Chapter # 6

ONLINE TECHNOLOGIES IN TEACHING AND LEARNING
Lessons learnt while teaching during COVID-19 pandemic in Romania: Towards a "dual" education system

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ABSTRACT
The education – as processes and systems, teachers and students – was affected by corona-virus pandemic, across the world. Since pandemic imposed rigorous social distancing, the education process has migrated to online environment, supported by appropriate technologies, with multi-sided effects on students, teachers, and technology producers. Thus, amid itsprofound negative impact, corona-virus pandemic functioned as an *accelerator of using new online teaching technologies*. The authors' scope of work encompassed a variety of education levels (from elementary to higher education) in Romanian educational environment. This chapter aims at summarizing major lessons learned by the authors' direct experiences of teaching under pandemic in *two different education settings* (international school, university) – with the general objective to formulate recommendations to: (i) teachers; (ii) students; (iii) education policymakers; as well as specific objectives: to identify similarities and significant differences among students by age and level of education; and eventually formulate recommendations for technology producers. Essentially qualitative, the research methodology included secondary research (literature survey) and primary research methods (observation, interview and survey) – based on the authors' direct experience, yet teaching both local and international students. This study contributes at filling a literature gap, and opening further research paths in the field of online education.

Keywords: online teaching, teaching technologies, technology accelerator, COVID-19 pandemic, elementary education, higher education, hybrid learning, Romania.

1. INTRODUCTION

The emergence of the corona-virus – in China (December 2019) then in Europe (the first case confirmed in France on 25 January 2020; and in Romania a month later, on 26 February 2020) – was just the beginning of the corona-virus crisis. On the 13th of March 2020 Europe became "the epicentre of the #COVID19 pandemic, with more reported cases and deaths than the rest of the world combined, apart from #China" and more cases were reported in Europe daily "than were reported in China at the height of its epidemic" (Fredericks, 2020), quoting a declaration of the World Health Organization (WHO) Director-General. The very same day of 13 March, the European Commission (EC) has launched a coordinated answer to mitigate the socio-economic impact of the COVID-19 pandemic. A Google search for "covid 19" displayed, in fractions of a second, 4,82 billionresults on 22 August 2022 as compared to 5.71 billion results on 23 September 2020(Scarlat & Stănciulescu, 2021). This demonstrates (i) brusque, huge *interest on the pandemic matter worldwide*, and (ii) relatively steady high level of interest in it for about two years.

The corona-crisis has been the dominant element of the socio-economic environment worldwide, for the next two years. According to Holmes (2020) corona-crisis was impacting

"companies, employees and consumers" as well as the global megatrends themselves (Angus & Evans, 2020). The financial and capital markets have suffered significant impact as result of corona-crisis – as Sands (2020) has pictured a post-corona- crisis finance world. According to Euromonitor (2020, p. 3), "*Covid-19 has transformed the economic and consumer landscape*. It has changed the way we as consumers live, work andshop. Uncertainty remains high." Kamal (2020) has signalled the "triple-edge sword of COVID-19" – *i.e.* the triple impact of corona-virus pandemic (productive, disruptive and destructive nature of the pandemic) while using digital technologies.

Gross Domestic Product (GDP) contractions in low-income countries – as India and Mexico – demonstrate that "COVID-19 curbs do not worth economic pain" or, in other words, "severe lockdowns [produce] economic damage" (Wheatley, 2020). The unexpected corona-crisis has brought unexpected side effects – as illicit trade in times of corona-crisis (Chavarria, Walker, & Bahamon, 2020).

In Europe, the economies of the EU member states react slightly differently to coronavirus. In Germany, Sita, Dutton, and Ha (2020) have described a rapid evolution amidst the crisis as far as changing the consumer landscape, how consumers shop and pay. The technology plays a mounting role, changing the balance between leisure and experiences "out of home" *versus* "in the home".

At the organization level, *corona-crisis was definitely a threat*, and organization's strategies were challenged. However, their leaders behaved differently facing threats. Turning threats into opportunities (assuming *strategic changes*) is an evidence of remarkable leadership (Şişu & Scarlat, 2020).

Besides the general negative effects on countries, organizations and people – temporary lockdown, social media discontinuance intention (Liu, Liu, Yoganathan, & Osburg, 2021); grief feeling was seriously analyzed (Kübler-Ross & Kessler, 2014; Kessler, 2019; Beriatino, 2020) – the *education system* was among the most affected (Cho, 2021). Treve (2021) has analyzed the challenges in higher education, and Aboagye, Yawson, and Appiah (2021) focused their research on challenges faced by students. Scholars emphasized the negative effects during covid-impacted virtual teaching and learning (Das, Srivastava, Tripathi, & Das, 2022) as well as psychological and motivational aspects (Abdimusa, Kuatbekov, Ismailova, Shchedrina, & Kulanina, 2022). As far as education (as area of interest), two relevant face-to-face surveys are presented below.

A survey conducted in September 2020 aiming to analyze a set of press releases – issued by the European Commission (2020) during the first 6 months of pandemic (13 March – 22 September 2020) and e-mailed by the EC office in Romania – displayed the interest for corona-virus pandemic (49.6% from total) – from which 44% were healthcare- related and 24% economy-related, while *education was not among top three areas of interest* (Scarlat & Stănciulescu, 2021, pp. 85–86), counting for less than 10%.

A quick survey exercised two years later (22 August 2022) using the Google search engine – checking two sets of relatively equivalent keywords ("corona-virus impact on …" and "covid impact on …" respectively) by four categories of relative interest (Economy, Education, Healthcare and Society) – displays a different picture (Table 1):

(i) Economy tops the ranking as far as "COVID / corona-virus impact" by subjects of interest;
(ii) *Education becomes second to economy as subject of interest*, overcoming the Healthcare.

Table 1.
Level of interest relative to the corona-virus impact [*by number of items*].

Interest ranking	Impact on	Impact of	
		"Corona-virus impact on …"	"Covid impact on …"
I	Economy	13,300	17,100
II	*Education*	*7,570*	*14,200*
III	Healthcare	4,350	7,890
IV	Society	3,020	4,020

Source: author (22 August 2022)

The conclusion is that *education sector* (all levels) *has emerged as a significant area ofinterest for investigation during and post corona-crisis*, while education in the *average countries like Romania* seems to enjoy less attention – as compared to the world powerhouses and major European countries. In other words, since the pandemic seems to go down, despite significant amount of literature on COVID-19 and its effects, the *literature on corona-virus impact on education system in Romania is rather limited.* Therefore, this chapter aims to contribute at filling this gap by investigating the effects of online education technologies as result of corona-virus pandemic at two levels in two Romanian education setting: an international school and a technical university (Table 2*)*, over a longer period (2020–2022) – characteristic for pandemic in Romania.

Table 2.
Levels and focus of investigations.

Level of education	Influence of online technologies on education process
Higher education – master studies	**Focus on students:** The students' results of using the online teaching technologies (attendance, performance and satisfaction) – during pandemic as compared to the pre-pandemic period.
Elementary and upper elementary	**Focus on teachers:** The teachers' use and intention to use online educational technologies; perceived advantages and disadvantages of using digital resources.

Consequently, the rest of this chapter is structured as follows: secondary research on pandemic teaching environment; presentation of two qualitative studies conducted by authors in two areas, at two levels – elementary and master studies (as shown in Table 2); results discussion; recommendations; limitations and further research paths; conclusions.

2. PANDEMIC TEACHING ENVIRONMENT

Not long after the first case was confirmed, almost a global quarantine was installed. In Romania, all sectors have suffered alterations. Different industry sectors (*e.g.* tourism, retail) changed their leadership, business strategies and aspects related to employees or consumer behaviour. Many businesses were forced to close their doors, while others (*e.g.* delivery services, online sales, online marketing) were on a win.

The introduction of technology and the internet have changed the people's life from many perspectives. Vasile, Boboc, and Ghiță (2020) show in their report that the work-from- home practice, not very often met in our country, was adopted by most of the companies (65% of employees have worked from home), and 40% assess their work as more efficient. In education specifically, Hossain et al. (2021) signal not only challenges but also opportunities – as opportunity of m-learning during pandemic.

Worldwide, 1.2 billion students could not attend school or university because of the COVID-19 pandemic (Li & Lalani, 2020). Dhawan (2020, p. 7) noted that amid emergence of new teaching technologies, "online teaching is no longer an option, it is a necessity".

Online teaching came with challenges for both teachers and students. The flexibility and creativity in schools of all levels were called in action – in order to organize and conduct online teaching activities, despite teaching staff was not prepared for such a challenge (Bell et al., 2021). Teachers had to adapt their methods and use new technologies to cope with the new way of teaching (Schleicher, 2020). Innovative professors adapted social network services for online teaching (Ghobrini, Benzert, & Balas, 2022).

Barbu (2020) presents the results of a study completed by Forbes Romania in which 603 students, teachers and parents have participated. According to this survey, the most used communication platforms have been Zoom (21%), WhatsApp (23%), Google Classroom (13%) and Facebook (11%). *Table 3* also displays a list of open educational websites and other educational resources, as well as educational websites.

Table 3.
List of platforms and educational websites used by Romanian teachers [August 2020].

Platforms		
1.	Zoom	Program for video teleconference
2.	Google Meet	Video-communication service developed by Google
3.	Microsoft Teams	Platform designed for business communication
Educational websites		
4.	Twinkl	British online educational publishing house
5.	Krokotak	Educational website with free printable materials
6.	Didactic	Educational website where teachers can download and uploadmaterials for free
7.	Emalascoala	Educational website with articles, printable materials and ideasfor teachers
8.	Livresq	Educational website and interactive platform where teachers can create and up/download materials, lesson plans, etc.
9.	Digitaliada	Digital and interactive program that help teachers to use digitaleducational content in their lessons

Source: adapted after Forbes Romania (Barbu, 2020)

According to the same survey, communication platforms, websites, online libraries, virtual museums and other applications that are used during teaching activities have been used only 2.82%. The specialised platforms in e-learning have been underused, too. Only a percent of 2.6% of teachers claim that they have carried out their teaching activity through platforms (such as Google Classroom, Moodle, *etc.*). Another small percentage of teachers (2.8%) claim that they used Zoom, Meet, Teams or Skype, while teaching.

Table 4 presents the applications mostly used in teaching during the early pandemic period. To the total of learning instruments, applications such as Kahoot, Padlet, Wordwall *etc.* are added (Botnariuc et al., 2020).

Table 4.
List of applications used by Romanian teachers [August 2020].

Applications		
1.	Wordwall	Digital instrument based on a collection of words organised in different ways: wall, bulletin board, match up, missing word, *etc*.
2.	Skype	Telecommunication application
3.	Kahoot	Ideal for recaps and evaluations
4.	Mentimeter	It's an application through which the teacher may present contentand also receive feedback in real time
5.	Padlet	Perfect for presentations and teamwork, and as organizer
6.	Canva	A platform dedicated to graphic design used to create media content presentations, posters, documents, worksheets, charts
7.	ThingLink	Ideal for virtual tours, using digital objects or to combinedifferent images/links/words
8.	Imapuzzle	It's a perfect instrument for math lessons. The teacher can easilycreate a puzzle and add some math exercises to it
9.	Edpuzzle	Ideal for music lessons, communication or any teaching materialbased on a video
10.	Liveworksheets	Application for creating digital worksheets
11.	Quizizz	Application for online questionnaires

Source: adapted after Forbes Romania (Barbu, 2020)

There are a few comments to be made as results of secondary research:

- Interestingly, among educational platforms mostly used (some depicted in Table 3), there are social media (*e.g.* Facebook), while Microsoft Teams (specialized educational platform) – used in several higher education institutions – is not in the top.
- The specialized e-learning platforms have been underused because of their novelty and, sometimes, because they were costly.
- Basic internet-based communication technologies were used as education means because they were freely available and already popular among parents, students and teachers – *before* the pandemic.

One of the explanations is that Forbes Romania survey was conducted during the early phase of pandemic. In addition, the study was focused on elementary and pre-university education (one third were math professors, and one fifth were teachers for primary schools). The sample was pretty balanced urban *versus* rural (students 57% *vs.* 43% teachers and 52% urban *vs*. 48% rural).

Therefore, the authors decided to fill the research gap as follows:

- To observe a larger period of time, covering the first two years of corona-virus pandemic;
- To focus on limited number of education settings, but at extreme levels (elementary and higher education) and open to international students;

Thus, one international school and one leading university (for master studies) were selected with the main objective to note the effects of online education (*i.e.* use of teaching technologies) on process participants (teachers and students) – as indirect result of the corona-virus pandemic. Both were explorative, qualitative studies.

3. QUALITATIVE STUDIES IN ROMANIAN EDUCATION SETTINGS

The specific research objectives, methods and instruments used are different and adapted for each case. So the results are presented.

As depicted in Table 2, the focus in each case is different – from the standpoint of educational process – for each educational setting: the focus is on teachers in case of the international school, and the focus of the research is on the students in case of the technical university.

3.1. A survey in a private, International School

The education setting is a private school in Bucharest, open to international students (from pre-school to high school). The purpose was to understand the teachers' view on the digitalization process, during exclusive online teaching and currently (technology-mediated face-to-face teaching). The specific research questions were: (i) Which were the most used digital platforms, educational websites and online applications while teaching during corona-virus pandemic? (ii) What is the proportion of teachers that intend to continue the use of educational technologies when return to classroom teaching? (iii) What is the proportion of teachers that use the digital technologies daily? (iv) Which are the perceived advantages and disadvantages of using digital resources?

The source of data was the school teaching staff, and the research method was the questionnaire-based survey (Bird, 2009). In several situations, interviews completed the results of the survey. The study was conducted in 2022, and referred to the pandemic period (2020–2022).

The questionnaire has been emailed and also distributed through social networks, using the extension Google forms. The questionnaire contained questions to assess the teachers' demographic profile and questions related to the use of digital technologies during the educational process. The total number of respondents was 86, most of them (70%) involved in primary teaching; 20% in middle school and high school, 10% in pre-school. As seniority, 40% were experienced teachers (more than 10 years); 30% between 6 and 10 years; 20% between 3 and 5 years; and 10% were teachers with less than 3 years of experience. As declared by responding teachers, the most used (exclusively for online teaching) digital platforms, educational websites and online applications while teaching during corona-virus pandemic are displayed in Table 5.

Table 5.
The most used educational platforms, websites and online applications, byRomanian teachers during corona-virus pandemic.

Platforms	Educational websites	Online applications
Microsoft Teams Zoom	Twinkl Emalascoala Krokotak Didactic	Wordwall Kahoot Canva Nearpod Genially Learning Apps Baaboozle Pinterest

Source: author (first semester 2022)

The proportion of teachers that declared their *intention to continue the use of educational technologies when return to classroom teaching* is overwhelming (90%) – as opposed to 10% of teachers that will give them up in classroom teaching. The same percentage (90%) of the teachers uses the digital resources almost daily – ascompared to 10% only that does not. Correlation analysis points to the same majority groupof teachers.

The last group of questions had open answers, as every teacher had the opportunity to list the advantages and disadvantages of using digital resources while teaching (Table 6).

Table 6.
Advantages and disadvantages of using digital resources, by Romanian teachers during corona-virus pandemic.

Advantages	Disadvantages
Higher motivation and growing interestamong students	Weak internet connection that interruptsteaching sessions
Increased inter-activity during teachingsessions	Longer time spent for developing theteaching materials
Perform activities that are difficult to becarried out in the classroom	Insufficient training for teachers
Quick and direct (not-mediated)feedback	High cost of technology

Source: author (first semester 2022)

Comparing the results of authors' 2022 survey to Forbes Romania 2020, there are notable trends relative to both technology users and used teaching technologies:

- Changes in the hierarchy of all categories of technologies used – platforms (increased use of Microsoft Teams associated with decreased use of Zoom); educational websites (stability of the top four websites – Twinkl, Krokotak, Emmalascoala, Didactic – associated with disappearance of Livresq and Digitaliada); and online applications (consolidation of top three – Wordwall, Kahoot and Canva – associated with larger number of abandonment as well as newcomers, as seen by comparing the results from Tables 3–5);

- Spectacularly increased percentage of technology users and technology used (from under 3% to 90%) – which both display close correlation.

Nevertheless, it should be mentioned that results of the comparison (2022 *vs.* 2020) have an indicative value only (they cannot be extended to across schools), because the surveyed samples have limited similarity (population surveyed), and also differences as segment surveyed (single education unit from urban environment, open internationally); this is an area for further, deeper investigation. Even in this case, there is a lesson to learn: *dissemination of the good practices from this urban international school.*

3.2. Observing Master Classes at a Leading Technical University

The education setting is a large technical university located also in the capital city that has a long tradition and runs higher education degree programmes at all levels (undergraduate, master and doctoral research programmes). The area of this qualitative study is very narrow (a master course) and the research objectives are so specific.

Since the majority of master students have engineering background, the use of online technologies was not a problem; nor for professors.

Moodle was already familiar as communication media between students and professors, and *Microsoft Teams* was the online teaching platform promoted across university since pandemic restrictions were in place. Thus, the research focus is on the results of using the online teaching technologies (attendance, performance and satisfaction) – during pandemic as compared to the pre-pandemic period.

Just one master course (taught in English, open to international students) was observed, along three semesters (spring semester 2020, 2021 and 2022), with tree different cohorts of students (Table 7). The course was taught in the second (final) year of the masterprogramme, along 14 weeks, totalling 56 hours (split equally for lectures and applications).

The results are compared to those reported by the preceding three cohorts – *i.e.* the three years prior the corona-virus pandemic (2017-2019). In principle, mixed challenges – cross-cultural teaching-learning (Bauler, 2019) in international environment (Appiah-Kubi & Annan, 2020) – make teaching online more complex; however, the demographic structure of students did not change significantly during the period in discussion.

There are two notable comments related to the figures exhibited in Table 7.

Table 7.
Three cohorts of students attending the same course during pandemic [2020–2022].

Year	**Number of students**			**Exam results**		**Average grade****	**No. online semesters**
	Enrolled	Gave up	Active*	Failed	Passed		
2017	65	24	36	1	40	7.55	0
2018	55	4	43	6	45	7.64	0
2019	34	6	27	1	27	8.22	0
2020	38	4	28	0	34	8.06	0.5
2021	44	2	13	0	42	7.98	2.5
2022	60	5	14	5	50	7.24	4.0

*Active students are meant students that actively attended classes (asked & answeredquestions, were involved in debates, submitted optional assignments, *etc*.)
**Grading system: 1-to-10 scale; 10 = max; 5 = min for passing.
Source: author.

The data presented in *Table 7* are comparable – as during the period under scrutiny (six academic years, 2017–2022) the course was taught by the same teaching team (professor and teaching assistant); it kept the same framework (syllabus, teaching objectives, grading system, difficulty of assignments and exams); nevertheless, the content was updated yearly and teaching methods have changed during pandemic.

The abandon rate (number of the students giving up for different reasons against total number of students) – 8% during pandemic – is considered reasonable (between 4%–8%) according to Genesys (2019). The exception (unusual high rate in 2017) was most likely caused by changes in administrative regulations.

To note that circumstances of the spring semester 2020 were somehow particular – in that respect of restrictions (that imposed the online teaching) have occurred during semester. This is why the last column in Table 7 displays only half-semester of online teaching during spring semester in the academic year 2019–2020 (respectively 2.5 online teaching in 2020–2021, and all four semesters of online teaching in 2021–2022 *i.e.* cohort of students admitted in 2020 had full online teaching / learning experience).

The method of research and collecting information was direct observation, completed with consultation of academic and personal records, course evaluations, and random interviews by the end of semester.

The main research questions were: (i) How was the master students' attendance and activity during the pandemic as compared to the pre-pandemic period? (ii) What was the master students' performance (exam results) as compared to the pre-pandemic period? (iii) Which are the main comments (both students' and professor's) regarding the online teaching during pandemic?

The *students' activity* can be assessed by *the activity rate* (or *active attendance rate*) – defined as number of active students (Table 7) divided by total number of enrolled students. The examination of data displayed in Table 7 provides the following results of the activity rates during the pandemic: 74% (28/38) in 2020; 30% in 2021; 23% in 2022. Hence, two obvious comments:

- During pandemic, the students' activity rate continuously decreased;
- The average activity rate during pandemic (39%) is significantly inferior to the pre-pandemic attendance rate (82%) which was at relatively stable levels (between 78–88%).

The *students' performance* can be assessed by two indicators: the *rate of passing* (number of passing students as percentage from total number of students presented at the exam) and the *yearly average passing grade* (already calculated in Table 7). Based on the data presented summarized in *Table 7*, the following values for the rate of passing during the pandemic were: 100% in 2020 (34/34), 100% in 2021, and 91% in 2022. Hence, the observations:

- The rate of passing during the pandemic was pretty stable at high levels; the decrease from 2022 probably needs a separate discussion;
- The average passing rate during pandemic (96%) is fairly higher than in pre-pandemic period (93%) – which is not necessarily surprising as both are at high levels.

The analysis of the yearly average passing grades is finer and completes the picture – as it displays:

- Significant negative (descending) trend during pandemic; following to
- Positive trend during pre-pandemic period.

The negative trend of the average passing grade during pandemic is similar to the variation of average passing grade against number of semesters of online learning experienced by students (number of online semesters, per Table 7).

As far as *students' satisfaction* (Cao, 2022), the overall feedback (Clayson, 2021) was positive – as the passing rates have remained at high levels. However, the declining average grades during the pandemic demonstrate a certain frustration. This was consistent with the results of informal interviews with both students and professors: by the end of teaching semesters 2020–2022 many professors – and, surprisingly, a good part of students – frankly declared that they were *lacking the direct social contact and classroom environment*.

The author's experience of the last semesters of online teaching is frustrating: to talk to computer displays actually, rarely animated by students' faces – less than 10% post live image of them. Rough statistics show an average percentage of about 50% connected students during the course (numbers largely fluctuate during the course – as there were students that reported connection problems and late connections). Disappointingly, four rounds of blitz attention tests conducted during the last two semesters have shown that only 12-15% of students as being really active during the course (Scarlat, 2022).

4. RESULTS DISCUSSION

The period under scrutiny covers the corona-virus pandemic (early 2020 – mid 2022); in this period the *population's interest for education matter has raised* from non-significant (September 2020) *to second place* (right after economy matter) in August 2022, mainly because of the corona-virus impact on the education system.

The studies presented are two pieces in a larger puzzle, and both are meant to complete the literature gap on the subject of corona-virus impact on Romanian education system by turning classroom to online teaching. The target groups were students of two educational units situated at the extremes of the educational ladder: elementary and, respectively, master students. Therefore, the *focus of the research was on issues considered critical in each case*: how school teachers have adapted to the new online teaching technologies (themselves having their own dynamic during pandemic); and how master students performed during pandemic-driven online education – bearing in mind that both they and their professors (within a large technical university) were knowledgeable about online teaching technologies. Actually, *there were two evolutionary stages of the same educational process, each of them facing different challenges of the online education*.

Scrutiny of the elementary education – focused on professors.

The elementary education was unprepared for online teaching: when pandemic started, less than 3% of teachers carried out their teaching activity through online education platforms, and less than 3% have used communication platforms, websites, online libraries, virtual museums and other applications during their teaching activities.

The specialized platforms in e-learning have been underused, too. Along pandemic, the specific secondary survey highlighted spectacular increase of thepercentage of technology users and technologies used for online teaching (from under 3% to 90%), apparently in close correlation. As a stimulating factor, it is worth to mention that the current generation of students has grown alongside technology, and they are familiar with all kinds of tech devices and applications (Bhasin & Rajesh, 2021).

The increased use of online teaching technologies was paralleled by changes in the hierarchy of in all technology categories – platforms, educational websites, and online applications:

- platforms (increased use of Microsoft Teams associated with decreased use of Zoom);
- educational websites (stability of the top four websites – Twinkl, Krokotak, Emmalascoala, Didactic);
- online applications (consolidation of the top three – Wordwall, Kahoot and Canva).

To note that *stability and consolidation are attributes of maturity.*

Overall, the results of this first study are in line with other studies conducted in Romania that highlight the side-effect of pandemic as *technology accelerator* (Scarlat & Stănciulescu, 2021; Scarlat, Stănciulescu, & Panduru, 2022).

Scrutiny of the higher education – focused on students.

The observation of the online teaching at master level (as a result of the corona-virus pandemic) does not reveal spectacular impact on students or professors during the pandemic (as compared to an equal ante-pandemic period) – from that standpoint of technology use. However, there are a few finer issues to be mentioned.

Amid pretty stable rate of passing the exam during pandemic (even at high levels), the negative trend reported both as activity rate and average passing grade should be emphasized – as they are undoubtedly the results of online teaching (see the number of semesters of online teaching experienced by the master students – Table 7). These observations should be correlated compared to and correlated with the master students' and professors' feedback and opinions (a certain degree of dissatisfaction because of lacking the *direct social contact and classroom teaching environment*). In addition, as a professor, it is frustrating to have a (yet virtual) dialog with students' photos only (and not real people).

5. RECOMMENDATIONS

The experience of using online technologies in education is new for both educators and students. At elementary level, an important category of stakeholders are young students' parents. In addition, educational institutions (either schools or universities) as individual organizations and/or as collective category of same type of educational institutions are key-stakeholders. For each of them are lessons learnt, experiences to share, and recommendations to be made.

For parents (in case of elementary level), effective communication with educators, active engagement in, and deep understanding of the online education system is of key-importance; more critical as students are younger (even in that non-uncommon case when students are more technology-accustomed than their parents).

The authors' teaching experience is that teaching online was an opportunity to learn regardless the previous technology experience, background or teaching experience. The main lesson learnt (and experience to share and recommendation to other teachers) is to continuously improve in finding the most suitable teaching technology out of available arsenal of methods and technologies. *Sharing the best practice* has to become the norm.

Another issue is linked to accidentally poor Internet connection – situations thatrequire a solid preparation of teachers for any adverse, unexpected situation, *in addition to basic options* (face-to-face classroom teaching or online teaching – that already mean different teaching style and methods). Nevertheless, it should be mentioned that results of the comparison (2022 *vs.* 2020) have an indicative value only, because of the singularity of the surveyed samples. Even in this case, there is a lesson to learn: *dissemination of the good practices from this urban international school.*

The experience of online teaching at master level using Microsoft Teams platform – to interact with students without having live image (less than 10% of them post live images) – is frustrating twofold.

First, the students used to be 100% online as a device, and by choice as a personindividual (disappointingly, four rounds of blitz attention tests conducted during last two years have shown that only 12-15% of students were actively listening to the lecture).This issue of low involvement is partially addressed by gradually getting back to classroom teaching activities (Scarlat, 2022) or going to "dual" (*i.e. hybrid* or *blended*) teaching system (Zeqiri, Kareva, & Alija, 2021) – method of teaching that integrates traditional classroom teaching with new technology and digital media – aiming at allowing students more learning flexibility. Recommendations in this matter addressed to university policymakers had effect: some universities already decided to apply the "dual" system of teachingstarting with the academic year 2022–2023.

Probably the better term for *dual education system* would be *balanced teaching* – balanced not only as classroom-online but also by discipline (area of knowledge), type and profile of the education institution, adapted to the cultural and social peculiarities of students, *etc*.

Secondly, from professors' perspective, it is not fair to conduct a non-symmetrical communication (only professors have to post a live image). This situation is possible because there is no enforcement rule in this respect. This is a solid recommendation to schools' and universities' administrators to develop proper sets of regulations (rights and obligations) for access and use of online technologies ("online driving license" type) – still observing the GDPR principles.

There is also an important recommendation for the acquisition managers from all education institutions: when new equipment and/or technology are acquired (not only in case of online use), the appropriate training should be acquired as well – in order to properly train the teaching staff. In addition, after using the acquired equipment and/or technology, the feedback collected during usage should be directed to theequipment/technology supplier.

6. LIMITATIONS AND FUTURE RESEARCH PATHS

The main limitation is the singularity of samples investigated. Therefore, it should be mentioned that survey results have an indicative value only (they cannot be extended to across schools or universities), because the surveyed samples are limited (as organization and population surveyed); these are large perspectives for further, deeper investigations: more education organizations (elementary schools, universities), more education levels (high schools, undergraduate programmes). Even comparative studies with similar education programmes from other countries are appealing research paths for further studies.

More specific studies related to higher education programmes (master programmes and master courses in particular) could be oriented toward the hypothetical correlation between students' *activity rate* and *average passing grade.* Also, the decrease of *passing rate* from 2022 probably needs a deeper and further longitudinal investigation – in order to conclude a definite trend.

As this study was not focused on the influence of technologies on the conditions of teaching and learning as well as teaching process itself – all related but beyond the purpose of the study presented in this chapter – these might also be directions for future research.

7. CONCLUSION: LOOKING FORWARD!

The pandemic has definitely provoked a disruption in traditional education system, turning it towards online, and surprising many education institutions unprepared. However, a positive side effect was reported, at least in Romanian education system: pandemic as a *technology accelerator* – effect which was observed not only in education (Scarlat & Stănciulescu, 2021) or provoking a so-called *digital acceleration* (Scarlat et al., 2022).

The authors' research objectives were fully reached. The overall objective to contribute at completing the literature gap relative to turning the Romanian education system online under the corona-virus impact was completed with recommendations made to main stakeholders, and suggestions for further research.

This study identified both positive and negative effects of turning Romanian education online – in line with advantages and disadvantages of online teaching (Dhawan, 2020). Sood, Sharma, and Kumar (2022) show that synchronous teaching is one remarkable advantage brought by online technologies during corona-virus pandemic.

This study also identifies the tendency of two Romanian education institutions to evolve towards a dual (hybrid) education model (Zeqiri et al., 2021) or, as Edelhauser and Lupu-Dima (2021) described as a "mix-and-match" of tools and delivery methods, such as interactive e-learning courses, live and recorded lectures, and collaborative documents for group work; this model "can work well to provide a comprehensive learning experience" but it can also generate difficulties for both students and teachers.

A number of recent studies display research results and share the authors' concern about future education, in particular the future of higher education (Sousa, Suleman, Mercadé Melé, & Molina Gómez, 2021; Torr, Kildunne, Clulow, & Sutcliffe, 2021; Almaraz-Menéndez, Maz-Machado, López-Esteban, & Almaraz-López, 2022; Colón & Alsace, 2022).

Donthu and Gustafsson (2020, pp. 287–288) cited five trends identified by Krishnamurthy (2020) related to the higher education system that "will undergo a decade of technology-led transformations":

(i) The *algorithm* as *professor*;
(ii) The *university* as a *service*;
(iii) The *university* as *assessment* powerhouse;
(iv) Learning personalization to support *diversity*;
(v) *Problem-solving* through *ethical inquiry* (given the exponential growth of the AI algorithms).

Shukla, Kolahal, Padmakumar, Jacob, and George (2022) argue that *open access* to educational resources is the future of learning, in line with *UNESCO Recommendation on Open Science* (UNESCO, 2021).

As far as educator's role, Scarlat (2020, p. 279; 2021, p. 273) considers that on short term "the education system [...] will continue its mission and address the needs of the increasingly technologized society, while the educator's role is undergoing a paradigmshift: from educator to master of new technologies as well as students' mentor and guide to discern the right information from the available ocean of mixed information" and, on longerrun, "the future education will depend on future technologies and their impact on the human society, but mostly decisions made by humans; therefore, the education system and educator's role will significantly depend on how the future humans (both educators and students) will evolve". Or, in more dramatic terms, the human race suffocation or extinction as result of wrong technology decisions is an extreme possibility (Wiener, 1989; Martenson, 2011; Harari, 2016).

Today, the higher education is at a crossroads – as its future is intimately inter-linked with the future of human society as humankind. The humans are actually in front of largely spread options. It is up to us to make the right decisions.

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ACKNOWLEDGEMENTS

The authors are thankful to their students of all ages – who endlessly are providing new lessons to be learnt.

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