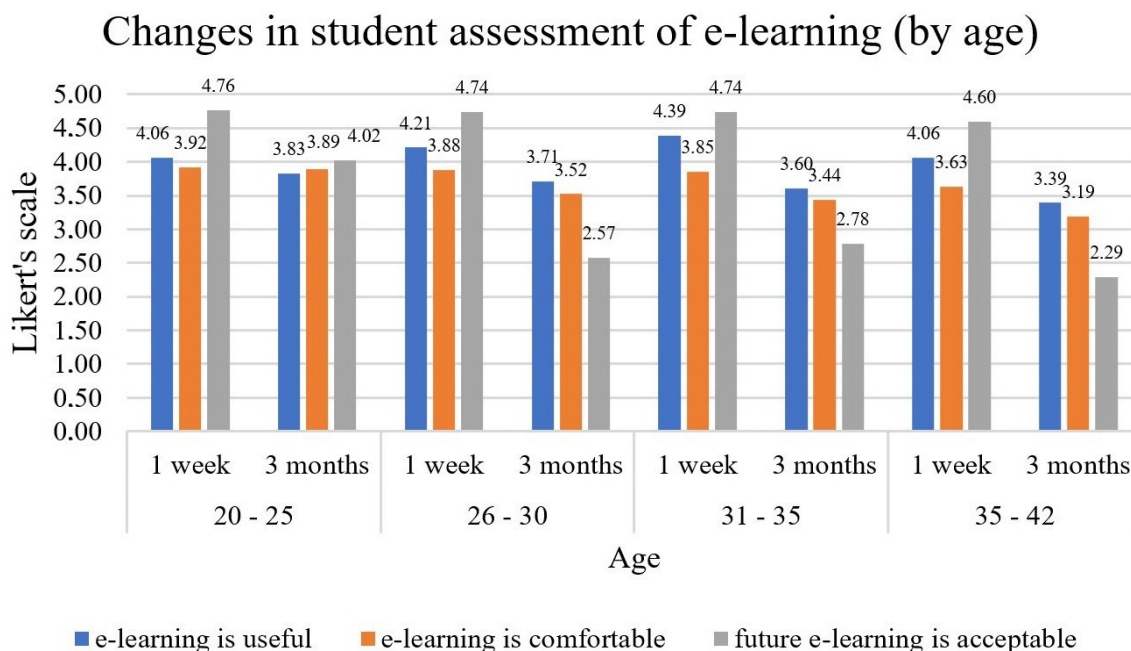


Figure 2: Changes in learners' perception of e-learning (by age)

There was a much smaller discrepancy as regards the suitability of e-learning. A statistically significant difference was noted only in two older age groups: in the 31-35 age group, there was a decrease from 3.85 to 3.44, and in the 36-42 age group, a diminishment from 3.63 to 3.19 was found. These data are presented in Table 3.

Table 3: Changes in student assessment of e-learning (by age)

	20-25		26-30		31-35		35-42	
	1 week	3 months	1 week	3 months	1 week	3 months	1 week	3 months
e-learning is useful	4.06	3.83	4.21	3.71	4.39	3.60	4.06	3.39
e-learning is comfortable	3.92	3.89	3.88	3.52	3.85	3.44	3.63	3.19
future e-learning is acceptable	4.76	4.02	4.74	2.57	4.74	2.78	4.60	2.29

In order to get more reliable data, the results obtained from an objective language proficiency test (conducted at the beginning of the e-learning) and the results collected three months later were compared (Table 4). As a consequence, a considerable drop in the grade point average for both genders was revealed. Among the groups of male and female participants, the standard deviation was no more than 4.75 and 4.18, respectively. Thus, a decrease in academic success was an objective phenomenon that correlated with participants' subjective assessment.

Table 4: Changes in participant performance assessment during the lockdown

1 week		3 months	
male	female	male	female
47.95	52.88	37.18	46.56

Another factor that could influence a decline in academic performance and the evaluation of e-learning by research participants was the change in the number of students during the first three months of the lockdown in the studied educational institutions (Table 5). From the beginning of the quarantine, in the wake of increased interest in e-learning and hopes for acquiring a new job or profession, the number of new students studying remotely increased to 49.73% (excluding the dynamics over three months under consideration). However, 42.14% of students, including those who joined the distance learning course within three months, either stopped participating and did not complete the program or formally announced their decision to drop out. In addition, 64.6% of those who joined the learning process during the lockdown dropped out of the course before the end of the first three months of learning.

Table 5: Changes in the number of participants during the COVID-19-related lockdown

Total at the start of the lockdown	11857
Total at the end of the third month	10271
Joined during lockdown	5896
Dropped out during lockdown	7482
Joined and dropped during the lockdown	3809

A strong correlation was found between all test results and the results of assessing the usefulness of e-learning and its acceptability in the future by all gender and age groups (Table 6). Besides, a certain consolidation of the Pearson's correlation coefficient was noted: for all the indicated groups, it ranged between 0.73-0.81 and thus was recognized as high. In view of the foregoing, an inference could be made that the decline in test scores and the decline in motivation and engagement revealed by student assessments are closely interrelated.

Table 6: Pearson's correlation between participants' e-learning assessment and performance test outcomes

	performance assessment			
	1 week		3 months	
	male	female	male	female
e-learning is useful	0.73	0.74	0.79	0.81
e-learning is comfortable	0.73	0.74	0.77	0.79
future e-learning is acceptable	0.75	0.77	0.74	0.80

Data presented above suggest that the provided e-learning course clearly failed to meet some important learners' needs or was poorly organized. Therefore, another unstructured survey was conducted among the participants who wished to share their opinion ($n = 432$). Within this examination, they were asked to describe things that interfered with the learning process and factors that led to their negative evaluation of the e-learning experience compared to the traditional face-to-face classes. Since the provided opinions were reformulated and further approved by participants themselves, it was impossible to accurately indicate how many individuals participated in the formulation of each of the presented points.

In general, the reasons for the negative evaluation of the e-learning experience were as follows:

1. Unstructured timetable, class omissions, late delivery of educational materials and feedback by teachers.
2. Lack of a full set of training materials and content in the form of a complete training course. The content was largely created by teachers during the learning process.

3. Homework and language mistakes were not checked and analyzed by teachers in contrast to classroom learning.
4. Lack of communication with the educators and other students resulted in no proper foreign language communication practice.
5. Lack of constant motivation provided by a teacher in the classroom.
6. Lack of ability to allocate time to study at home independently due to the availability of numerous personal affairs and activities as well as the constant presence of other family members.
7. Failure to deal with digital distractions, primarily with those of entertainment nature.

Summing up the obtained results, it can be concluded that the transition to an exclusively online foreign language learning in those institutions that used classroom instruction led to a drop in academic performance, a decrease in motivation to continue learning, as well as a worsened judgment of the quality and usefulness of e-learning by most learners.

The study also revealed that female participants generally found the learning process more important – they showed better academic progress even in the context of deteriorating learning conditions and expected them to be improved. Older learners (over the age of 30) generally had a more pessimistic view of e-learning usefulness, fewer expectations for it, and a weaker intention to continue learning in this way. The drawbacks in education and the unwillingness of educational institutions to operate in a completely digital environment led to the fact that about half of the candidates dropped out or refused to continue training immediately after starting a course. According to the participants, the most important subjective factors of this process were the lack of motivation, little involvement, and scarce contact with a teacher and the social environment.

5. Discussion

The results of the present study overlap with a number of related works that were conducted in developed and developing countries and outlined the processes of transition to e-learning (Chetty et al., 2018; Sanad and El-Sayyed, 2020; World Bank, 2020; Yeung and Lee, 2019). As already mentioned, it is extremely hard, if not almost impossible, to find research on the sudden education shifts during the COVID-19 lockdown period. This research topic is presently being developed and is still under investigation. However, there is some evidence (Krishnapatria, 2020) that the direct transition to e-learning, but not through blended learning, leads to noticeable academic performance deterioration. The results obtained in the present study are somewhat different than those obtained in the cited sources; this may be attributed to tougher transition conditions and lower degree of education system readiness.

Higher educational demands of female respondents compared to those of male respondents are often noted in quantitative studies in the field of education (Stone et al., 2016; Yeboah and Smith, 2016). For the most part, they are associated with women's greater responsibility to their current or future families and other social factors. The present research demonstrates a similar correlation between grades and real objective learning outcomes for men and women, but objective learning outcomes for women are better throughout the entire period of e-learning. According to a number of scholars, similar results can also be explained by the greater psychological stability of women in overcoming difficulties in the learning process (Rosen, 2020; Sanad and El-Sayyed, 2020; Sheina and Grashchenkova, 2020). Besides, women may be less prone to loss of interest and motivation and may retain them longer than men (Stone et al., 2016; Sigit et al., 2019).

It is often suggested that the stress of education digitalization is reduced through gamification tools. Gamification can involve both the use of special computer games with educational content as well as the use of available free game applications for the educational process gamification. For example, a certain level or "rank" can be a reward for achieving a certain level of success. The learning process can utilize the character development pattern of a fantasy role-playing game (Hung et al., 2018; Poole and Clarke-Midura, 2020). As noted by the researchers, the means of gamification affect adults as effectively as they do children and adolescents (Hung et al., 2018; Poole and Clarke-Midura, 2020).

Recently, developed countries with a deep penetration of the digital environment are characterized by the transfer of social communication in the context of learning in virtual reality, which allows, if the necessary equipment is available, to completely eliminate the problems identified in the present study by its participants (Kövecses-Gósi, 2018). Many studies prove that the use of digital tools by the majority of users involved in e-

learning is regarded as improvement in usability (Santoso et al., 2016; Rosen, 2020). The results achieved during this examination demonstrate the importance of this criterion for maintaining involvement and academic achievement.

The problems of establishing online partnerships to communicate with native speakers, other students, and a teacher have been solved for some time with the help of social networks and specialized groups that allow expanding social contacts and even organizing visits to other countries (Al-Shammari, 2020). In the case of the present study, the lack of relevant knowledge, and in particular, the lack of willingness to establish network communication on the part of educators, led to a decrease in the motivation and educational progress of students (Dzekoe, 2020).

E-learning creates additional opportunities for individualizing learning of each student, but only upon the availability of three important factors: technological infrastructure to provide access to information and resources, including communication ones, good digital literacy skills (Chetty et al., 2018; Rosen, 2020), and readiness to accept trending technologies (Gharib et al., 2016; Pallotti, Niemants, and Seedhouse, 2017). In this case, e-learning contributes to the development of critical thinking, promotes the ability to solve real problems competently, and encourages independent development of an individual learning path, which is one of the most important skills of the 21st century.

6. Conclusion

This research addressed one of the most acute and relevant modern-day pedagogical problems - forced digital transformation of education due to the global COVID-19 lockdown. In the wake of this transformation, traditional in-class instruction switched to the fully digital learning model, for which the education system in most countries, even in highly developed ones, has not yet been fully prepared. The novelty of this study lies in the search for the reasons and characteristics of changes in academic performance, motivation, and student involvement in e-learning under the current conditions. The research process involved 600 respondents from five private specialized educational institutions located in Moscow (the Russian Federation), which suddenly switched from traditional classroom instruction to e-learning. The examination process presupposed study participants to undertake two repeated surveys (one week and three months after the lockdown), in which usefulness, comfort, and acceptability of continuing e-learning were rated on a five-point Likert scale. The study showed that the perception of the male and female participants of the acceptability of continuing online English learning dropped from 4.72 and 4.29 to 3.01 and 2.61, respectively. The female respondents' perception of the suitability of e-learning decreased significantly (from 3.70 to 3.14 points). As regards the usefulness of learning English as a foreign language online, the score dropped significantly according to both male and female participants (from 4.10 to 2.98 and from 3.80 to 2.26, respectively). In general, for individuals aged from 20 to 42, similar changes were found. However, especially notable was that the persons over 30 demonstrated lower final scores than others. At the same time, a more pronounced decrease in an objective measure of academic success was inherent to the group of men.

Today there is a need for a further thorough investigation of digital transformation in terms of the effectiveness of various blended learning models and increasing the digital literacy of teachers, including in other areas. The practical significance of this work is in the applicability of its findings for the further transformation of learning programs and additional preparation of educators with the aim of facilitating learning transition to an online mode. Similar research can be conducted in other world regions to obtain more comparative data and investigate different learners' perceptions.

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