





Article

Sustainability Analysis of the E-Learning Education System during Pandemic Period—COVID-19 in Romania

Constantin Aurelian Ionescu ¹, Liliana Paschia ¹, Nicoleta Luminita Gudanesu Nicolau ^{1,2}, Sorina Geanina Stanescu ³, Veronica Maria Neacsu Stancescu ⁴, Mihaela Denisa Coman ^{3,*} and Marilena Carmen Uzla ^{1,5}

¹ Faculty of Economics, Hyperion University of Bucharest, 030615 Bucharest, Romania; aurelian.ionescu@hyperion.ro (C.A.I.); liliana.paschia@hyperion.ro (L.P.); nicoleta.gudanesu@hyperion.ro (N.L.G.N.); carmen.uzlau@hyperion.ro (M.C.U.)

² Institute of National Economy, Romanian Academy, 050711 Bucharest, Romania

³ Institute of Multidisciplinary Research for Science and Technology, Valahia University of Targoviste, 130004 Targoviste, Romania; geanina.stanescu@icstm.ro

⁴ Mental Health Center, Targoviste County Emergency Hospital, 130083 Targoviste, Romania; psihologveronica@yahoo.com

⁵ Institute of Economic Forecasting, Romanian Academy, 050711 Bucharest, Romania

* Correspondence: coman.denisa@icstm.ro; Tel.: +40-072-326-6666

Received: 28 September 2020; Accepted: 28 October 2020; Published: 30 October 2020



Abstract: The unprecedented situation of the COVID-19 pandemic has generated radical transformations of the Romanian education system, forcing teachers as well as students to adapt in a short time to new social conditions and to the online learning process. The paper analyzes the sustainability of the e-learning system implemented in Romania during the pandemic, and it is based on an opinion poll based on a questionnaire developed on three levels of schooling (middle school, high school, and university), analyzed from three perspectives, teachers–students–parents, and identifying the possible psychological effects on students, resulting from the corroboration of social isolation with the online continuation of the educational process. Although before the pandemic the e-learning system was rarely used by both students and teachers, the research results indicate that students have accepted online learning, even if they find it less attractive than the traditional education system. From the teacher–student–parent perspective, e-learning is an effective sustainable learning solution in current and future conditions, but it requires good collaboration between parents and teachers, careful monitoring of children’s/students’ behavior to identify and combat possible effects determined by the changing way of learning and of social realities.

Keywords: e-learning; online learning; sustainable learning process; information technology; virtual learning

1. Introduction

The rapid worldwide spread of the new coronavirus (COVID-19) has created unprecedented challenges for safety, health, education, the economy, and job stability. According to UNESCO statistics, in May 2020, 1.21 billion students, respectively 69.3% of their total number, could not return to schools and universities [1]; thus, the closure of educational institutions generated significant social and economic costs. According to UNESCO, the main effects generated by the closure of schools were [2] (i) interruption of the educational process; (ii) compromised nutrition: school closures affect a significant number of children and young people who rely on free meals or discounts offered in schools for

food and healthy eating; (iii) confusion and stress for teachers: teachers are often insecure about their obligations of identifying the optimal way to maintain connections with students to support learning, and the transition to online learning platforms tends to be quite difficult and complex, presenting both human and technical challenges; (iv) parents unprepared for online and home schooling: parents often need to facilitate their children's learning at home; (v) significant economic costs for working parents, because they have to stay home for childcare during the closing period, but there may also be gaps in childcare, in the case of low-income families who cannot afford a parent to stay at home to ensure proper care of children; (vi) increasing drop-out rates: this is a challenge especially in the case of prolonged school closures and when economic shocks put pressure on children to work and generate income for families in financial difficulty; (vii) increased exposure to violence and exploitation; and (viii) social isolation: schools are the hubs of social activity and human interaction, and by closing them many children and young people lose the social contact that is essential for learning and development. The effects of the COVID-19 Pandemic of 2020 on the dynamics of changes in interpersonal relationships were analyzed by Antonini Philippe, R. Schiavio, and A. Biasutti M [3], in a study on teachers and students in music and sports, whose results suggested the possibility of grouping in the following dimensions: establishing a new relationship; working on a new form for the relationship; development of functional, positive adaptations; and the development of non-adaptive, detached relationships.

In the context of the current COVID-19 pandemic that also affected Romania, economic and social problems, determined by the reduction of the activity of economic entities and public institutions, the reorganization of the activity of health services, social assistance, and especially education, lead directly to increase the vulnerabilities of children, families, and communities by exacerbating pre-existing risks, such as limited access to social services, health care, inequalities in access to education, and poverty [4]. In order to continue school activities at national level, it was recommended to implement online education, as a tool that contributes to the protection of the health of students and teachers, as well as parents and grandparents. The parents of primary school students were faced with an unprecedented situation, and their questions were: "Who do I leave my child at home with? Who can keep an eye on him while I'm at work?" These unanswered questions created tension and family conflicts, making the situation even more difficult for single-parent families. All the discussions related to this topic have negatively influenced the children, as they do not have the ability to be fully aware of these times. They developed feelings of guilt, fear, and uselessness and saw themselves as their parents' problems, in addition to the fact that they changed their routine and this change again had a negative effect on their personal development. When the schools closed, they went into a kind of "vacation" and so they gave up the daily schedule: they gave up waking up at the same time, doing homework, participating in extracurricular activities, etc., without anyone telling them what will happen in the future. In other words, the period in which all life was put on "break" led to possible negative psychological effects.

The aim of the paper is to perform an analysis of the e-learning system implemented in Romania, during the pandemic generated by the SARS-COV-2 coronavirus, between March and June 2020, to highlight the perception of the main actors involved in the educational process (students, teachers, and parents). The analysis is based on a questionnaire, developed on three categories of learning (middle school, high school, and university). At the middle school level, the three-dimensional e-learning system is analyzed from the perspective of student-teacher-parents. At high school and university level, the analysis is elaborated two-dimensionally from the student-teacher perspective. The topicality and innovative nature of the paper is supported by the analysis undertaken and by the fact that an in-depth research is needed that can identify possible problems resulting from the exclusive use of the online education system, because the time for ending the coronavirus pandemic and the school/university year 2020–2021 can be based on the intensive use of the e-learning educational system, or on the use of a mixed education system depending on the evolution of the pandemic in Romania. The paper is structured as follows: introduction, literature review that presents a selection of research relevant to the scientific approach undertaken, materials and methods, results, and conclusions.

2. Literature Review

Online education can take place during pandemics [5], such as the current period when the entire planet is affected by the SARS-COV-2 coronavirus. Online education provides unprecedented access to learning opportunities, as evidenced by its role during the coronavirus pandemic of 2020 [6]. This model of education can contribute to democratization and to the evolution of the teaching act [7], by the fact that students must actively participate in online courses to achieve significant results [8], and the interaction between student–teacher–colleagues–digital course materials is essential and can be achieved through simulation, research, role play [9], open discussions involving all participants [10,11], student-centered education [12]. Factors that ensure the success of the online learning process are: Information Technology and Communications (IT&C), the teacher and the student's experience in using IT&C. Although the teacher plays a central role in online education [13], the allocation of time required for study and student discipline are factors influencing the educational process [14]. The online learning process can be achieved by combining recorded videos and live courses with greater online interaction that can help reduce the impact of unstable networks and increase the active participation of students [15].

Online education offers new courses, interesting learning methods and encourages students to work at their own pace and enjoy the challenge, freedom, and independence that result from this educational process [16]. Digital course materials remain up-to-date and can be updated at any time [17]. The creation of digital courses can be an opportunity for teachers to research and experiment with various technologies for content presentation, to improve their digital skills, to stay in touch with the needs of students [18]. Principles with high impact for online education are (i) high relevance between online training design and student learning, (ii) efficient provision of online training information and active student participation, (iii) adequate assistance provided by teachers to students, and (iv) emergency plan for dealing with unexpected incidents of online education platforms [19]. Online education can be especially useful for students with special needs, as they have unlimited access to learning [20]. Online education reduces potential problems related to gender, race, and other physical characteristics that can lead to conflicts between students [21]. Online education is not about geographical constraints, so students can learn from the best teachers no matter where they live and can participate in the best schools in the world, regardless of geographical location [5]. In online education, small classes (groups) through which the teacher can support personalized learning, building collaborative knowledge, student-centered activity are formed [22]. Individual learning styles must be taken into account in the instructional design model used in online education [22,23]. Developing the strategies needed for successful online teaching and learning requires an understanding of learning styles and how they can best be addressed in the online environment [24,25]. Online education saves costs for both students and educational institutions [26], but the quality of online teaching and learning must be ensured [27].

The online educational process involves a multidimensional effort by the teacher to determine a high degree of involvement of online learners, and student involvement can be established in online learning through communication, constant feedback on student performance and critical discourse. Connecting with students is essential in an online learning environment [28]. In the online educational process, the online time spent by students is directly proportional to the teacher's online time and the prompt response of the teacher to questions about online activities carried out by students [29]. The guidance provided by the teacher generates a significant effect on the student's learning process [30]. The learning performance of online students can be assessed by the following indicators: course logins, lesson reading, lesson quiz activity, and lesson quiz scores. In order to increase the performance of online education, from the point of view of pedagogy, students should be encouraged to complete as many online lessons as possible, including tests, to take tests before, during and at the end of the course. All these considerations can generate higher grades, which is a gain for both students and educational institutions [31]. Online education contributes to the development of communication skills, as every student and teacher must communicate, and communications must be clear [32]. Students prefer interactive tutorials to online lectures or materials, which they can access on their own as needed.

They also mainly access the online material that they think will be most useful for obtaining higher grades and prefer online materials that are related to the results of the assessment, rather than those intended for a better understanding of the course [33].

The quality of the platform used in the educational process has a favorable effect on the performance of students in online education. The quality of data and the quality of learning units, systems, services as well as compatibility with the needs and expectations of students can contribute favorably to increasing user satisfaction and effective use of the online education system [34], as well as to accepting opportunities generated by the online learning process [35]. Jordan, C. notes that activities conducted through the Moodle platform foster a constructivist approach (constructivism is a way of knowing where students collaborate, reflect, and use their own experiences to build new knowledge) of learning and can provide students with types of learning. learning experiences, they want. The effectiveness of online activities depends largely on the role of the teacher in designing and directing the online learning experience [36]. Through the analysis of a course conducted through the Moodle platform Han, Y., Wei, S., and Zhang, S. (2015) find that learning analysis is effective in supporting tutors' reflection on online teaching and interactive learning, causing tutors to focus on key teaching and learning activities [37]. Small, F., Dowell, D., and Simmons, P. (2012), following the research conducted, finds that the tools that allow instructors to communicate with students and vice versa are more important for students and more satisfying for them than the tools that allow students to interact with each other [38]. Biasutti M. highlighted the aspects associated with satisfaction resulting from the use of a collaborative e-learning module such as collaborating, comparing ideas, the usability of the platform, group planning, and workload management, etc. [39].

E-guests can facilitate students' learning process, as they bring practical experience to the online educational environment. E-guests from different regions offer students an opportunity to learn from specialists they would not necessarily have access to in the traditional classroom [40]. Haythornthwaite, C. believes that learning outcomes can be associated with connectivity through online networks and through the open online exchange of information in the context of various contemporary information practices. Thus, the learning process can be seen as a social network relationship, an interpersonal relationship and a result of interaction and connectivity and how network connectivity can be used as input for designing new learning environments [41].

The online learning experience becomes more attractive for online learners if a positive learning environment is created and maintained, multicultural learning communities are built [42], constant feedback is provided in a timely manner; and the appropriate technology is used to deliver the course content [43,44]. An online learning environment must be culturally inclusive, so there is a direct relationship between students' cultural aspects and the organizational, technological and pedagogical components of online learning that can help improve the quality of learning for all students [45]. Heather Robinson, Maha Al-Freih, and Whitney Kilgore highlights the role of emotions in the online learning process, through the prism of care theory. A strategy must be developed and implemented having as fundamental elements the way students are cared for, the specific behaviors of the teacher and the elements of the course design that support the emergence and maintenance of a climate of care in an online learning environment [46]. Vikas Gupta and Namita Jain believes that the online education model cannot completely replace the traditional educational model, but rather can complement it by providing a complex experience for students and teachers. At the same time, the existence of a mixed educational model, in which the best online and offline methods are used can turn into an optimal experience for stakeholders [47]. Wdowik, S. believes that a blended learning system can enable the teacher to be more accessible, supportive, to expect and support high standards of education, to offer challenging activities that can generate various interactions and to promote the development of more raised to improve the level of the educational process. The blended learning system contributes to increasing the involvement of students, the quality of student learning and their educational experience [48]. Zhang, T.; Shaikh, Z.A.; Yumashev, A.V.; Chład, M. note from conducted research [49] that the success of distance education is based on the use of smart technologies and

self-adjusting learning strategy. The results of learners' progress in self-assessment suggest that learning success has been achieved through: optimized structure based on levels of learning content; a strong student involvement; focus on practical skills; a flexible approach to social interaction; personalized guidance; ease of use of advanced technologies; and a progress-oriented approach. The self-regulated e-learning model needs to be improved to cover a wide range of digital tools and to fit an independent online platform.

Although online education offers many advantages and has the power to overcome traditional barriers in education in terms of time and space, strategies must be developed to encourage collaboration between students and reduce the feeling of social isolation. Aspects of collaborative learning, organizational and pedagogical structures, philosophical assumptions, and educational settings can be combined to reduce one of the main challenges of online education, namely distance, which contributes to the feeling of social isolation [50]. The feeling of social isolation can be combated by integrating new approaches to incorporate teamwork into online courses and assessing students' self-efficacy in teamwork [51] or by effective strategies for cultivating a learning community, creating opportunities for connection, sharing and reflection, involving participants as facilitators and supporting a global, multilingual community of learners [52]. Huang, P.-S.; Chiu, P.-S.; Huang, Y.-M.; Zhong, H.-X.; and Lai, C.-F. note that a cooperative learning approach using Google Docs has improved learning outcomes, teaching interest and reduced cognitive load, and the collaborative learning approach associated with mobile learning is more effective than personal learning [53]. Alzahrani, N.M. notes that the use of augmented reality (AR) in the e-learning process generates advantages such as: support for kinesthetic (tactile) learning, collaborative learning, student-centered learning, and creative learning. At the same time, AR contributes to the increase of involvement, motivation, attention to interaction, verbal participation, and student concentration [54].

At the international level, UNESCO has compiled a list of applications, platforms, and educational resources that aim to help parents, teachers, schools and school administrators, facilitate student learning and provide social care and interaction during school closure periods, classified on the basis of distance learning needs [55], respectively: resources to provide psychosocial support; digital learning management systems; systems built for use on basic mobile phones; systems with strong offline functionality; Massive Open Online Course (MOOC) platforms; self-directed learning content; mobile reading applications; collaboration platforms that support live-video communication; tools for teachers to create of digital learning content; and external repositories of distance learning solutions.

During the pandemic period generated by the SARS-COV-2 coronavirus, in Romania, the following measures were implemented in the field of education: (i) maintaining the measure of closing schools throughout the state of emergency and alert; (ii) students in the final grades, 8th, 12th, 13th—where applicable, in vocational schools for the final year—will be able to return to school between 2nd and 12th of June, to prepare for national exams; (iii) implementation at the level of the Ministry of Education and Research (MEC) of the “Home School” program, in partnership with the Romanian Television Society; (iv) the modification of the Framework Methodology for organizing and conducting the bachelor's/diploma exams and dissertation, in the sense of conducting the tests for the exams mentioned in the online system, registered in full for each graduate and archived at the faculty level; and (v) continuation of the Euro 200 program—a computer for students from disadvantaged backgrounds; continuing the online learning process [56]. The main learning platforms and tools available and used at national level are described in Appendix A.

3. Materials and Methods

The study performs an analysis of the e-learning system implemented in Romania, during the pandemic generated by the SARS-COV-2 coronavirus, between March and June 2020. A descriptive survey was used based on a questionnaire analyzed from three perspectives: student, teacher, and parent, a survey whose main purpose is to identify respondents' perceptions of the online teaching system and distance learning. The survey was administered to a random sample of 250 teachers,

250 students, and 200 parents, from South-Muntenia Region of Romania. The questionnaires were sent by e-mail and were received answers' only from 211 teachers, 208 students, and 152 parents, whose children, until this pandemic blow generated by COVID 19, went to school participating in classes in the classical system of education and were forced to complete the school year through distance learning. For children under 18 years, the teacher's distributed the questionnaires to parents for completion in their own name or for their children. The distribution and the collection of questionnaires were made between June and August 2020.

The questionnaires were anonymous, instead they had to mention the environment and the type of affiliation of the educational unit (urban/rural; public/private) as well as the level of education (middle school/high school/university). Each questionnaire, regardless of the analyzed perspective, consists of 16 items, of which the first 4 items have a demographic role. For a better understanding of the data provided by the questionnaire, the other 12 questions of the questionnaire are grouped in the following categories: previous use of the online education system (3 items teachers/1 item students/parents), accessibility and e-learning tools (4 items teachers/6 items students/parents), advantages and disadvantages of e-learning (2 items), preferences for further learning (3 items), (Appendix B). For the analysis and interpretation of the data we used the statistical program SPSS 21. The reliability of the questionnaires was calculated using the Cronbach Alpha coefficient. Internal coherence is an important measurement property for questionnaires that intend to measure a single underlying concept (construct) using several items, as in our case when we want to find out the perception of the online education system based on 16 items. The analysis of the reliability of the final version of the questionnaire in this study was performed by analyzing the internal consistency of its elements by Cronbach's Alpha at full scale. The value of the Cronbach's Alpha coefficient is 0.531 (having an acceptable consistency) and we notice that even if we reduce any of the items in the questionnaire the value of this coefficient will not increase significantly, reaching only a value of 0.580 if we give up the Item 8 about the online teaching tools. Although many authors reliably consider a Cronbach's value greater than 0.70 [57–59] there are studies in which a value of 0.50 is considered acceptable for the reliability of the items in the questionnaire [60]. Thus, we consider that we should not give up any question in the questionnaire, as they are not redundant or repetitive, contributing to the validation of the research results.

For each item, the frequencies and percentages were calculated, which allows a comparative analysis and a correlation from the point of view of the three perspectives pursued. Furthermore, it was performed a factorial analysis of the online education system before and during the pandemic period from the students' perspective in order to better describe the profile of students, using Correlation Matrix, Bartlett's Test of Sphericity, and the Total Variance Explained.

4. Results

The study was attended by 211 teachers, 208 students, and 152 parents, the response rate along with demographic information being presented in Table 1. The study sample consists of teachers and students from all three levels of schooling (middle school, high school, and university), and the parents who participated in the study are among those who have children in high school or high school, considering that students are already adults with their own opinions. Of the 211 responding teachers, 88 teach in the Middle school, 76 in the High School, and 47 in the University. Regarding the age category, 33 teachers fall into the age category 21–30 years, 68 are between 31 and 40 years, 65 teachers are between 41 and 50 years, 38 are in the category 51–60 years, and seven over 60 years. Of the 56 middle school students, 9.60% are between 10 and 12 years old and 17.30% are between 13 and 14 years. Of the 91 high school students, 16.80% are between 15 and 16 years, 18.3% are between 17 and 18, and 19.78% are over 18. All 61 university students are over 18 years old.

Table 1. Demographics respondents.

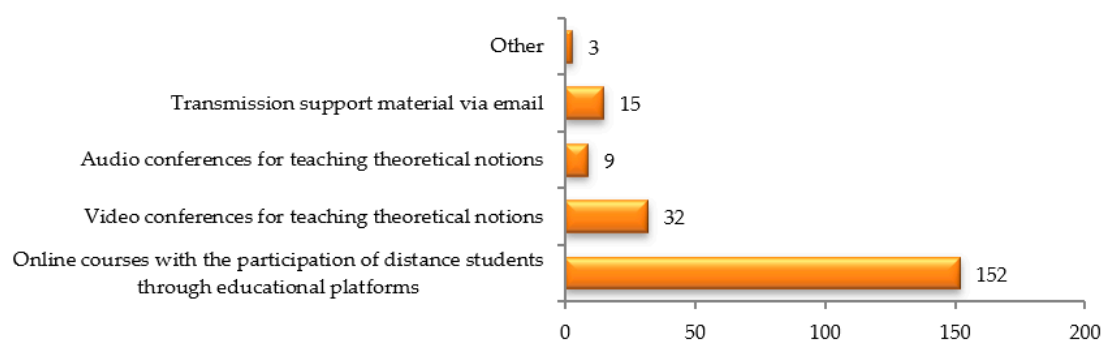
	Frequency			Percentage%		
	T	S	P	T	S	P
Response rate	211	208	152	84.40	83.20	76.00
Teaching/learning category						
Middle school	88	56	99	41.71	26.92	65.13
High School	76	91	53	36.02	43.75	34.87
University	47	61	0	22.27	29.33	0
The environment in which the educational institution is located						
Urban	124	135	101	58.77	64.90	66.45
Rural	87	73	51	41.23	35.10	33.55
Type of educational institution						
Public	185	183	132	87.68	87.98	86.84
Private	26	25	20	12.32	12.02	13.16

4.1. Pre-pandemic Use of the Online Education System

As of 10 May 2020, the COVID 19 pandemic has affected more than 215 countries worldwide, leading to the blocking and closure of economic and educational activities [61]. In Romania, schools have been closed since 11 March 2020, initially for a period of 2–3 weeks, but the situation has extended from one month to another. Thus, if initially the online courses were optional, each teacher could decide if distance teaching was needed, from the end of April the online courses became mandatory for all children in the Romanian education system (middle school, high school, and university). Regarding the use of the online learning system, only 17% of the teachers participating in the study stated that they had used online education before. Of the students, only 9% had previously used the e-learning system, all these respondents being from the university environment. Of the teachers participating in the study, only 36% have participated in digital knowledge improvement courses in the last five years and over 54% believe that they need to improve their IT knowledge in order to cope with online learning.

4.2. Accessibility and E-Learning Tools

The study shows that among the most used teaching tools were online platforms (80%), followed by social networks (15%) and other tools such as telephone conversations or indirect communication but in a much smaller proportion. All teachers participating in the study stated that they had to change their educational activities in the way of online learning in a very short period of time, so that the learning objectives are appropriate to the e-learning system. All teachers indicated that they used at least one teaching method listed in the questionnaire to cover the theoretical notions (Figure 1).

**Figure 1.** Methods of teaching theoretical notions.

For the training of practical skills 153 (72.51%) teachers reported the use of online teaching tools, 52 [24.64%] individual worksheets and only 6 [2.84%] other teaching tools (Figure 2).

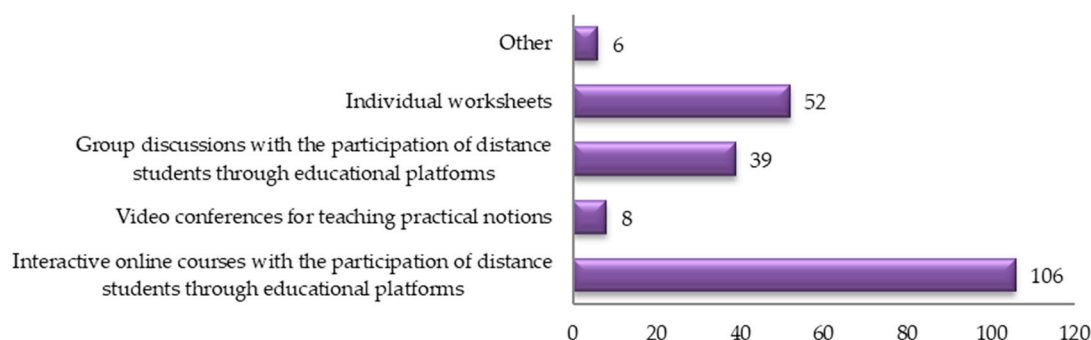


Figure 2. Methods of teaching for practical skills.

Regarding the participation of students in online learning activities: 69 (35.70%) teachers stated that all students participate in online courses, 94 (44.55%) students participate to a large extent, 45 (21.33%) in a small measure and only 3 (1.42%) teachers stated that their students do not participate in online courses at all. How often do online courses take place: 48 (22.75%) teachers take online courses daily; 124 (58.77%) at least three times a week; and only 39 (18.48%) teachers take online courses occasionally, once a week. As it can be seen, all teachers participating in the study took online courses at least occasionally during this period. From the students' perspective, it is observed that 97 (46.63%) of them stated that they participated in all online courses about which they were informed; 62 (29.81%) students partially participated in the courses, the main reason being the lack of resources to access the platforms online; 38 (18.27%) students did not participate in online courses at all (81% of them are from rural areas and do not have an Internet connection at home); 5 students stated that they did not participate in online courses because they were not interested; and 6 of the students participating in the study stated that they could not participate in online courses for other reasons. The answers of the parents surveyed were also in line with the answers of the students, so 79 (51.97%) of them confirmed the children's participation in all the courses they were informed about, 43 (28.29%) partially participated only in certain courses, 25 (16.45%) did not participate in online courses at all because they did not have the necessary resources. Regarding the device used by students surveyed to access online platforms, it is observed that both students and parents said that the most used is the mobile phone 58.17%, followed by computer/laptop being in the preferences of 25.48% of respondents. Only 10 (4.81%) respondent students used the tablet to access online courses and 24 (11.54%) students do not have a digital device to participate in online courses. At the same time, for 92 (44.23%) the device used is personal property, 50 (24.04%) use for participation in online courses a device borrowed from parents, and 22 (10.57%) a device they have from their siblings. We also encounter here a very rare but gratifying situation where 20 (9.62%) of the interviewed students stated that they received from the school the necessary device to be able to participate in online courses; however, 24 (11.54%) of the students still have no IT device available.

4.3. The Advantages and Disadvantages of E-Learning from the Three Perspectives: Teacher/Student/Parent

The COVID-19 pandemic is proving to be a major disruption with consequences for all education systems [62]. Under these conditions and taking into account the norms of social distancing, the educational environment was forced to develop and use e-learning platforms in order to continue the courses and complete the school year [63]. After the COVID-19 outbreak, students and teachers in Romania were forced to switch to online learning. However, teachers, students, as well as their parents found the e-learning system less attractive than the traditional education system mainly due to its limitations on the practical aspects of learning. The main obstacles and dissatisfaction of e-learning raised by the respondents to the questionnaire were summarized and presented in Figure 3.

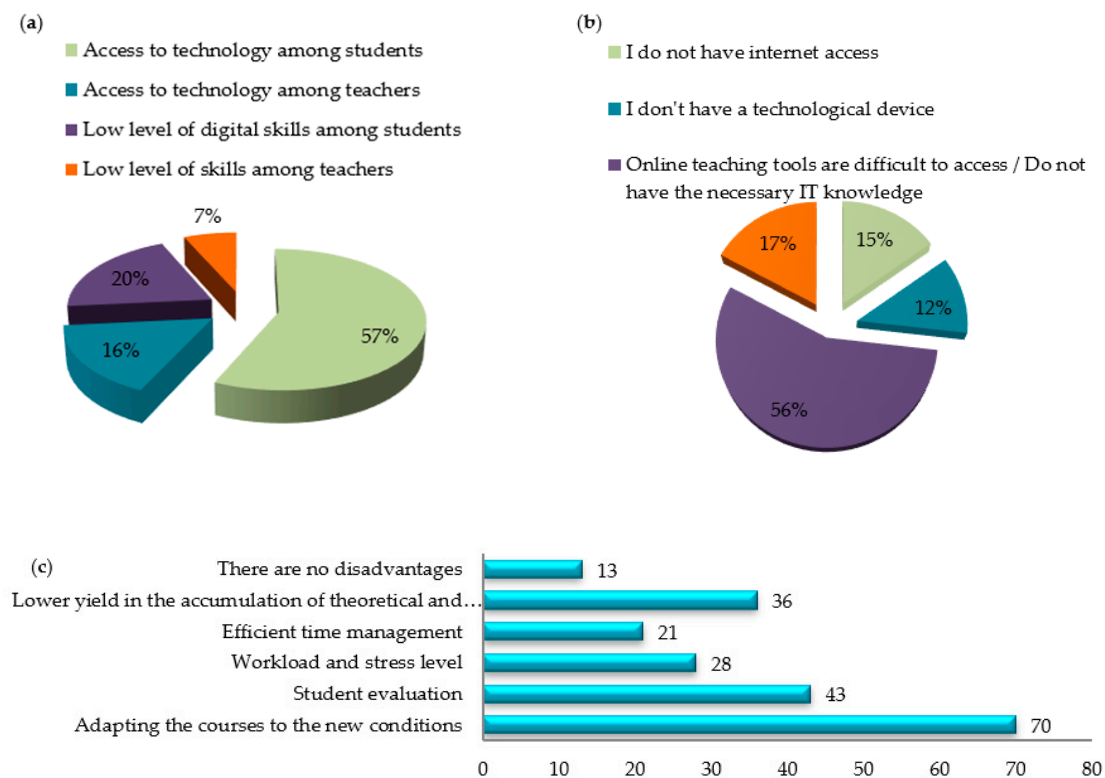


Figure 3. Obstacles and limits in the use of e-learning (a) Obstacles from the perspective of teachers; (b) Obstacles from the perspective of students and parents; (c) Disadvantages from the teachers' perspective.

As can be seen from Figure 3c teachers consider the biggest disadvantage of the e-learning system the need to adapt the courses to the new teaching conditions, but also the student evaluation system in the online environment, as well as the low efficiency of the accumulation of new knowledge by students. Instead, the main dissatisfaction among the students participating in the study was the lack of student–teacher interaction, lack of socialization with colleagues, and also stated a lower level in terms of teaching quality.

Referring to the students' attitude towards the online system, the parents surveyed stated that only 51 (33.55%) were enthusiastic about the e-learning system and gladly participated in these activities; 43 (28.29%) participated out of necessity, being urged by teachers and parents; while 35 (23.03%) of the parents considered that these courses do not help them in accumulating new knowledge; and 23 (15.13%) validated the answer variant regarding the total disinterest of the children (Figure 4). The study indicates that of the 152 parents who responded to the questionnaire received, 54 (35.53%) consider that a serious consequence of closing schools and using distance learning is that the student spends a lot of time in front of the computer; and 33 (21.71%) of parents consider the lack of socialization as a negative effect of this situation that led to nervousness, stress, and anxiety among 22 (14.47%) of respondents (Figure 4). Furthermore, a large number of parents 43 (28.29%) consider it a limitation of e-learning that they have to supervise their child, this answer being frequently validated by parents whose children are younger and who need help in accessing educational platforms.

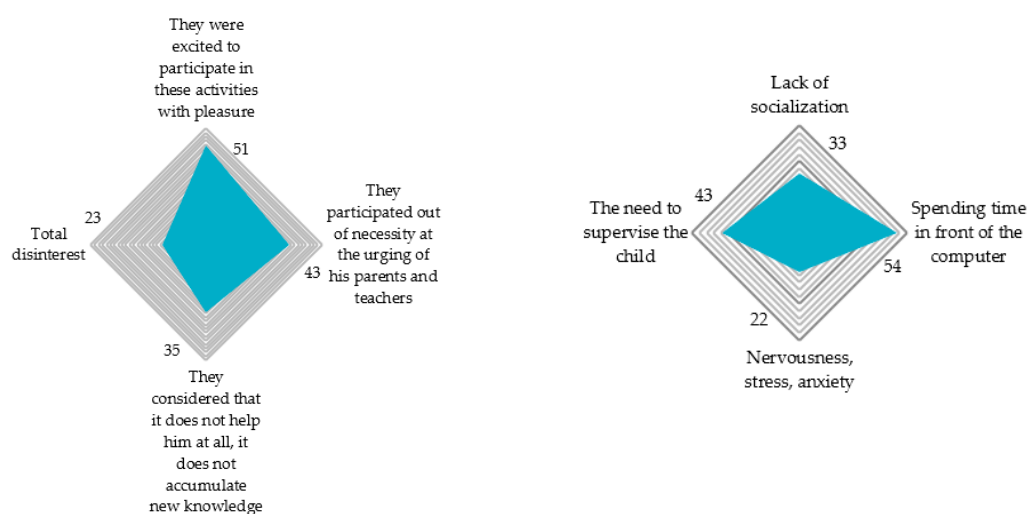


Figure 4. (a) Students' attitude towards the use of e-learning (b) The consequences of school closures and the use of e-learning from the parents' perspective.

4.4. Further Learning Preferences

Regarding the continuity of online learning after the reopening of schools, the frequency of answers is presented in Table 2. It is observed that both teachers and students and parents do not agree with the continuity of online learning after the reopening of schools, however in the current conditions, when the pandemic has not stabilized 100 teachers consider that the optimal teaching system is the hybrid system (an alternation of online courses with traditional ones), 76 teachers consider that the traditional system can be adequate in the current conditions and only 35 have opted for the online education system.

Table 2. Continuing the online education system.

	Frequency			Percentage%		
	T	S	P	T	S	P
Yes	77	65	58	36.49	31.25	38.16
No	88	120	60	41.71	57.69	39.47
No answer	46	23	34	21.80	11.06	22.37

Among the students, the situation is similar. 130 students consider the hybrid system appropriate, 57 the traditional system and only 21 chose the online system. Among parents the situation is slightly different 108 of them consider the traditional education system adequate while only 32 chose the online system (Figure 5).

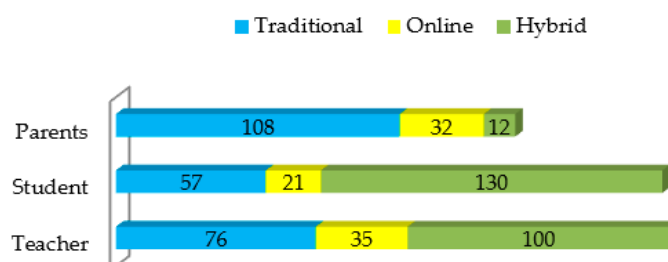


Figure 5. Preference of the interviewed categories regarding the teaching system appropriate to the current conditions.

The results of the study are consistent with international studies comparing e-learning with face-to-face teaching [64,65] and which found that e-learning has a lower impact than face-to-face learning. However, there are studies that treat exclusively the advantages of e-learning, considering it a more efficient teaching tool than classical learning and it is preferred, in future uses [66].

4.5. Factorial Analysis of the Online Education System before and during the Pandemic Period from the Students' Perspective

Examination of the Correlation Matrix (Appendix C, Table A1) reveals fairly high correlations between the fourteen variables written to measure the efficiency of the online education system before and during the pandemic period from the students' perspective (Teaching category, Age, Environment, Type of the institution, Used Online learning (O.L.) until, Used O.L. now, O.L. versus classical teaching (C.T.) (O.L./C.T.), Tools O.L., Device used, Device proprietary, Time accessing O.L., Obstacle of online connection, O.L. after pandemic, and Teaching system appropriate). For example, the inter-correlations between the variables of Category, Age, Type, and using online learning until the pandemic period, (identification variables) are greater than 0.30. Similarly, the inter-correlations between Environment, students who are using online learning (O.L.) in the pandemic period, and the device's proprietary is also greater than 0.50. Given the number of high inter-correlations between the online learning-specific variables, the hypothesized factor model appears to be appropriate.

The Bartlett's Test of Sphericity (Appendix C, Table A2) tests the adequacy of the correlation matrix and yielded a value of 1037.024 and an associated level of significance smaller than 0.001. Thus, the hypothesis that the correlation matrix is an identity matrix can be rejected, the correlation matrix has significant correlations among at least some of the variables. Kaiser–Meyer–Olkin Measure of Sampling Adequacy is 0.670 indicating sufficient items for each factor.

The Total Variance Explained (Appendix C, Table A3) presents the number of common factors computed, the eigenvalues associated with these factors, the percentage of total variance accounted for by each factor, and the cumulative percentage of total variance accounted for by the factors. Although fourteen factors have been computed, it is obvious that not all fourteen factors will be useful in representing the list of nine variables. In deciding how many factors to extract to represent the data, it is helpful to examine the eigenvalues associated with the factors. Using the criterion of retaining only factors with eigenvalues of 1 or greater, the first five factors will be retained for rotation. These three factors account for 26.17%, 13.79%, 9.90%, 9.50%, and 8.23% of the total variance, respectively. That is, almost 67.59% of the total variance is attributable to these four factors. The remaining nine factors together account for only approximately 32.41% of the variance. Thus, a model with four factors may be adequate to represent the data.

5. Conclusions

In Romania, the COVID-19 virus created an unprecedented situation, at least at the level of the Romanian educational system, so Romanian students and teachers had to adapt to an unprecedented situation, being forced to complete their school year at distance. Under these conditions, the e-learning system was the necessary and optimal solution. The results of this study showed that before COVID-19 the use of e-learning was very low (17% of teachers have used it, and only students from universities). Moreover, the teachers believe that they need to improve their IT knowledge in order to cope with online learning (54%) in order that 36% of them have participated in digital knowledge improvement courses in the last 5 years.

From the teachers' perspective, students' participation in online activities was good, only 1.42% said that their students did not participate in online courses, the main reason being the lack of technical resources to access the platform or Internet connection at home. From the students' perspective, 81% of those who declared that have not participate in online courses at all, are from rural areas and do not have an Internet connection at home. However, most students participating in the study accepted online learning and participated frequently in all required courses; however, the online learning system

is not considered an alternative to traditional learning that can be used permanently, being considered a complement to the classical education system. The devices most used to access online platforms were mobile phones (58.17%), followed by computers/laptops (25.48%) and tablets (4.81%). At the same time, 9.62% of the interviewed students stated that they received from the school the necessary device to be able to participate in online courses; however, 11.54 of the students still have no IT device available. Referring to the students' attitude towards the online system, the parents surveyed stated that only 33.55% were enthusiastic about the e-learning system and gladly participated in these activities, 28.29% participated out of necessity, being urged by teachers and parents, and 23.03% of the parents considered that these courses do not help them in accumulating new knowledge. Overall, 15.13% validated the total disinterest of the children.

Among the positive aspects of the online learning system, a large number of teachers stated many advantages of the e-learning system, such as ease of conducting online courses, flexibility in the work schedule, adaptability to broad learning styles, a variety of tools available at hand, ease in monitoring, and documenting teaching activities. The students and parents surveyed considered as the main advantages of the e-learning system: the flexibility of working time, the comfort of working from home, as well as the variety of documentation sources.

Although under normal public health conditions, the online education system offers many advantages, highlighted by the evaluation made in the literature review, in conjunction with the COVID-19 pandemic, which causes stress and anxiety for all people, the online education system can it also had disadvantages or negative effects. Regarding the rapid transition to the online education system in conjunction with the effects of the pandemic on interpersonal relationships, we believe that the following negative effects can be identified:

- When the child surfs the Internet it is necessary to be supervised, especially when we refer to children up to the age of seven because they have a limited ability to differentiate between ads and real content, they cannot realize the benefits and the disadvantages of using the Internet. In this situation it is recommended that adults monitor and guide them to choose the necessary material according to their age, but this was less achievable during the pandemic because many children were alone at home.
- Another negative aspect may be that the use of the Internet limits creativity and imagination. During the online classes they no longer socialized, did not recognize and identify real emotions, did not perform their school tasks at the same intensity because it was easier for them to retrieve information from the Internet.
- Absenteeism—there were situations in which students did not participate in online courses citing the reason that there is a very poor Internet connection and thus lost useful information during working hours with the teacher.
- The fact that the teacher/colleagues are beyond the screen determined some of the students to create a comfort zone that meant isolation from the family, they did not have to face problems encountered in real life, they did not have to find real solutions, to discuss with colleagues, summarizing the discussions related to the school.

At the moment we need to take all the protection measures to protect ourselves from the corona virus infection and this can even mean conducting classes and courses on an online platform. Of course, it is necessary to consider a number of important factors for the optimal development from the emotional point of view, from the teaching method to the time spent in online courses so that students feel comfortable and secure. Parents and teachers play a very important role during this period. Good collaboration between parents and teachers is necessary, they must carefully monitor the behavior of children/students, identify certain symptoms that may fall into a certain typology, help them become aware and guide them to solve them, the problems they face. It is desirable that both parents and teachers be more open, more attentive to what children/students want to convey, listen to them in an empathetic way and be a real support for those in need. The research is mainly limited by the

disparities in development and access to ICT and Internet technologies between urban and rural areas, as well as by the sample of respondents, which for a more complex highlighting of the results must be extended. As a future research direction, it is proposed to identify the main tools/methods through which the implementation of the e-learning system can be successfully continued during the period when the COVID-19 pandemic will end. At the same time, detailed research is needed on the degree of specialization of teachers on ICT use, identification of the current state of knowledge of students to use ICT, and ways to increase ICT skills for teachers, students, and even parents by stimulating the process of lifelong learning.

Author Contributions: Conceptualization, C.A.I., M.D.C. and M.C.U.; methodology, L.P., N.L.G.N. and S.G.S.; software, C.A.I., S.G.S. and M.D.C.; validation, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; formal analysis, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; investigation, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; resources, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; data curation, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; writing—original draft preparation, C.A.I., S.G.S., V.M.N.S. and M.D.C.; writing—review and editing, C.A.I., S.G.S. and M.D.C.; visualization, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; supervision, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; project administration, C.A.I., L.P., N.L.G.N., S.G.S., V.M.N.S., M.D.C. and M.C.U.; funding acquisition, C.A.I., L.P., N.L.G.N., M.D.C. and M.C.U. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Appendix A.1. Learning Platforms and Tools Available and Used at National Level

- Educared (www.educared.ro)—online platform launched by the Ministry of Education and Research that centralizes different types of free digital resources and useful information to support teachers in using new technologies during learning activities with students.
- Manuals (www.manuale.edu.ro)—the digital version of all textbooks approved by the Ministry of Education and Research that can be accessed and downloaded free of charge.
- Teleschool (www.tvr.ro/telescoala.html)—partnership between the Ministry of Education and Research and the Romanian National Television (TVR), which offers courses to 8th and 12th grade students, in order to prepare for future national exams. The courses are available on TV and online (on Youtube, on the Facebook page of the channel and on the sites of the TV channels).
- Rocnee.eu—subject models for National Assessment and Baccalaureate.
- Class of the Future (www.clasaviitorului.ro)—activation platform for GSuite for Education and Office 365 A1 licenses. A free, automated system for creating accounts, organizational groups, email lists and classes by synchronizing with SIIIR. Tutorials: classroom.clasaviitorului.ro, meet.clasaviitorului.ro, drive.clasaviitorului.ro, forms.clasaviitorului.ro, sites.clasaviitorului.ro, docs.clasaviitorului.ro, sheets.clasaviitorului.ro, slides.clasaviitorului.ro.
- EDUS (www.edus.ro)—a solution for digitizing the educational system that combines components such as school organization management, online lessons and video conferencing lessons, online testing, electronic catalog for grading and attendance, library of materials and social network, in order to ensure the complete flow of teaching and classroom learning in the digital environment.
- Digital educational content library for learning (www.eduonline.roedu.net/)—The interactive multimedia courses in this library, developed for Romanian primary, secondary and high school education, are designed to support the teaching process carried out both online and offline, representing an ideal tool for remedial learning activities. All these digital contents were developed between 2009–2011, in projects managed by the Ministry of National Education: Computerized Educational System, eScoală (eSchool) and Supporting the special educational system through a dedicated educational portal. These digital contents have been

evaluated and validated by the Ministry of National Education, and their use is allowed freely and non-restrictively.

- ExamenulTau.ro (www.examenultau.ro)—online educational platform approved by MEC through the identification code 41.425/12.02.2018, is intended to prepare students for the National Assessment Exam, 8th grade, in the subjects Romanian Language and Literature and Mathematics. Intuitive and easy to navigate, in support of students and teachers, the resources in the platform are divided into sections: learning, recapitulation and assessment. Resources included in the platform: 224 teaching videos, 345 evaluation tests and National Evaluation simulations, hundreds of exercises solved step by step and explained, summary sheets, and real-time progress reports.
- iTech Platform (www.itech.ro)—is a collaborative space dedicated exclusively to the continuous professional development of teachers. It has free online courses taught by the Institute of Educational Sciences, CCDs, the University of Bucharest, companies, and NGOs. It hosts three electronic journals for teachers.
- ScoalaIntuitext.ro (www.scoalaintuitext.ro)—is the online educational product for primary classes based on the concept of learning through play, endorsed by MEC through the identification code 41.425/19.01.2018. Teachers can use hundreds of teaching films, practice games, recap games, experiments, simulations, and assessment tests for online teaching, homework, in-depth and recap: clear explanations, understandable to children, gradual, starting from examples concrete from their lives, varied practice, on levels of difficulty, exercises that develop creativity, sharpness, cleverness and that form the general culture.
- Digitaliada Platform (www.digitaliada.ro)—is a space that encourages the creation and sharing of free educational content, which can be used by any teacher. On the platform the digital educational materials made within all editions of the Digitaliada project, by the partners and authors of the Digitaliada partners can also be found (eContent section).
- School on the Net (<https://scoalapenet.ro/>)—resource platform for all teachers interested in developing digital skills and supporting learning activities with the help of new technologies.
- ReteauaEDU.ro (reteauaedu.ro)—network of eLearning school platforms that allow the creation and management of digital lessons, communication between members of the teacher community, including video conferencing solution. School teachers can create and distribute digital content, interact, and make complex assessments.
- School in a suitcase (www.scoaladinvaliza.ro)—platform for schools that allows the creation of digital lessons and organization by subjects, classes, and school years, accessible by teachers and students, both in class and at home. The platform offers free access to a video conferencing solution, accredited digital content, communication space, tutorials and offers the teacher the opportunity to create himself digital content and assessments for students.
- LearningPark Platform (learningpark.upb.ro)—provided by the Polytechnic University of Bucharest with video lessons from the baccalaureate program for the disciplines of mathematics, physics, and chemistry.

Appendix B

Appendix B.1. Questionnaire on the Efficiency of Online Learning—The Perspective of Teachers

1. Teaching category you belong:
Middle school; High School; University
2. What age group do you fit:
21–30 years; 31–40 years; 41–50 years; 51–60 years; Over 60 years
3. The environment in which the institution you teach is located:
Urban; Rural
4. The type of the institution to which you teach:
Public; Private

5. Until this pandemic period, have you ever used the online learning system?
Yes; No
6. In the last 5 years you have participated in courses/trainings or other forms of improving digital skills:
Yes; No
7. Consider that you need to improve your digital skills in order to cope with online learning:
Yes; No
8. What online teaching tools did you use during this period?
Educational platforms; Social networks; Telephone conversations;
Indirect communication
9. What teaching method did you use to present the theoretical notions?
Online courses with the participation of distance students; Video conferencing; Audio conferences; Sending course materials by email; Other methods
10. What about teaching practical motions?
Interactive online courses with the participation of distance students; Video conferencing;
Group discussions with the participation of distance students;
Individual work; Other methods
11. How often have you been able to connect with students by accessing the online teaching tools mentioned?
Permanent/daily during the week; At least three times a week;
Occasionally/Once a week; Not
12. To what extent do students participate in online learning activities?
All students participate; To a large extent; To a small extent; Not
13. What would be the main disadvantage of the online education system?
Low performance of students in the accumulation of new knowledge
Adapting courses to the new conditions specific to online learning
Student evaluation
Workload and increased stress level
Efficient management of working time
I did not encounter any difficulties
14. Consider that after the reopening of schools it would be useful to continue learning online:
Yes; No; I don't know/I don't answer
15. In your opinion, which teaching system do you consider more appropriate to the current conditions?
Traditional; Online; Hybrid
16. Consider that online learning can be an alternative to classical teaching
Yes; No; It can be a supplement; I'm not interested

Appendix B.2. Questionnaire on the Efficiency of Online Learning—Students' Perspective

1. The teaching category you belong to:
Middle School; High School; University
2. What age category you fall into:
10–12 years; 13–14 years; 15–16 years; 17–18 years; Over 18 years
3. The environment in which the institution you study is located:
Urban; Rural
4. The type of the institution where you study:
Public; Private
5. Until this pandemic period, have you ever used the online learning system?
Yes; No
6. During this period of suspension of courses you participated in online learning activities:

- Yes, to all I was informed about
 Yes, partially (I didn't always have access to the resources needed to access online platforms)
 No, (I did not have access to the resources needed to access the online platforms)
 No, (I was not interested in online learning)
 No, (for other reasons)
7. Consider that online learning can be an alternative to classical teaching;
 Yes; No; It can be a supplement; I'm not interested
8. What type of online teaching tools have you been introduced to and used during this period?
 Educational platforms; Social networks; Telephone conversations;
- Indirect communication
9. What was your device for accessing online platforms?
 Computer/Laptop; Tablet; Phone; They do not have such devices
10. Is the device used proprietary?
 Personal; Of the parents; Of siblings; Received from school; They do not have such devices
11. How often have you managed to connect by accessing the online teaching tools mentioned?
 Permanent/daily during the week; At least three times a week;
 Occasionally/Once a week; Not
12. What would be the main obstacle/main cause for which you could not connect?
 I do not have Internet access
 They do not have a technological device
 Online teaching tools are difficult to access, they do not have the necessary IT knowledge
 I was not informed from time about the schedule of online courses
13. In your opinion, what would be the main disadvantage of online learning?
 | _____
14. In your opinion, what would be the main advantage of online learning?
 | _____
15. Do you consider that after the reopening of schools it would be useful to continue online learning?
 Yes; No; I don't know/I don't answer
16. In your opinion, which teaching system do you consider more appropriate to the current conditions?
 Traditional; Online; Hybrid

Appendix B.3. Questionnaire on the Efficiency of Online Learning—the Perspective of Parents

1. The teaching category to which your child belongs:
 Middle School; High School
3. The environment of the institution where your child is studying:
 Urban; Rural
4. The type of entity of the institution where your child is studying
 Public; Private
5. Within your family are:
 1 child; 2 children; 3 children; 4 or more children
6. Have the necessary technological resources to use online learning platforms
 Yes; No; I don't know
7. Within your family there are the following technological devices needed for online learning:
 A device for all family members; One device for each family member; We do not have any device
8. During this period of suspension of classes your child/children had/have participated in online learning activities:

Yes, to all I was informed about

Yes, partially (I didn't always have access to the resources needed to access online platforms)

No, (I did not have access to the resources needed to access the online platforms)

No, (I was not interested in online learning)

No, (for other reasons)

7. Do you consider that online learning can be an alternative to classical teaching?

Yes; No; It can be a supplement; I'm not interested

8. What type of online teaching tools have you been introduced to and used during this period?

Educational platforms; Social networks; Telephone conversations;

Indirect communication

9. What device did your child use to access online platforms?

Computer/Laptop; Tablet; Phone; They do not have such devices

10. What would be the main obstacle/main reason why your child could not connect?

I do not have Internet access

They do not have a technological device

Online teaching tools are difficult to access, do not have the necessary IT knowledge to help him

I was not informed in advance about the schedule of online courses, and my child is too young to connect alone

11. What was your child's attitude towards the online learning system?

He was enthusiastic, he gladly participated in these activities

He participated in these activities out of necessity, at the insistence of teachers and parents

He considered that it does not help him at all/does not accumulate new knowledge

Total disinterest

12. In your opinion, what would be the most serious consequence of the school closure and online learning that you felt during this period for you and your child?

Lack of socialization; Spending time in front of the computer/gadgets;

Nervousness, stress, anxiety; Need to supervise the child

13. In your opinion, what would be the main disadvantage of online learning?

| _____

14. In your opinion, what would be the main advantage of online learning?

| _____

15. Consider that after the reopening of schools it would be useful to continue online learning

Yes; No; I don't know/I don't answer

16. In your opinion, which teaching system do you consider more appropriate to the current conditions?

Traditional; Online; Hybrid

Appendix C

Table A1. Correlation Matrix.

		Category	Age	Environ.	Type	Used O.L until	Using O.L. Now	O.L./C.T.	Tools O.L.	Device	Device Proprietary	Time AccessingO.L.	Obstacle Online Connect	O.L. after Pandemic	Teaching System Appropriate
Correlation	Category	1.000	0.902	−0.265	0.343	0.413	−0.241	0.152	0.140	0.053	−0.282	0.096	0.248	0.311	0.264
	Age	0.902	1.000	−0.313	0.315	0.325	−0.304	0.138	0.113	0.046	−0.277	0.038	0.316	0.259	0.291
	Environment	−0.265	−0.313	1.000	−0.179	−0.233	0.517	−0.063	0.128	0.145	0.567	0.149	−0.548	−0.118	−0.167
	Type	0.343	0.315	−0.179	1.000	0.653	−0.049	0.037	−0.100	0.105	−0.235	−0.109	0.228	0.360	0.121
	Used O.L until	0.413	0.325	−0.233	0.653	1.000	−0.037	0.063	−0.013	0.091	−0.166	−0.066	0.212	0.319	0.082
	Used O.L now	−0.241	−0.304	0.517	−0.049	−0.037	1.000	−0.054	−0.071	0.172	0.392	0.154	−0.440	−0.159	−0.089
	O.L./C.T.	0.152	0.138	−0.063	0.037	0.063	−0.054	1.000	0.023	0.005	0.048	0.024	−0.162	−0.030	−0.150
	Tools O.L.	0.140	0.113	0.128	−0.100	−0.013	−0.071	0.023	1.000	−0.050	0.066	−0.094	−0.005	−0.086	−0.062
	Device used	0.053	0.046	0.145	0.105	0.091	0.172	0.005	−0.050	1.000	0.298	0.365	0.116	0.105	0.046
	Device proprietary	−0.282	−0.277	0.567	−0.235	−0.166	0.392	0.048	0.066	0.298	1.000	0.355	−0.296	−0.182	−0.250
	Time accessing O.L	0.096	0.038	0.149	−0.109	−0.066	0.154	0.024	−0.094	0.365	0.355	1.000	0.037	−0.057	−0.112
	Obstacle online connection	0.248	0.316	−0.548	0.228	0.212	−0.440	−0.162	−0.005	0.116	−0.296	0.037	1.000	0.110	0.111
	O.L. after pandemic	0.311	0.259	−0.118	0.360	0.319	−0.159	−0.030	−0.086	0.105	−0.182	−0.057	0.110	1.000	0.263
	Teaching system appropriate	0.264	0.291	−0.167	0.121	0.082	−0.089	−0.150	−0.062	0.046	−0.250	−0.112	0.111	0.263	1.000

Note: online learning (O.L.); classical teaching (C.T.).

Table A2. KMO and Bartlett's Test.

Kaiser–Meyer–Olkin Measure of Sampling Adequacy	0.670
Approx. Chi-Square	1037.024
Bartlett's Test of Sphericity	df
	91
	Sig.
	0.000

Table A3. Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.664	26.170	26.170	3.664	26.170	26.170	2.438	17.418	17.418
2	1.930	13.789	39.958	1.930	13.789	39.958	2.267	16.191	33.609
3	1.386	9.899	49.858	1.386	9.899	49.858	1.801	12.867	46.475
4	1.330	9.499	59.357	1.330	9.499	59.357	1.672	11.945	58.420
5	1.153	8.234	67.592	1.153	8.234	67.592	1.284	9.172	67.592
6	0.996	7.115	74.707						
7	0.772	5.514	80.221						
8	0.688	4.913	85.134						
9	0.493	3.525	88.659						
10	0.478	3.417	92.076						
11	0.400	2.859	94.935						
12	0.367	2.623	97.558						
13	0.261	1.865	99.423						
14	0.081	0.577	100.000						
Extraction Method: Principal Component Analysis.									

References

- Huang, R.; Liu, D.; Tlili, A.; Knyazeva, S.; Chang, T.W.; Zhang, X.; Burgos, D.; Jemni, M.; Zhang, M.; Zhuang, R.; et al. Ghid pentru aplicarea Practicilor Educaționale Deschise în timpul pandemiei de coronavirus. In *Utilizarea Resurselor Educaționale Deschise în Conformitate cu Recomandările UNESCO, Traducere și Adaptare*; Grosseck, G., Andone, D., Holotescu, C., Eds.; Smart Learning Institute of Beijing Normal University: Beijing, China, 2020; Available online: http://sli.bnu.edu.cn/uploads/soft/200802/2_2018008721.pdf (accessed on 14 August 2020).
- UNESCO. Adverse Consequences of School Closures. Available online: <https://en.unesco.org/covid19/educationresponse/consequences> (accessed on 14 August 2020).
- Antonini Philippe, R.; Schiavio, A.; Biasutti, M. Adaptation and destabilization of interpersonal relationships in sport and music during the Covid-19 lockdown. *Heliyon* **2020**, *4*, e05212. [CrossRef] [PubMed]
- UNICEF Romania. Evaluare Rapidă a Situației Copiilor și Familiilor, Cu Accent Pe Categoriile Vulnerabile, în Contextul Epidemiei de COVID-19 Din România—Runda 3 (Rapid Assessment of the Situation of Children and Families, with A Focus on Vulnerable Categories, in the Context of the COVID-19 Epidemic in Romania—Round 3). Available online: <https://www.unicef.org/romania/ro/documents/evaluare-rapidă-situa—iei-copiilor-și-familiilor-cu-accent-pe-categoriile-vulnerabile-0> (accessed on 14 August 2020).
- Lehmann, K.; Chamberlin, L. *Making the Move to Elearning: Putting Your Course Online*; R&L Education: Lanham, MD, USA, 2009.
- Kizilcec, R.F.; Reich, J.; Yeomans, M.; Dann, C.; Brunskill, E.; Lopez, G.; Turkay, S.; Williams, J.J.; Tingley, D. Scaling up behavioral science interventions in online education. *Proc. Natl. Acad. Sci. USA* **2020**, *117*, 14900–14905. [CrossRef] [PubMed]
- Larreamendy-Joerns, J.; Leinhardt, G. Going the Distance with Online Education. *Rev. Educ. Res.* **2006**, *76*, 567–605. [CrossRef]
- Chang, S.H.H.; Smith, R.A. Effectiveness of Personal Interaction in a Learner-Centered Paradigm Distance Education Class Based on Student Satisfaction. *J. Res. Technol. Educ.* **2008**, *40*, 407–426. [CrossRef]
- Hrastinski, S.; Watson, J. Designing and evaluating an online role play in conflict management. *Campus-Wide Inf. Syst.* **2009**, *26*, 287–297. [CrossRef]
- Moreno-Ger, P.; Burgos, D.; Martínez-Ortiz, I.; Sierra, J.L.; Fernández-Manjón, B. Educational game design for online education. *Comput. Hum. Behav.* **2008**, *24*, 2530–2540. [CrossRef]
- Keeler, C.G.; Horney, M. Online course designs: Are special needs being met? *Am. J. Distance Educ.* **2007**, *21*, 61–75. [CrossRef]
- Sonwalkar, N. Adaptive individualization: The next generation of online education. *Horizon* **2008**, *16*, 44–47. [CrossRef]
- Volery, T.; Lord, D. Critical success factors in online education. *Int. J. Educ. Manag.* **2000**, *14*, 216–223. [CrossRef]
- Montgomerie, K.; Edwards, M.; Thorn, K. Factors influencing online learning in an organisational context. *J. Manag. Dev.* **2016**, *35*, 1313–1322. [CrossRef]
- Sun, L.; Tang, Y.; Zuo, W. Coronavirus pushes education online. *Nat. Mater.* **2020**, *19*, 687. [CrossRef] [PubMed]
- Butler, K.C. A model of successful adaptation to online learning for college-bound Native American high school students. *Multicult. Educ. Technol. J.* **2012**, *6*, 60–76. [CrossRef]
- Gupta, S.; Eastman, J.K.; Swift, C.O. Creating an effective online learning environment: A shift in the pedagogical paradigm. *Acad. Educ. Leadersh. J.* **2005**, *9*, 79.
- Pasch, G.; Stewart, Q. Using the Internet to teach the Internet: An opportunistic approach. *Electron. Libr.* **2002**, *20*, 401–412. [CrossRef]
- Bao, W. COVID-19 and online teaching in higher education: A case study of Peking University. *Hum. Behav. Emerg. Technol.* **2020**, *2*, 113–115. [CrossRef]
- Basilaia, G.; Kvavadze, D. Transition to Online Education in Schools during a SARS-CoV-2 Coronavirus (COVID-19) Pandemic in Georgia. *Pedagog. Res.* **2020**, *5*, em0060. [CrossRef]
- Ruthotto, I.; Kreth, Q.; Stevens, J.; Trively, C.; Melkers, J. Lurking and participation in the virtual classroom: The effects of gender, race, and age among graduate students in computer science. *Comput. Educ.* **2020**, *151*, 103854. [CrossRef]

22. Bower, M. *Design of Web 2.0 Enhanced Learning, Design of Technology-Enhanced Learning*; Emerald Publishing Limited: Bingley, UK, 2017; pp. 159–217. [\[CrossRef\]](#)
23. Zapalska, A.; Brozik, D. Learning styles and online education. *Campus-Wide Inf. Syst.* **2006**, *23*, 325–335. [\[CrossRef\]](#)
24. Burd, B.A.; Buchanan, L.E. Teaching the teachers: Teaching and learning online. *Ref. Serv. Rev.* **2004**, *32*, 404–412. [\[CrossRef\]](#)
25. Luka, I. Summative evaluation of online language learning course efficiency for students studying tourism and hospitality management. *Qual. Assur. Educ.* **2018**, *26*, 446–465. [\[CrossRef\]](#)
26. Chowdhury, F. Blended learning: How to flip the classroom at HEIs in Bangladesh? *J. Res. Innov. Teach. Learn.* **2019**. [\[CrossRef\]](#)
27. Zhao, F. Enhancing the quality of online higher education through measurement. *Qual. Assur. Educ.* **2003**, *11*, 214–221. [\[CrossRef\]](#)
28. Arghode, V.; Brieger, E.; Wang, J. Engaging instructional design and instructor role in online learning environment. *Eur. J. Train. Dev.* **2018**, *42*, 366–380. [\[CrossRef\]](#)
29. Dwivedi, A.; Dwivedi, P.; Bobek, S.; Zabukovšek, S.S. Factors affecting students' engagement with online content in blended learning. *Kybernetes* **2019**, *48*, 1500–1515. [\[CrossRef\]](#)
30. Riley, J.M.; Ellegood, W.A.; Solomon, S.; Baker, J. How mode of delivery affects comprehension of an operations management simulation: Online vs. face-to-face classrooms. *J. Int. Educ. Bus.* **2017**, *10*, 183–200. [\[CrossRef\]](#)
31. Strang, K. How student behavior and reflective learning impact grades in online business courses. *J. Appl. Res. High. Educ.* **2016**, *8*, 390–410. [\[CrossRef\]](#)
32. Suryasa, W.; Zambrano, R.; Mendoza, J.; Moya, M.; Rodríguez, M. Mobile devices on teaching-learning process for high school level. *Int. J. Psychosoc. Rehabil.* **2020**, *20*, 330–340. [\[CrossRef\]](#)
33. Lindorff, M.; McKeown, T. An aid to transition? The perceived utility of online resources for on-campus first year management students. *Educ. Train.* **2013**, *55*, 414–428. [\[CrossRef\]](#)
34. Aldholay, A.; Abdullah, Z.; Isaac, O.; Mutahar, A.M. Perspective of Yemeni students on use of online learning: Extending the information systems success model with transformational leadership and compatibility. *Inf. Technol. Peopl.* **2019**, *33*, 106–128. [\[CrossRef\]](#)
35. Hofmeister, C.; Pilz, M. Using E-Learning to Deliver In-Service Teacher Training in the Vocational Education Sector: Perception and Acceptance in Poland, Italy and Germany. *Educ. Sci.* **2020**, *10*, 182. [\[CrossRef\]](#)
36. Jordan, C. Comparison of International Baccalaureate (IB) chemistry students' preferred vs. actual experience with a constructivist style of learning in a Moodle e-learning environment. *Int. J. Lesson Learn. Stud.* **2013**, *2*, 155–167. [\[CrossRef\]](#)
37. Han, Y.; Wei, S.; Zhang, S. Analysis of Online Learning Behaviour from a Tutor Perspective: Reflections on Interactive Teaching and Learning in the Big Data Era1. *Asian Assoc. Open Univ. J.* **2015**, *10*, 29–48. [\[CrossRef\]](#)
38. Small, F.; Dowell, D.; Simmons, P. Teacher communication preferred over peer interaction: Student satisfaction with different tools in a virtual learning environment. *J. Int. Educ. Bus.* **2012**, *5*, 114–128. [\[CrossRef\]](#)
39. Biasutti, M. The student experience of a collaborative e-learning university module. *Comput. Educ.* **2011**, *57*, 1865–1875. [\[CrossRef\]](#)
40. Fulton, C. Collaborating in online teaching: Inviting e-guests to facilitate learning in the digital environment. *Inf. Learn. Sci.* **2020**, *121*, 579–585. [\[CrossRef\]](#)
41. Haythornthwaite, C. Learning, connectivity and networks. *Inf. Learn. Sci.* **2019**, *120*, 19–38. [\[CrossRef\]](#)
42. Brown, W.J. Student multicultural awareness in online community college classes. *Multicult. Educ. Technol. J.* **2010**, *4*, 99–112. [\[CrossRef\]](#)
43. Chakraborty, M.; Muyia Nafukho, F. Strengthening student engagement: What do students want in online courses? *Eur. J. Train. Dev.* **2014**, *38*, 782–802. [\[CrossRef\]](#)
44. Presicce, C.; Jain, R.; Rodeghiero, C.; Gabaree, L.E.; Rusk, N. WeScratch: An inclusive, playful and collaborative approach to creative learning online. *Inf. Learn. Sci.* **2020**, *121*, 695–704. [\[CrossRef\]](#)
45. Hannon, J.; D'Netto, B. Cultural diversity online: Student engagement with learning technologies. *Int. J. Educ. Manag.* **2007**, *21*, 418–432. [\[CrossRef\]](#)
46. Robinson, H.; Al-Freih, M.; Kilgore, W. Designing with care: Towards a care-centered model for online learning design. *Int. J. Inf. Learn. Technol.* **2020**, *37*, 99–108. [\[CrossRef\]](#)

47. Gupta, V.; Jain, N. Harnessing information and communication technologies for effective knowledge creation: Shaping the future of education. *J. Enterp. Inf. Manag.* **2017**, *30*, 831–855. [CrossRef]
48. Wdowik, S. Using a synchronous online learning environment to promote and enhance transactional engagement beyond the classroom. *Campus-Wide Inf. Syst.* **2014**, *31*, 264–275. [CrossRef]
49. Zhang, T.; Shaikh, Z.A.; Yumashev, A.V.; Chlăd, M. Applied Model of E-Learning in the Framework of Education for Sustainable Development. *Sustainability* **2020**, *12*, 6420. [CrossRef]
50. Wieser, D.; Seeler, J.T. Online, Not Distance Education. In *The Disruptive Power of Online Education*; Altmann, A., Ebersberger, B., Mössenlechner, C., Wieser, D., Eds.; Emerald Publishing Limited: Bingley, UK, 2018; pp. 125–146. [CrossRef]
51. Konak, A.; Kulturel-Konak, S.; Cheung, G.W. Teamwork attitudes, interest and self-efficacy between online and face-to-face information technology students. *Team Perform. Manag.* **2019**, *25*, 253–278. [CrossRef]
52. Gabaree, L.; Rodeghiero, C.; Presicce, C.; Rusk, N.; Jain, R. Designing creative and connected online learning experiences. *Inf. Learn. Sci.* **2020**, *121*, 655–663. [CrossRef]
53. Huang, P.-S.; Chiu, P.-S.; Huang, Y.-M.; Zhong, H.-X.; Lai, C.-F. Cooperative Mobile Learning for the Investigation of Natural Science Courses in Elementary Schools. *Sustainability* **2020**, *12*, 6606. [CrossRef]
54. Alzahrani, N.M. Augmented Reality: A Systematic Review of Its Benefits and Challenges in E-learning Contexts. *Appl. Sci.* **2020**, *10*, 5660. [CrossRef]
55. UNESCO. Distance Learning Solutions. Available online: <https://en.unesco.org/covid19/educationresponse/solutions> (accessed on 14 August 2020).
56. Government of Romania. Raport de activitate al Guvernului României pe perioada stării de urgență instituită de Președintele României (Activity Report of the Government of Romania during the State of Emergency Established by the President of Romania). 2020. Available online: https://gov.ro/fisiere/stiri_fisiere/Raport_de_activitate_al_Guvernului_Rom%C3%A2niei_pe_perioada_st%C4%83rii_de_urgen%C8%9B%C4%83_instituit%C4%83_de_Pre%C8%99edintele_Rom%C3%A2niei.pdf (accessed on 14 August 2020).
57. Nunnally, J.C. *Psychometric Theory 3E.*; Tata McGraw-Hill Education: New York, NY, USA, 1994.
58. Cronbach, L.J. Coefficient alpha and the internal structure of tests. *Psychometrika* **1951**, *16*, 297–334. [CrossRef]
59. Cortina, J.M. What is coefficient alpha? An examination of theory and applications. *J. Appl. Psychol.* **1993**, *78*, 98. [CrossRef]
60. Leontitsis, A.; Pagge, J. A simulation approach on Cronbach's alpha statistical significance. *Math. Comput. Simulat.* **2007**, *73*, 336–340. [CrossRef]
61. World Health Organization. Available online: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> (accessed on 14 August 2020).
62. Theoret, C.; Ming, X. Our education, our concerns: The impact on medical student education of COVID-19. *Med. Educ.* **2020**, *54*, 591–592. [CrossRef] [PubMed]
63. Block, P.; Hoffman, M.; Raabe, I.J.; Dowd, J.B.; Rahal, C.; Kashyap, R.; Mills, M.C. Social network-based distancing strategies to flatten the COVID-19 curve in a post-lockdown world. *Nat. Hum. Behav.* **2020**, 588–596. [CrossRef] [PubMed]
64. Singh, A.; Min, A.K.K. Digital lectures for learning gross anatomy: A study of their efficacy. *Korean J. Med. Educ.* **2017**, *29*, 27–32. [CrossRef]
65. Bali, S.; Liu, M.C. Students' perceptions toward online learning and face-to-face learning courses. *J. Phys.* **2018**, *1108*, 012094. [CrossRef]
66. Jamil, B.; Sethi, A.; Ali, S. Attitude of nursing students towards e-learning. *Adv. Health Prof. Educ.* **2016**, *2*, 24–29.

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



© 2020 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).