

A nexus analysis of the online teaching context in Romanian schools

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Abstract. *The COVID-19 pandemic has forced education institutions to adapt by using online tools to continue teaching when distancing was required. While the pandemic has had a negative effect on education, online learning has proven to be better than learning alone. This new paradigm shift in the way teaching can be delivered has paved the way for online classes to be taken in consideration outside of the pandemic. For countries which have a poor infrastructure in some regions, that makes it hard for all children to arrive to school daily, especially during harsh winters, online teaching could be used to offer continuous learning to all students. It can also continue to be used in some cases where classes cannot be attended due to illnesses. It is relevant to further study the impact of online learning within different schools from different regions, and to recognize the shaping factors for online teaching. The present study was based on a survey, in which 522 teachers from different categories of schools participated. Differences between the teaching processes during the pandemic have been studied based on the school's funding (public or private), the region the school is based in, and the level of education that teachers provide. Results have highlighted differences based on all the studied categories.*

Keywords: online teaching, digitalization, public education, private education.

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Introduction

The emergence of the COVID-19 pandemic has raised enormous public-health concerns, which led to the introduction of lockdowns to limit the spread of the virus (Favale et al., 2020). The closure of schools as part of lockdowns has posed significant issues for teachers, students, and their parents, affecting 94% of the world's student population (Psacharopoulos et al., 2020). Concerns were raised that this period might have a negative influence on the students' education (Azevedo et al., 2021). This has driven the interest to study the effects of online learning on children's education and wellbeing, as well as the overall context in which online teaching has been carried out. A research performed on primary-school students in Belgium has shown that students experienced learning losses, based on their results on their

standardized tests after the COVID-19 lockdown, compared to students taking the tests previously (Maldonado and De Witte, 2020).

Clark et al. (2021) have analyzed the impact of online learning during the pandemic and have obtained results which show that online teaching, as opposed to no support and learning alone, has driven better results. The content of the online materials was also important – some students had access to content created by top professors, as opposed to their usual professors, and their grades were higher than the others who only had access to content created by their own professors. However, learning results – proven by exam grades – were overall lower than before the pandemic.

Although the importance of digitalization is widely acknowledged, schools have been lagging in using modern digital technology (Vainionpää et al., 2019). During the pandemic, schools had to adapt quickly in using technology to continue the education of children and limit the disruptions caused by the pandemic.

This article aims to find out what how online learning has evolved in Romanian schools during the pandemic, and what were the factors that drove differences in the adoption and delivery of online teaching.

Literature review

Research before the pandemic has shown that using computer applications can be beneficial to learning, but it is important to combine them with learning in schools (Bakker et al., 2014). Concerns of online risks were also raised. Bayraktar (2017) has analyzed online risks from the perspective of meeting face-to-face with other internet users, being exposed to inappropriate content, cyber-bullying, and excessive internet use. Mediating factors for these threats have also been researched, with results showing that students' self-control, digital literacy and parental control might mitigate online risks (Purnama et al., 2021; Dima et al., 2019). Another threat driven by the pandemic was the socioeconomic gradient, as children from disadvantaged families received less support from their parents and didn't have access to IT infrastructure (Bol, 2020). Jomezai et al. (2021) underlined the use of social media for online teaching during the pandemic. Social media can be used especially in developing regions, where digital skills are lower and teachers do not have access to many IT tools.

Technology can be used in various educational activities, and its role has evolved with these. ICT was initially used for preparing the teaching material (lessons, presentations, charts etc.), using multimedia facilities, accessing information, developing structural charts and implementing modern methods of evaluation (Craina & Losonczy, 2005). Today, learning institutions make use of Open Wikis, mobile applications, eBooks, simulations, virtual environments for collaborative learning, smart devices and other interactive tools (Daniela et al., 2019). Although not widely used, the effectiveness of robotics and virtual reality for the learning process has also been outlined (Daniela et al., 2019).

Interest towards the integration of technology in the education process has been growing starting with the 2000s. The ImpaCT2 study performed in the UK (Harrison et al., 2002) has outlined a positive influence between the use of ICT and English national tests, although it didn't prove a statistically significant correlation between the level of use of ICT and mathematics exam results. However, there are authors who have raised methodological concerns regarding results of the study, since learning was viewed mainly through subject measures of knowledge and understanding, concerns regarding the representativeness of the students' sample and the limited information regarding the different forms of ICT being used

(Passey, 2014). Some universities and schools had introduced some form of blended learning even before the pandemic, giving their students access to an online learning environment (Cavalcanti et al., 2021; Dascalu et al., 2021).

Among the online learning platforms which are available to students and educators, there are Course Management Systems (CMS), Massive Open Online Course (MOOC), and Small Private Online Course (SPOC) (Dascalu et al., 2021; Dima et al., 2022). In Romania, many universities, among which the Bucharest University of Economic Studies or the Politehnica University of Bucharest, rely on the Moodle platform, which is an open source CMS. While these tools have been used also prior to the pandemic, the COVID outbreak drove a high increase in online platform usage (Dascalu et al., 2021).

Students prefer to do written activities online, in their own time, but feel more engaged in face-to-face discussions, although both methods can lead to same academic performances (Kemp & Grieve, 2014). When using online learning environments during the pandemic, some students became disengaged at a higher rate than when they used online learning systems prior to the pandemic (Spitzer et al., 2021).

While some benefits of the use of technology have been identified, the learning and teaching processes differ depending on age and education stage. Some researchers have argued that younger children should not be exposed to online learning, as their social and emotional development is very important at this stage (House, 2012). If unsupervised at home, younger children are also at higher online risk than older children. During the pandemic, when schools were shut down, primary education children also had to use technology for the online school. The research of Dong et al. (2020) has found that Chinese parents of young children generally had negative beliefs about online learning and preferred traditional learning. Their reason of rejecting online learning were the shortcomings of online learning (harmful to the eyes, lacks social interaction, reduces the amount of physical exercise and others), the inadequate self-regulation of their young children and their lack of time and knowledge to support their children's online learning (Dong et al., 2020).

Another concern is the digital divide between rural and urban areas. Inequalities between students in rural areas and those in urban areas have been studied also before the pandemic, but in the light of the COVID pandemic, their effects have become even more concerning (Zhao et al., 2022; Olanrewaju et al., 2021).

These challenges should be further analyzed and understood by scholars, educators and regulators in order to mediate the online teaching process. The time during which students learned online has highlighted some of the effects of this method, which could be used in developing regions or when children are sick.

Methodology

To complement the previously mentioned research, which was focused on educational inequalities, as well as the adoption of technology for educational purposes, we chose to study these aspects within Romanian schools. Our research questions ask whether there were differences in the teaching process during the COVID-19 pandemic depending on:

RQ1: the school environment

RQ2: the school type of funding

RQ3: the level of education

The survey was conducted from 10 March to 25 May 2021. The respondents were selected through non-probabilistic sampling. The questionnaire was created in Google Forms

and disseminated within working groups of school inspectorates, school directors and teachers. 260 responses were received to this online questionnaire. Further 262 respondents filled out the questionnaire in physical form. Participants were assured confidentiality of their responses. The questionnaire had 5 sections: information about the school and the teacher; the communication during the COVID-19 pandemic; the teaching process during the COVID-19 pandemic; support for pupils who are unable to participate in online courses/teaching activities; reopening schools during the pandemic.

298 of participants in the study are from urban schools and 224 from rural schools. By type of funding, 463 of the teachers teach in state-funded schools and 59 teachers teach in private schools. By level of education, 71 teachers teach at pre-primary level, 128 teach at primary level, 227 teach at secondary level and 96 teach at high school level.

For the online teaching process, the following aspects were analyzed - *"delivery of materials and tasks or directions for learning to students"*, *"online platforms or other communication means used in online teaching"*, *"selection criteria for online platforms"*, *"participation in professional development activities related to the development of digital competencies"*; the following independent variables were tested: the school environment (rural/urban), the type of financing (state/private) and the education level (pre-primary, primary, secondary and high school).

The statistical analysis of the results was carried out using SPSS.20 software. The statistical techniques used were the t-test for independent samples, the analysis of variance simple ANOVA (One-Way) and the Chi-square test of association/independence.

Results

Most teachers have adapted and started to use digital materials and technologies, fact which can be observed in Table 1. Most of them used Google Classroom/Meet, but many of them also used the Zoom and Moodle platforms.

Table 1. Means of the delivery of materials, tasks and learning guidance to students and online platforms or other media used in online teaching

	Averages
<i>The way in which materials and tasks or learning directions are delivered to learners (Averages on scale 0-4)</i>	
Students are offered digital materials through digital technologies	3.44
Students are provided with printed materials	1.17
Students' parents/guardians take printed materials from the teacher	0.97
<i>Online platforms or other means of communication used in online teaching (Averages on scale 0-4)</i>	
Google Classroom/Meet	3.07
Zoom	2.14
Adservio	0.59
Microsoft Team	0.53
Moodle	1.32
E-mail	1.07
Other means	0.72
Facebook	0.86

Source: Authors' own research.

RQ1. Comparisons by school environment in terms of the teaching process during the COVID-19 pandemic

To test for differences in the teaching process during the COVID-19 pandemic, influenced by the environment (urban/rural) of the school, we applied the independent samples t-test and the chi-square test of independence/association.

Results have shown that in the case of the *delivery of materials and tasks or directions for learning to students*, there are significant differences between school environment (regions) in the provision of digital materials to students via digital technologies [$t(520) = 3.954, p < 0.01$], with provision of digital materials to students via digital technologies being higher in urban than in rural areas. There are significant differences by school environment in the provision of printed materials to pupils [$t(520) = 8.390, p < 0.01$], with the provision of printed materials to pupils being higher in rural than in urban areas. Regarding the extent to which parents/guardians take printed materials from teachers [$t(520) = 3.997, p < 0.01$], there is a higher tendency to do so in rural than in urban areas (Table 2).

Table 2. Independent samples t-test results when comparing how materials and learning tasks or directions are delivered to students, by school environment

	School environment averages		t-test result
	urban	rural	
Students are offered digital materials through digital technologies	3.57	3.25	$t(520) = 3.954, p = .000$
Students are provided with printed materials	0.74	1.75	$t(520) = 8.390, p = .000$
Students' parents/guardians take printed materials from the teacher	0.77	1.24	$t(520) = 3.997, p = .000$

Source: Authors' own research.

In the case of *online platforms or other communication means used in online teaching*, t-test results show that there are no significant differences by school environment in the use of Google Classroom/Meet platforms [$t(520) = 0.050, p > 0.05$], or Zoom [$t(520) = 1.221, p > 0.05$] in online teaching. However, there are significant differences by school environment in the use of Adservio [$t(520) = 3.441, p < 0.01$], Microsoft Team [$t(520) = 2.073, p < 0.05$], Moodle [$t(520) = 2.751, p < 0.05$], email services [$t(520) = 6.773, p < 0.01$], other means [$t(520) = 2.847, p < 0.01$] or Facebook [$t(520) = 5.146, p < 0.01$]. Thus, the use of Adversio, Moodle, email or other means in online teaching was more common in urban schools than in rural schools. In contrast, the use of Microsoft Team or Facebook in online teaching was higher in rural schools than in urban schools (Table 3).

Table 3. Independent samples t-test results when comparing the degree of use of online platforms or other media used in online teaching, by school environment

	School environment averages		t-test result
	urban	rural	
Google Classroom/Meet	3.03	3.04	$t(520) = 0.050, p = .961$
Zoom	2.22	2.04	$t(520) = 1.221, p = .223$
Adservio	0.75	0.37	$t(520) = 3.441, p = .001$
Microsoft Team	0.43	0.67	$t(520) = 2.073, p = .039$
Moodle	0.18	0.06	$t(520) = 2.751, p = .006$
E-mail	1.38	0.67	$t(520) = 6.773, p = .000$

	School environment averages		t-test result
	urban	rural	
Other means	0.85	0.55	t (520) = 2.847, p = .005
Facebook	0.58	1.24	t (520) = 5.146, p = .000

Source: Authors' own research.

For the comparison of the *selection criteria for online platforms* used for online teaching/learning activities in the school year 2020/2021, depending on the school environment, the results of the chi-square test show that there are significant differences depending on the school environment [$\chi^2 (1) = 25.350$, $p < 0.01$], with regard to *the recommendations of the responsible education institutions*, this criterion being more important for teachers teaching in urban schools than for teachers teaching in rural schools. There are significant differences depending on school environment, for the criterion "*the whole school uses the same platform*" [$\chi^2 (1) = 14.285$, $p < 0.01$], this criterion being more important for teachers teaching in rural schools than for teachers teaching in urban schools. There were no significant differences depending on the school environment, for the criterion based on "*personal affinity*" [$\chi^2 (1) = 2.710$, $p > 0.05$]. There are significant differences depending on the school environment, for the criterion based on "*previous experience with using the respective online platform*" [$\chi^2 (1) = 11.234$, $p < 0.01$], with this criterion being more important for teachers teaching in urban schools than for teachers teaching in rural schools.

In the case of *participation in professional development activities related to the development of digital competencies prior to the COVID-19 pandemic*, Chi-square test results show that there are significant differences depending on the school environment [$\chi^2(1) = 21.277$, $p < 0.01$], in that teachers teaching in urban schools participated in such activities to a greater extent than teachers teaching in rural schools.

In the case of *participation in professional development activities related to the development of digital skills after the COVID-19 pandemic*, the results of the Chi-square test show that there are no significant differences depending on the environment of the school [$\chi^2 (1) = 2.858$, $p > 0.05$].

To compare participation in different professional development activities related to digital competence development after the COVID-19 pandemic by school environment, Chi-square test results are presented below for each criterion.

- There were no significant differences depending on the school environment for participation in courses organized and paid for by the school [$\chi^2 (1) = 0.018$, $p > .05$].
- There were no significant differences depending on the school environment for participation in free/tutorial courses [$\chi^2 (1) = 2.216$, $p > 0.05$].
- There are significant differences according to the school's environment in the case of participation in personally paid courses [$\chi^2 (1) = 8.195$, $p < 0.01$]. Thus, participation in personally paid courses is higher for teachers teaching in urban schools than for teachers teaching in rural schools.
- There are significant differences depending on the school environment for the participation in exchanges of experience and good practice with colleagues who had digital skills [$\chi^2 (1) = 42.253$, $p < 0.01$]. Thus, participation in exchanges of experience and good practice with colleagues who had digital skills was higher for teachers teaching in urban schools than for teachers teaching in rural schools.

In the case of bearing the costs of professional development activities related to the development of digital skills after the COVID-19 pandemic, the Chi-square test results show that there are significant differences depending on school environment [$\chi^2(1) = 5.523$, $p < 0.05$] – teachers from urban schools personally bore the costs of participating in such activities to a greater extent than teachers from rural schools. Moreover, in the case of teachers from urban areas, more teachers personally bore the costs of participating in such activities than those who did not, whereas in the case of teachers teaching in rural schools, the situation is the reverse, with more teachers who did not personally bear the costs than those who did.

RQ2. Comparisons by type of funding in terms of the teaching process during the COVID-19 pandemic

In the case of the *delivery of materials and tasks or directions for learning to students*, the t-test results showed that there are significant differences by type of funding in the provision of digital materials to pupils through digital technologies [$t(520) = 14.588$, $p < .01$], with the provision of digital materials to pupils through digital technologies being higher in private schools than in state schools; there are significant differences depending on school environment in the provision of printed materials to students [$t(520) = 12.441$, $p < .01$], with provision of printed materials to students being higher in state schools than in private schools; there are significant differences by school environment in the extent to which parents/guardians take printed materials from teachers [$t(520) = 15.542$, $p < .01$], with parents/guardians taking printed materials from teachers more in state schools than in private schools (Table 4).

Table 4. Independent samples t-test results when comparing how materials and learning tasks or directions are delivered to students, by type of funding

	Average		t test result
	urban	rural	
Students are offered digital materials through digital technologies	3.37	4.00	$t(520) = 14.588$, $p = .000$
Students are provided with printed materials	1.31	0.10	$t(520) = 12.441$, $p = .000$
Students' parents/guardians take printed materials from the teacher	1.09	0.03	$t(520) = 15.542$, $p = .000$

Source: Authors' own research.

In the case of *online platforms or other media used in online teaching*, the t-test results show that there are no significant differences by funding type in the use of Google Classroom/Meet [$t(520) = 0.561$, $p > .05$] and Adservio [$t(520) = 1.455$, $p > .05$] platforms in online teaching; there are significant differences by funding type in the use of Zoom [$t(520) = 15.492$, $p < .01$], Microsoft Team [$t(520) = 6.907$, $p < .01$], Moodle [$t(520) = 5.471$, $p < .01$], email services [$t(520) = 2.969$, $p < .01$], other media [$t(520) = 3.937$, $p < .01$] or Facebook [$t(520) = 8.732$, $p < .01$] in online teaching. Thus, the use of Microsoft Team, Moodle, other media or Facebook in online teaching is more common in state schools than in privately funded schools. In contrast, the use of the Zoom platform or email for online teaching was higher in privately funded schools than in state schools (Table 5).

Table 5. Independent samples t-test results when comparing the degree of use of online platforms or other media used in online teaching, by school funding

	Average		t-test result
	State schools	Private schools	
Google Classroom/Meet	3.05	2.92	t (520) = 0.561, p = .576
Zoom	1.96	3.6	t (520) = 15.492, p = .000
Adservio	0.55	0.88	t (520) = 1.455, p = .150
Microsoft Team	0.59	0.05	t (520) = 6.907, p = .000
Moodle	0.15	0.00	t (520) = 5.471, p = .000
E-mail	1.02	1.49	t (520) = 2.969, p = .004
Other means	0.78	0.31	t (520) = 3.937, p = .005
Facebook	0.96	0.12	t (520) = 8.732, p = .000

Source: Authors' own research.

For the comparison of *the selection criteria for online platforms to be used for online course delivery/teaching activities* in the school year 2020/2021 according to the type of funding, the results of the chi-square test are presented below for each criterion.

- There are significant differences by type of funding for the criterion *based on the recommendation of the institutions responsible for education* [$\chi^2 (1) = 20.262, p < .01$], with this criterion being more important for teachers teaching in state-funded schools than for teachers teaching in privately funded schools.
- There are significant differences by funding type for the criterion *the whole school uses the same platform* [$\chi^2 (1) = 8.010, p < .01$], with this criterion being more important for teachers teaching in privately funded schools than for teachers teaching in state-funded schools.
- There were no significant differences by type of funding for the criterion based on *personal affinity* [$\chi^2 (1) = 1.471, p > .05$]
- There are significant differences by funding type for the criterion based on *prior experience using that online platform* [$\chi^2 (1) = 6.434, p < .05$], with this criterion being more important for teachers teaching in state-funded schools than for teachers teaching in privately funded schools.

In the case of participation in *professional development activities related to the development of digital skills before the COVID-19 pandemic*, the results of the Chi-square test show that there are no significant differences by type of funding [$\chi^2 (1) = 0.115, p > .05$]. In the case of participation in *professional development activities related to the development of digital skills after the COVID-19 pandemic*, the chi-square test results show that there are significant differences by type of funding [$\chi^2 (1) = 8.170, p < .01$], in that teachers from privately funded schools participated in such activities to a greater extent than teachers teaching in state-funded schools.

To compare participation in different professional development activities related to digital competence development after the COVID-19 pandemic by type of funding, the results of the Chi-square test are presented below for each criterion.

- There were no significant differences by type of funding for *participation in courses organized and paid for by the school* [$\chi^2 (1) = 1.100, p > .05$].
- There are significant differences by type of funding for *participation in free/tutorial courses* [$\chi^2 (1) = 61.955, p < .01$]. Thus, participation in free/tutorial courses is higher for

teachers teaching in state-funded schools than for teachers teaching in privately funded schools.

- There are significant differences by type of funding for *participation in personally paid courses* [$\chi^2 (1) = 31.610$, $p < .01$]. Thus, participation in personally paid courses is higher for teachers teaching in state-funded schools than for teachers teaching in privately funded schools.
- There are significant differences by type of funding for *participation in exchanges of experience and good practice with colleagues who had digital skills* [$\chi^2 (1) = 13.754$, $p < .01$]. Thus, participation in exchanges of experience and good practice with colleagues who had digital skills was higher for teachers teaching in privately funded schools than for teachers teaching in state-funded schools.

In the case of *bearing the costs of professional development* activities related to the development of digital competencies after the COVID-19 pandemic, the Chi-square test results show that there are significant differences by type of funding [$\chi^2 (1) = 63.580$, $p < .01$], in that professors teaching in state-funded schools personally bore the costs of participating in such activities to a greater extent than teachers teaching in privately funded schools. Thus, while in state schools 56.8% of teachers personally bore the costs, in privately funded schools only 1.7% of teachers personally bore the costs.

RQ3. Comparisons by education level in terms of teaching process during the COVID-19 pandemic

To test for differences by education level in the teaching process during the COVID-19 pandemic, we applied the simple analysis of variance (One-Way ANOVA) method. We present below the results obtained.

In the case of the ways in which materials and tasks or directions for learning were delivered to students, the results of the one-way ANOVA are presented below (Table 6).

Table 6. Simple ANOVA results when comparing how materials and learning tasks or directions are delivered to students, by education level

	Education level - averages				F	Signifiant comparisons*
	Preprimary	Primary	Secondary	Highschool		
Students are offered digital materials through digital technologies	3.27	3.33	3.54	3.50	2.32	-
Students are provided with printed materials	1.28	1.41	1.25	0.60	7.06***	H < PP, P, S
Students' parents/guardians take printed materials from the teacher	1.27	1.13	1.04	0.38	8.75***	H < PP, P, S

*Tests from the Bonferroni t test; ** $p < .05$; *** $p < .01$; PP = preprimary; P = primary; S = secondary; H = highschool
Source: Authors' own research.

- There were no significant differences by grade level in providing students with digital materials through digital technologies [F (3, 521) = 2.324, $p > .05$].
- There are significant differences by level of education in providing students with printed materials [F (3, 521) = 7.06, $p < .01$]. The results of the Bonferroni test show that the

provision of printed materials to pupils is more developed for teachers teaching at pre-primary, primary and secondary level compared to teachers teaching at highschool level.

- There are significant differences by education level in the extent to which parents/guardians take printed materials from the teacher [$F(3, 521) = 8.75, p < .01$]. The results of the Bonferroni test show that the situation in which parents/guardians take printed materials from the teacher is more developed in the case of teachers who teach at pre-primary, primary and secondary level, compared to teachers who teach at highschool level.

In the case of online platforms or other media used in online teaching, the results of the simple ANOVA are shown below (Table 7).

Table 7. Simple ANOVA results when comparing the degree of use of online platforms or other media used in online teaching by level of education

	Education level - averages				F	Significant comparisons*
	Preprimary	Primary	Secondary	Highschool		
Google Classroom/Meet	2.93	3.32	2.97	2.88	2.09	-
Zoom	2.46	1.92	2.29	1.85	3.18**	H < PP, P, S
Adservio	0.39	0.52	0.63	0.75	1.15	-
Microsoft Team	0.08	0.21	0.72	0.84	10.37***	S, H > PP, P
Moodle	0.03	0.13	0.11	0.28	3.38**	H > PP
E-mail	1.08	0.93	1.14	1.08	0.73	-
Other means	0.86	0.87	0.64	0.61	1.39	-
Facebook	1.27	0.84	0.83	0.68	2.57	-

*Tests from the Bonferroni t test; ** $p < .05$; *** $p < .01$; PP = preprimary; P = primary; S = secondary; H = highschool
Source: Authors' own research.

- There are no significant differences by education level in the use of Google Classroom/Meet platforms [$F(3, 521) = 2.09, p > .05$], Adversio [$F(3, 521) = 1.15, p > .05$], email [$F(3, 521) = 0.734, p > .05$], other media [$F(3, 521) = 1.39, p > .05$] or Facebook [$F(3, 521) = 2.55, p > .05$] in online teaching.
- There are significant differences by education level in the use of the ZOOM platform in online teaching [$F(3, 521) = 3.18, p < .05$]. However, Bonferroni test results show no significant differences by education level in the use of the ZOOM platform in online teaching.
- There are significant differences by education level in the use of the Microsoft Team platform in online teaching [$F(3, 521) = 10.37, p < .01$]. Bonferroni test results show that the use of the Microsoft Team platform in online teaching is more developed for teachers teaching at the middle and high school level compared to teachers teaching at the pre-primary and primary level.
- There are significant differences by grade level in the use of the Moodle platform in online teaching [$F(3, 521) = 3.38, p < .05$]. Bonferroni test results show that the use of the Moodle platform in online teaching is more developed for teachers teaching at the highschool level compared to teachers teaching at the pre-primary level.

Conclusions

As expected, schools from the urban environment used digital technologies to send students learning materials more than schools in rural areas did, where there was a higher tendency to print materials and hand them out to students or parents and tutors. The online learning environment Moodle is utilized in urban schools, while rural schools rely on Facebook to communicate with students online. Configuring the open-source platform Moodle requires some digital skills, while Facebook is a convenient platform also for people without IT skills.

In line with previous research (Zhao et al., 2022; Olanrewaju et al., 2021), there are differences between professors from the rural environment and professors from the urban environment regarding online teaching. In terms of criteria for the selection of digital tools, in urban schools, professors are guided by the recommendations of education institutions, while professors from the rural environment are influenced by their peers. The lower level of digital skills of the professors in rural areas during the COVID pandemic can be explained also by the finding that professors attended less trainings for the development of IT competencies before the pandemic, than professors in the urban environment. This difference was changed by the adaptations which schools had to undergo after the pandemic started.

Financial resources also seem to be a mediator of digitalization of the teaching process, as private schools have used digital technologies to give students materials more than state schools, have access to paid platforms such as Zoom, and participated in more trainings for the development of digital skills after the pandemic. Moreover, professors in state-owned schools participated in more professional development activities that they personally funded, which underlines the failure of the state in providing support to professors to shift to the digital environment. It is interesting that prior experience in using a certain online tool was more important for state schools, which could suggest that teachers in public schools had more freedom to use whatever tools they wanted. In private schools, there was a higher tendency to use tools that the entire school used.

In line with previous research that underlined that online teaching is not as appropriate for younger children than older children (House, 2012), our analyses showed differences between the usage of online resources and tools with younger children and those at high school level, which can be attributed to their obvious lack of digital skills, a lower self-control and self-motivation. However, young children could also benefit from digital learning environments, as addition to learning face-to-face, and this could be achieved by educating them in this respect within schools.

Limitations of the study are driven by the usage of non-probabilistic sampling. Also, for a thorough understanding of the drivers and drawbacks for online teaching, interviews are recommended to be used, instead of questionnaires.

Further research is required for each category of schools, professors and education level, in order to identify measures for the reduction of inequalities in terms of digital skills and the resources needed for the enrichment of the curriculum with online tools.

References

- Azevedo, J.P., Hasan, A., Goldemberg, D., Iqbal, S.A., Geven, K. (2021). Simulating the Potential Impacts of COVID-19 School Closures on Schooling and Learning Outcomes: A Set of Global Estimates. *The World Bank Research Observer*, 36.

- Bakker, M., van den Heuvel-Panhuizen, M., Robitzsch, A. (2014). Effects of playing mathematics computer games on primary school students' multiplicative reasoning ability. *Contemporary Educational Psychology*, 40, January 2015, 55-71.
- Bayraktar, F. (2017). Online risks and parental mediation strategies comparison of Turkish children/adolescents who live in Turkey and Europe. *Education and Science*, 42(190), pp. 25-37.
- Bol, T. (2020). Inequality in homeschooling during the Corona crisis in the Netherlands. First results from the LISS Panel. *SocArXiv hf32q*, Center for Open Science, 10.31235/osf.io/hf32q.
- Cavalcanti, A.P., Barbosa, A., Carvalho, R., Freitas, F., Tsai, Y.S. (2021). Automatic feedback in online learning environments: A systematic literature review, *Computers and Education: Artificial Intelligence*, 2, 2021, 100027.
- Clark, A.E., Nong, H., Zhu, H., Zhu, R. (2021). Compensating for academic loss: Online learning and student performance during the COVID-19 pandemic, *China Economic Review*, 68, August 2021, 101629, <https://doi.org/10.1016/j.chieco.2021.101629>.
- Craina, S. & Losonczy, C. (2005). *Utilizarea calculatorului in procesul de predare-invatare*. Bucharest: Educatia 2000+.
- Daniela, L., Visvizi, A. & Lytras, M.D. (2019). How to predict the unpredictable: technology-enhanced learning and learning innovations in higher education, in Eds. Visvizi, A., Lytras M.D., Daniela, L., *The Future of Innovation and Technology in Education, Policies and Practices for Teaching and Learning Excellence. Emerald Studies in Higher Education, Innovation and Technology*, Emerald Publishing.
- Dascalu, M.D., Ruseti, S., Dascalu, M., McNamara, D.S., Carabas, M., Rebedea, T., Trausan-Matu, S. (2021). Before and during COVID-19: A Cohesion Network Analysis of students' online participation in moodle courses. *Computers in Human Behavior*, 121, August 2021, 106780.
- Dima, A., Clodnițchi, R., Istudor, L. & Luchian, I. (2019). Business excellence models in higher education – innovative solutions for management performance. *Proceedings of the International Conference on Business Excellence*, 13(1) 38-46.
- Dima, A. M., Busu, M., & Vargas, V. M. (2022). The mediating role of students' ability to adapt to online activities on the relationship between perceived university culture and academic performance. *Oeconomia Copernicana*, 13(4), 1253–1281. <https://doi.org/10.24136/oc.2022.036>.
- Dong, C., Cao, S., Li, H. (2020). Young children's online learning during COVID-19 pandemic: Chinese parents' beliefs and attitudes. *Children and Youth Services Review*, 118, November 2020, 105440, <https://doi.org/10.1016/j.chldyouth.2020.105440>.
- Favale, T., Soro, F., Trevisan, M., Drago, I., Mellia, M. (2020). Campus traffic and e-Learning during COVID-19 pandemic. *Computer Networks*, 176(2020), 107290.
- Harrison, C., Comber, C., Fisher, T., et al. (2002). *ImpacCT2: The Impact of Information and Communication Technologies on Pupil Learning and Attainment*, British Educational Communications and Technology Agency.
- House, R. (2012). The inappropriateness of ICT in early childhood: Arguments from philosophy, pedagogy, and developmental research, in S. Suggate, E. Reese (Eds.), *Contemporary debates in childhood education and development*, Routledge, New York, pp. 105-120.

- Jogezai, N.A., Baloch, F.A., Jaffar, M., Shah, T., Khilji, G.K., Bashir, S. (2021). Teachers' attitudes towards social media (SM) use in online learning amid the COVID-19 pandemic: the effects of SM use by teachers and religious scholars during physical distancing, *Heliyon*, 7(4), April 2021, e06781, <https://doi.org/10.1016/j.heliyon.2021.e06781>.
- Kemp, N. & Grieve, R. (2014). Face-to-face or face-to-screen? Undergraduates' opinions and test performance in classroom vs. online learning. *Front. Psychol.*, 12 November 2014, 5(2014), <https://doi.org/10.3389/fpsyg.2014.01278>.
- Maldonado, J.E. & De Witte, K. (2020) The effect of school closures on standardized student test outcomes. Discussion Paper Series DPS20.17, September 2020.
- Olanrewaju, G.S., Adebayo, S.B., Omotosho, A.Y., Olajide, C.F. (2021). Left behind? The effects of digital gaps on e-learning in rural secondary schools and remote communities across Nigeria during the COVID19 pandemic. *International Journal of Educational Research Open*, 2, 2021, 100092.
- Passey, D. (2014). *Inclusive technology enhanced learning. Overcoming cognitive, physical, emotional & geographical challenges*, Routledge, New York and London.
- Psacharopoulos, G., Collis, V., Patrinos, H.A., Vegas, E. (2020). *Lost Wages. The COVID-19 Cost of School Closures*. World Bank Group, Policy Research Working Paper 9246.
- Purnama, S., Ulfah, M., Machali, I., Wibowo, A., Narmaditya, B.S. (2021) Does digital literacy influence students' online risk? Evidence from Covid-19, *Heliyon*, 7(6), e07406, <https://doi.org/10.1016/j.heliyon.2021.e07406>.
- Spitzer, M.W.H., Gutsfeld, R., Wirzberger, M., Moeller, K. (2021). Evaluating students' engagement with an online learning environment during and after COVID-19 related school closures: A survival analysis approach. *Trends in Neuroscience and Education*, 25, December 2021, 100168.
- Vainionpää, F., Kinnula, M., Iivari, N. & Molin-Juustila, T. (2019). Gendering and Segregation in Girls' Perceptions of IT as a Career Choice – A Nexus Analytic Inquiry. In A. Siarheyeva, C. Barry, M. Lang, H. Linger, & C. Schneider (Eds.), *Information Systems Development: Information Systems Beyond 2020* (ISD2019 Proceedings). Toulon, France: ISEN Yncréa Méditerranée.
- Zhao, L., Cao, C., Li, Y., Li, Y. (2022). Determinants of the digital outcome divide in E-learning between rural and urban students: Empirical evidence from the COVID-19 pandemic based on capital theory. *Computers in Human Behavior*, 130, May 2022, 107177.