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Print ISSN 0034-8678; Online ISSN: 2559 - 639X

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Învățământul online în contextul pandemiei: o analiză a disparităților în implicarea
academică a studenților

Oana LUP, Elena Cristina MITREA

Journal of Pedagogy, 2021 (1), 31 - 50

<https://doi.org/10.26755/RevPed/2021.1/31>

The online version of this article can be found at: <http://revped.ise.ro/en/2021/>



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ONLINE LEARNING DURING THE PANDEMIC: ASSESSING DISPARITIES IN STUDENT ENGAGEMENT IN HIGHER EDUCATION

Oana Lup*
Elena Cristina Mitrea**

Lucian Blaga University of Sibiu,
Sibiu, Romania

oana.lup@ulbsibiu.ro, cristina.mitrea@ulbsibiu.ro

Abstract

Student engagement is consequential for learning outcomes and is a key factor in student achievement. While its impact on educational outcomes in a face-to-face setting has made the focus of extensive research, less is known about its effects in the context of online learning, especially in Eastern Europe. The Covid-19 pandemic has forced all higher education institutions in Romania to switch to emergency online learning, with little or no previous experience in this form of instruction. This makes it a highly relevant and interesting case for the study of online learning effects on student outcomes. This article therefore investigates disparities in student engagement in the context of emergency online learning in a sample of undergraduate Romanian students. The article focuses on active learning as a key element of student educational engagement, exploring differences in student background characteristics, such as socioeconomic status, employment status and time spent caring for dependents, as well as studying conditions. Results indicate that the sudden change to emergency online learning has created new disparities in perceived levels of student engagement based on the lack of private, interruption-free spaces and a reliable internet connection, as well as time spent doing housework.

* Assistant professor PhD., Department of Social Work, Journalism, Public Relations and Sociology, Faculty of Social and Human Sciences, Lucian Blaga University of Sibiu, Sibiu, Romania.

** Assistant professor PhD., Department of Social Work, Journalism, Public Relations and Sociology, Faculty of Social and Human Sciences, Lucian Blaga University of Sibiu, Sibiu, Romania.

Keywords: disparities, higher education, online education, student engagement.

Rezumat

Implicarea în procesul de învățământ al studenților este importantă pentru rezultatele învățării și este un factor esențial pentru performanțele academice obținute de către studenți. În timp ce impactul implicării asupra rezultatelor învățării în contextul predării față-în-față a fost studiat în detaliu, efectele sale în cadrul învățământului online sunt mai puțin cunoscute, în special în contextul european. Pandemia de Covid-19 din primăvara anului 2020 a forțat toate instituțiile de învățământ superior din România să realizeze o trecere bruscă la învățământul online de urgență, pe fondul unei experiențe limitate sau inexistente cu această formă de predare. Această situație oferă oportunitatea de a studia efectele învățământului online asupra implicării în procesul de învățământ al studenților. Acest articol analizează disparitățile în nivelul implicării în procesul de învățământ pe baza unui eșantion de studenți din universități din România. Articolul se concentrează asupra învățării active ca element esențial al implicării în procesul de învățământ, explorând diferențele în funcție de statutul socioeconomic, ocuparea unui loc de muncă sau timpul petrecut cu îngrijirea dependenților, precum și în funcție de condițiile de studiu ale studenților. Rezultatele cercetării indică faptul că nivelul de învățare activ este afectat negativ de lipsa unui spațiu adecvat pentru participarea la cursurile online, problemele cu conexiunea la internet și timpul alocat sarcinilor în gospodărie.

Cuvinte-cheie: *disparități, implicare în procesul de învățământ, învățământ online, învățământ superior.*

1. Introduction

The sudden switch to emergency online learning in the Romanian tertiary education sector in March 2020 due to the Covid-19 pandemic has caught students and academic staff off guard. Unlike other countries that have made considerable inroads into the development of online education, the overwhelming majority of students and teaching staff at Romanian universities have had no previous experience with this form of instruction. Moreover, the pandemic has given rise to a series of government measures that have restricted mobility and interfered with students' living and studying conditions, further straining their experience of online learning. Teaching

and learning have moved from university halls and dedicated spaces to one's living room, or any room with an Internet connection for that matter. This switch has raised a host of new challenges, from the technical aspects surrounding adequate equipment, Internet connection and digital skills, to finding appropriate, distraction-free spaces for study, or balancing study with work or caregiving duties within the household. In this context, many students were forced into less-than-ideal living and learning arrangements. Therefore, despite the general advantages of online learning in terms of accessibility and flexibility regarding time and space, the conditions under which the recent switch has occurred are very likely to have affected the effectiveness of learning in higher education.

This article investigates disparities in student engagement in the context of emergency online learning in a sample of Romanian undergraduate students. Engagement is a key factor in educational outcomes, including student achievement (McCormick, Kinzie & Gonyea, 2013; Pascarella & Terenzini, 2005). While its impact on educational outcomes in a face-to-face setting has been extensively researched, less is known about its effect in the context of online learning. Moreover, previous studies of student engagement in online learning are focused on the North American context (Paulsen & McCormick, 2020). This paper contributes to the research on student engagement in higher education by investigating the less studied context of Romania and focusing on the novel context of the Covid-19 pandemic. We expect both the sudden change to online learning, in the context of the pandemic, and the widespread absence of previous experience in online instruction to depress student engagement compared to face-to-face instruction. Moreover, we expect that student engagement levels are further lowered by the novel challenges brought about by the pandemic, especially surrounding living arrangements and studying conditions, and time management.

The article is structured as follows. The first section offers an overview of online learning, with a focus on fully web-based learning, touching on aspects regarding its advantages and differences to traditional modes of instruction in terms of student outcomes. The second section discusses the importance of student engagement and offers a literature review of its particularities for the case of online learning. This section also touches on factors that can contribute to disparities in student engagement, especially in the context of

the Covid-19 pandemic. The next section presents the data and measures used for the analysis, followed by the presentation of results. The article ends with concluding remarks.

2. Online learning

The popularity of online higher education programs has increased exponentially in recent years. Online learning takes many forms, which can be subsumed under the three categories of: fully web-based (entailing no face-to-face interaction), blended or hybrid (consisting of both online and face-to-face instruction), and online supplements to face-to-face courses (which support and expand traditional forms of instruction). This article focuses on the first category of online learning, particularly emergency fully web-based learning. As a protective measure against the spread of Covid-19, emergency online learning was officially decreed in the spring of 2020 as a replacement to face-to-face instruction in Romania, as well as worldwide. This emergency variant of fully web-based education has a few distinctive traits from its non-emergency counterpart. In Romania especially, this sudden change occurred on the background of limited previous experience with the logistics of organizing and delivering fully web-based instruction (Alexandru & Scoda, 2020). Moreover, the Covid-19 pandemic forced students into this arrangement in the absence of any deliberate choice on their part or any previous experience or preparation for online education. According to the Digital Economy and Society Index (DESI), Romania scores third to last in the EU in terms of digital competitiveness (European Commission, 2020).

Online learning presents a series of advantages over traditional education. Among these are accessibility, convenience, and flexibility, which increase the access to education of student groups that are limited by time and location, as well as socio-economic barriers from pursuing traditional forms of instruction (Castaño-Muñoz, Colucci & Smidt, 2018). This includes students who suffer from medical conditions that prevent them from going into university campuses, caregivers, and students who are working or have dropped out of conventional courses. Research indicates that students who are enrolled in fully online degrees versus face-to-face instruction indeed

have a specific profile: they are older, more likely working and living outside campus, and first generation college students (Paulsen & McCormick, 2020). Given the high and increasing popularity of online learning, much attention was dedicated to the question of its effectiveness in achieving educational outcomes compared to face-to-face learning. The wide consensus based on empirical evidence appears to be that student achievement is similar between the two (Garratt-Reed, Roberts & Heritage, 2016; Palloff & Pratt, 2001; Reece & Butler, 2017). However, students who pursue online higher education report higher satisfaction with their studies.

3. Student engagement in online learning settings

Student engagement is an indicator of the quality of the learning experience and reflects students' intrinsic, cognitive as well as emotional involvement with their learning (Chapman, 2002; Coates, 2006; Kuh, 2009; Shulman, 2002). Previous studies of student engagement have focused on active learning, peer collaboration, and the frequency and effectiveness of student-faculty interaction as its key elements (Chen, Gonyea & Kuh, 2008; McCormick, Kinzie & Gonyea, 2013; Rabe-Hemp, Woollen & Humiston, 2009). Active learning refers to students' participation in class activities and contributions to class discussions (Kuh, 2003). The relevance of analyzing and fostering student engagement in educational settings lies in its association with student outcomes. Students who display high engagement levels are more likely to have, among others, better academic performance levels (Jaggars & Xu, 2016; Kuh et al., 2007) and retention rates (Bean, 2005; Hu & McCormick, 2012). Levels of engagement vary with a host of factors, from students' motivation (Schuetz, 2008) to aspects related to teaching and institutional environment (Reason, Terenzini & Domingo, 2006), as well as socio-economic characteristics, such as employment (Zepke, Leach & Butler, 2011) or caring responsibilities (Kahu et al., 2014).

Comparative research into variations in student engagement by mode of instruction has uncovered certain differences between online and face-to-face instruction. Using 2015 US data, Paulsen and McCormick (2020) compared levels of engagement for students receiving face-to-face, online and dual-mode instruction (40% to 80% of their classes online). Their analysis

shows that online learners experience much lower levels of collaborative learning, have lower quality of interaction with peers and rate student-faculty interactions much lower than students in the two other categories. In qualitative studies, peer communication and the interaction with instructors also feature among the challenges of online learning that students mention (Kim, Liu & Bonk, 2005). Moreover, engagement in online courses decreases with transactional distance, i.e., the perceived cognitive and emotional distance that result from the geographical separation that exists between students and staff (Bolliger & Halupa, 2018; Moore, 1991), which is likely to be exacerbated in the context of the Covid-19 pandemic. Another shortcoming of online education is the difficulty faced by teaching staff in engaging in immediacy behaviors, both verbal and non-verbal (gestures, eye contact, smiles). Such behaviors convey a message of closeness to the students and were found to increase student engagement (Dixson et al., 2017). These results suggest that online learning is lagging behind face-to-face learning in terms of student engagement.

While research on the effects of the Covid-19 pandemic on higher education is still rather limited, existing studies point towards a series of negative effects (Adnan & Anwar, 2020; Bao, 2020). Some of the common problems faced by students include technical difficulties (with equipment, internet connection and audio interference), insufficient digital skills, higher workload distractions from family members or flat mates, a sense of isolation, limited interactions with teachers, low teacher responsiveness, or a lack of interaction with classmates and sense of community (Aristovnik et al., 2020; Farrell & Brunton, 2020; Molea & N stas , 2020). Although the switch to emergency online education resulted in increases in free time, given the rapidly evolving nature of the pandemic, students did not incorporate this free time efficiently into their daily routines (Nadolu, 2020). On the other hand, university teaching staff was forced to move face-to-face courses to an online setting with little to no preparation on the necessary adjustments required in terms of format and teaching strategies. Such problems seem to translate into worse student outcomes. Using a limited sample of 78 undergraduate students in Greece, Kostaki and Karayianni (2020) show that technical difficulties, such as a crashing or slow-running computer and a slow or lost internet connection, and home distractions coming from family members, phones or other environmental sources, depress levels of student engagement in online learning. The transition to fully online courses was evaluated largely negatively in a sample of American

students, who found the online version of a previously face-to-face course of choice to offer a lower learning value, facilitate less attention and effort, and overall be less interesting and enjoyable (Garris & Fleck, 2020).

4. Sample and method

To assess the relationship between students' emergency online learning environment and their educational engagement we used a quantitative research design. Data were collected from Romanian undergraduate students in an online survey conducted between April 26 and May 30, 2020. The study was approved by the Ethics Committee of the Lucian Blaga University of Sibiu with the approval number 1719/07.04.2020. The period of data collection largely overlapped with the country-wide lockdown imposed as a result of the Covid-19 pandemic. Face-to-face classes were suspended in Romania on March 11, 2020. Lockdown was instituted on the March 24 and lasted until May 14. We began the survey six weeks after the change to emergency online education in Romanian universities. The assumption was that by that time, the immediate disruptions brought about by the first weeks of online teaching would be less evident and we could more reliably assess the impact of the new environment in which students had to study on their educational engagement.

The survey was distributed via social media platforms, and emails were sent to most universities in Romania asking them to share the link with their students. The questionnaire was completed by 1851 undergraduate students from 16 university centers (Lup & Mitrea, 2020). Out of these, 73% were women and 63% from urban areas. 34% of the respondents were first year students, 26% second year and 26% third year students. The rest were fourth or higher year students. Women are slightly overrepresented in the sample. According to a recent study, they account for 59% of university students in Romania (Romanian Ministry of Research, 2017). The respondents were enrolled in various programs of studies, such as social sciences, medical studies, engineering, sciences, and humanities. For a detailed description of the fields of study, see Table 1. Although we used a non-probability sampling, the heterogeneity of the respondents in terms of their demographics, year and program of studies, together with the high number of responses contribute to an increase in the representativeness of the collected data.

Table no. 1. Respondents' field of study

Field of study	Number	Percentage
Computer Sciences and Mathematics	156	8.4
Economics	151	8.2
Engineering	223	12.0
Geography	2	0.1
History and Heritage Studies	37	2.0
Human Resources and Public Administration	203	10.9
Journalism, Communication, Public Relations	57	3.1
Language Studies	44	2.4
Legal Studies	143	7.7
Medical Studies	353	19.1
Pedagogy	67	3.6
Philosophy	11	0.6
Physical Education	3	0.2
Political Science, International Relations, and Security Studies	78	4.3
Sciences (Biology, Chemistry, Physics)	24	1.3
Social Sciences (Sociology, Anthropology, Psychology)	107	5.7
Social Work	82	4.4
Theatre and Film Studies, Media Studies, and Arts	20	1.0
Theology	64	3.5
No answer	26	1.5
Total	1851	100

Student engagement was measured using two sets of indicators focused on active learning. The first recorded how respondents felt during online classes, using a set of 10-point scale items. The items referred to course attractiveness, attention/focus, clarity, interest, and engagement. Higher scores indicate a better evaluation of the online classes on these dimensions. The second set of items pertaining to educational engagement asked respondents to rate on a 5-point scale their self-perceived level of concentration, understanding, participation to class discussions, and ease of expressing ideas in the online versus face-to-face environment. Higher scores

indicate higher levels of student engagement in the online compared to the traditional, face-to-face environment. For a description of the dependent variables, see Table 2.

To assess disparities in the facilities available to students in the online environment, we focused on two aspects, one pertaining to respondents' *access to an appropriate space* for taking part in online classes and the other relating to their *access to suitable technology and adequate technological skills*. Access to an appropriate space for online class participation was measured by asking respondents whether at the time of taking part in online classes they were: (1) alone in their room, uninterrupted by anyone; (2) other family members were present in the room, but did not interrupt them; (3) other housemates were present in the room, but did not interrupt them; (4) frequently interrupted by family members or housemates; (5) in other arrangement. In the analysis we contrasted each of the situations in which the respondent did not have a private space for taking part in online classes with the situation that we considered optimal for learning, i.e., being alone in the room, uninterrupted by anyone. Access to suitable technology and technological skills was assessed via three questions which asked about the frequency of encountering problems with: (1) the internet connection; (2) lack of an appropriate device; (3) technological skills. Answers ranged from never (1) to very often (5).

Table no. 2. *Descriptives for dependent variables*

Variable	Average	SD	N
How do you feel during the online classes:			
1(very bored)-10 (very captivated)	5.45	2.48	1841
1(very inattentive)-10 (very attentive)	5.76	2.43	1836
1(very confused)-10 (very clarified)	5.61	2.48	1837
1(very uninterested)-10 (very interested)	6.05	2.48	1835
1(very little engaged)-10 (very much engaged)	5.56	2.57	1828
How do you evaluate the following aspects in the online classes as compared to face-to-face classes:			
Your level of concentration during the classes (1=much worse; 5=much better)	2.27	1.1	1851
Your level of understanding the materials (1=much worse; 5=much better)	2.33	1	1851
Your level of participation to class discussions (1=much worse; 5=much better)	2.41	1.05	1851
How easy you express your ideas (1=much worse; 5=much better)	2.57	1.05	1851

The shift to emergency online education led many students in Romania to move back home with their families. This brought a change in their routines and participation in household chores. We used three measures of *time spent in activities that might interfere with learning*, namely time spent on housework activities, time spent attending to dependents' needs, and time spent working. Respondents were asked what percentage of their time was spent each week doing different types of activities, including the ones mentioned above.

Control variables that could influence each of the dependent variables pertaining to educational engagement in the online environment are as follows: gender (1=female), residence (1=urban), year of study, receiving a social scholarship (1=yes), and parents' education status used as a proxy for socioeconomic status. The latter variable compares whether one or both (compared to none) of the respondents' parents are university graduates. All these factors were shown to be related to students' academic performance and educational engagement. For a description of the independent and control variables, see Table 3.

Table no. 3. *Descriptives for independent variables*

Variables	Percentage	N
<i>How frequently have you experienced problems with:</i>		
Internet connection		1851
Never	19.39	
Rarely	23.93	
Sometimes	31.28	
Many times	18.53	
Very often	6.86	
<i>Lacked an appropriate device</i>		1851
Never	67.21	
Rarely	14.91	
Sometimes	10.37	
Many times	4.59	
Very often	2.92	
<i>Lacked technological skills</i>		1851
Never	56.02	
Rarely	22.74	
Sometimes	15.07	
Many times	4.05	
Very often	2.11	
<i>In general, when participating in the online classes I am:</i>		1851
Alone in my room, uninterrupted by anyone	66.83	
Other family members are in the same room but they do not interrupt me	16.64	

Variables	Percentage	N
Other housemates are in the same room but they do not interrupt me	3.4	
I am frequently interrupted by other family members or housemates	10.26	
Other arrangement	2.86	
<i>Percentage of time spent weekly for doing housework – mean (SD)</i>	18(17)	1840
<i>taking care of dependents -mean (SD)</i>	5(12)	1834
<i>at work - mean (SD)</i>	6(15)	1837
<i>Year of study</i>		1837
1 st	33.75	
2 nd	26.62	
3 rd	26.24	
4 th or higher	13.39	
<i>Which of your parents have graduated university studies</i>		1819
None	61.79	
Only mother	12.20	
Only father	5.94	
Both	20.07	
<i>Receive social scholarship</i>		1824
Yes	4.61	
No	95.39	
<i>Residence</i>		1834
Urban	63.25	
Rural	36.75	
<i>Gender</i>		1851
Female	73.26	
Male	26.74	

5. Results

To test the relationship between the conditions available to students for taking part in online classes and their engagement in online learning we conducted multivariate linear regression. Results (presented in Table 4) indicate that those students who frequently (many times and very often) experienced problems with their internet connection reported feeling less captivated, attentive, clarified, interested, and engaged in online classes compared to those who never had such problems. Lack of an appropriate device appears to depress students' engagement with online classes even more. Those who experienced this lack many times declared being, on average, close to one point less engaged with their studies on a 10-point scale, compared to their colleagues who never had such a problem. For those who experienced very often the lack of an appropriate device, the drop in educational engagement is even stronger, namely between one point and one point and a half on a 10-point scale. On average, those who encountered problems very often due to the lack of an appropriate device are

10% less engaged with online classes compared to their colleagues who never had such problems.

The lack of an appropriate space for taking part in online classes has equally strong negative consequences for students' active learning. Students who share a room with others report significantly lower engagement with the online classes compared to those who benefit from a private space. The situation is worse for those who are frequently interrupted by others. These respondents reported feeling less captivated, attentive, clarified, interested and engaged with online classes than those who are alone in their rooms when taking part in online classes. Their drop in engagement with the online classes is between 10% and 15%.

Time spent doing housework also negatively affects educational engagement, although to a much lesser degree, and only influences how captivated and clarified students are with online classes. On the other hand, taking care of dependents is positively related to active learning. This could be explained by the fact that these students may be taking care of their children or other dependents and benefitted from an increased time budget due to the shift to emergency online education.

Table no. 4. Relationships between new learning environments and engagement with education (OLS coefficients and S.E.)

	Captivated	Attentive	Clarified	Interested	Engaged
Experienced problems with the internet connection					
• rarely	.12 (.18)	-.07 (.17)	-.16 (.17)	-.17 (.18)	-.15 (.18)
• sometimes	-.1 (.17)	-.15 (.17)	-.41 [†] (.17)	-.17 (.17)	-.04 (.18)
• many times	-.53 [†] (.2)	-.53 [†] (.19)	-.89 ^{***} (.2)	-.63 [†] (.2)	-.54 [†] (.21)
• very often	-.84 [†] (.28)	-.79 [†] (.27)	-1.08 ^{***} (.28)	-.52 (.28)	-.55 (.29)
Experienced lack of an appropriate device					
• rarely	-.56 [†] (.17)	-.65 [†] (.17)	-.59 [†] (.17)	-.6 ^{***} (.17)	-.51 [†] (.18)
• sometimes	-.3 (.2)	-.18 (.2)	-.34 (.2)	-.29 (.2)	-.27 (.21)
• many times	-.83 [†] (.29)	-.96 [†] (.28)	-1.2 ^{***} (.29)	-.91 [†] (.29)	-.92 [†] (.31)
• very often	-1.16 [†] (.38)	-1.33 ^{***} (.38)	-1.46 ^{***} (.39)	-1.66 ^{***} (.39)	-1.29 [†] (.41)
Experienced issues with own technological skills					
• rarely	.08 (.15)	-.05 (.14)	-.12 (.15)	-.19 (.15)	-.18 (.15)
• sometimes	.26 (.18)	.11 (.17)	.31 (.18)	.19 (.18)	.3 (.18)
• many times	-.64 [†] (.3)	-.55 (.3)	-.73 [†] (.3)	-.61 [†] (.3)	-.58 (.32)
• very often	-.49 (.42)	.01 (.41)	-.6 (.42)	-.43 (.42)	-.41 (.45)

	Captivated	Attentive	Clarified	Interested	Engaged
When participating at the online courses are you:					
• with other family members who do not disturb me though	-.43** (.16)	-.37* (.16)	-.39* (.16)	-.25 (.16)	-.3 (.17)
• together with roommates who do not disturb me	-.97** (.32)	-1.17*** (.32)	-.8* (.32)	-1.23*** (.32)	-1.15** (.34)
• frequently interrupted by roommates or family members	-1.37*** (.2)	-1.21*** (.19)	-1.16*** (.2)	-1.15*** (.2)	-1.07*** (.21)
• other arrangement	.27 (.34)	.24 (.33)	-.18 (.34)	.18 (.34)	.43 (.36)
Percentage of time weekly spent for:					
• doing housework	-.01** (.004)	-.01 (.004)	-.01* (.004)	-.01 (.004)	-.007 (.004)
• taking care of dependents	.02*** (.005)	.03*** (.01)	.02*** (.01)	.02** (.01)	.02** (.01)
• at work	.004 (.004)	.002 (.004)	.002 (.004)	.004 (.004)	.01 (.004)
Year of study	-.01 (.06)	-.06 (.05)	-.03 (.06)	-.05 (.06)	-.03 (.06)
Receive social scholarship	.26 (.28)	.01 (.27)	.24 (.27)	.16 (.27)	.16 (.29)
None of the parents have higher education	.29 (.15)	.18 (.15)	.24 (.15)	.18 (.15)	.44** (.16)
One parent has higher education	.37* (.19)	.39* (.18)	.37* (.19)	.47* (.19)	.59** (.2)
Residence (urban=1)	.02 (.12)	.07 (.12)	-.03 (.12)	-.09 (.12)	-.04 (.13)
Gender (female=1)	.11 (.13)	.1 (.13)	-.09 (.13)	.07 (.13)	.04 (.14)
Adjusted R-squared	.09	.09	.1	.08	.07
N	1759	1755	1755	1754	1746

*p<0.05; **p<0.01; ***p<0.001

Respondents were also asked to evaluate their educational performance in online courses compared to the traditional, face-to-face instruction, on four aspects, namely level of concentration, understanding, participation to class discussions, and ease of expressing ideas. Each of these variables was measured on a 5-point scale, with higher scores indicative of higher levels of engagement in online compared to face-to-face education. Given the nature of the dependent variable, we used ordered logistic regression to assess whether disparities in the new fully web-based learning environment are related to differences in active learning. Results are shown in Table 5.

Results indicate that students' active learning is negatively affected by the problems they experience with internet connection. Compared to those who never experienced such problems, students who encountered problems even rarely declared being less focused, understanding less well, participating

less in class discussions, and feeling less at ease expressing ideas in online classes compared to face-to-face ones. This result is worrying, given the fact that only 19% of the respondents in the analyzed sample had never experienced problems with the internet connection, while 26% experienced them often and very often.

Frequent problems due to the lack of an appropriate device needed to take part to online classes also decrease students' levels of participation to class discussions compared to their participation in face-to-face environments, as well as their level of concentration, understanding, and ease of expressing ideas. Having another flat mate in the room, even when they are not interrupting, as well as being frequently interrupted by family members or flat mates has a significantly negative effect on students' ability to focus, understand, participate, and express their opinions in online classes compared to face-to-face classes. An increased participation in household chores also decreases students' participation in online class discussions, possibly as a result of more time constraints that do not permit these students to prepare properly for the classes. On the other hand, taking care of dependents is positively related to all aspects of active learning but ease of expressing ideas in class discussions. More advanced students report being able to focus and understand better in the online environment compared to the traditional one. Finally, issues encountered due to a lack of technological skills do not appear to affect students' performance in the online classes compared to traditional ones.

Table no. 5. Relationships between new learning environments and active learning (odds-ratios and S.E.)

	Concentrate	p	Understand	p	Participate	p	Express	p
Experienced problems with the internet connection								
• rarely	.7 (.09)	.008	.79 (.11)	.081	.75 (.1)	.030	.65 (.09)	.001
• sometimes	.75 (.1)	.030	.65 (.09)	.001	.66 (.09)	.002	.59 (.08)	.000
• many times	.56 (.09)	.000	.48 (.07)	.000	.57 (.09)	.000	.54 (.08)	.000
• very often	.43 (.09)	.000	.39 (.09)	.000	.55 (.12)	.005	.47 (.1)	.000
Experienced lack of an appropriate device								
• rarely	.75 (.1)	.027	.79 (.1)	.066	.84 (.11)	.184	.84 (.11)	.177
• sometimes	.94 (.15)	.689	.97 (.15)	.860	1.01 (.15)	.972	.86 (.13)	.308
• many times	.68 (.15)	.086	.56 (.13)	.010	.56 (.13)	.010	.58 (.13)	.013
• very often	.54 (.17)	.048	.57 (.17)	.061	.49 (.15)	.023	.63 (.2)	.135

	Concentrate	p	Understand	p	Participate	p	Express	p
Experienced issues with own technological skills								
• rarely	.95 (.11)	.621	.85 (.1)	.157	.92 (.1)	.440	.88 (.1)	.247
• sometimes	1.08 (.15)	.558	.86 (.12)	.253	1.06 (.14)	.679	.89 (.12)	.376
• many times	.9 (.21)	.694	.78 (.19)	.318	.85 (.19)	.467	.5 (.12)	.005
• very often	1.72 (.6)	.119	.88 (.32)	.723	.9 (.32)	.775	.83 (.28)	.581
When participating at the online courses are you:								
• with other family members who do not disturb me though	.82 (.1)	.106	.78 (.1)	.045	.94 (.11)	.580	.94 (.11)	.616
• together with roommates who do not disturb me	.58 (.15)	.030	.51 (.13)	.006	.42 (.1)	.001	.4 (.1)	.000
• frequently interrupted by roommates or family members	.31 (.05)	.000	.34 (.05)	.000	.35 (.05)	.000	.34 (.05)	.000
• Other arrangement	1.51 (.4)	.125	1.13 (.3)	.647	1.08 (.29)	.766	1.46 (.4)	.164
Percentage of time weekly spent for:								
• doing housework	1 (.003)	.334	1 (.003)	.378	.99 (.003)	.028	1 (.003)	.452
• taking care of dependents	1.02 (.004)	.000	1.01 (.004)	.009	1.01 (.004)	.002	1.002 (.004)	.611
• at work	1.004 (.003)	.179	1.003 (.003)	.368	1.004 (.003)	.170	1.003 (.003)	.281
Year of study	1.25 (.05)	.000	1.18 (.05)	.000	1.01 (.04)	.759	1.06 (.04)	.189
Receive social scholarship	1.6 (.33)	.025	1.29 (.28)	.231	1.5 (.31)	.052	1.31 (.28)	.200
None of the parents have higher education	.92 (.11)	.489	.97 (.11)	.767	1.21 (.14)	.102	1.12 (.13)	.344
One parent has higher education	1.02 (.15)	.863	1.02 (.15)	.869	1.23 (.18)	.148	1.33 (.19)	.047
Residence (urban=1)	.97 (.09)	.735	1.06 (.1)	.535	1.02 (.1)	.817	1.09 (.1)	.378
Gender (female=1)	1.06 (.11)	.568	1.05 (.11)	.642	.97 (.1)	.737	.97 (.1)	.796
N	1769		1769		1769		1769	

6. Discussion and conclusion

The current study contributes to the emerging literature on the effects of the abrupt shift to online learning during the context of the Covid-19 pandemic on student outcomes, particularly student engagement. In line with previous research (Kostaki & Karayianni, 2020), our results show that levels of student engagement vary with the disparities in learning conditions that resulted from the change to emergency online teaching. After face-to-face instruction

was suspended in the spring of 2020, many students moved back home with their families. For some of them, this meant having to take part in online classes from the same room they shared with other family members or flat mates, dealing with internet connection problems or the lack of appropriate devices for taking part in online classes. In short, they had to adapt to an unsuitable learning environment, which lacked the appropriate amenities needed for good learning outcomes. The results of our analysis indicate that these conditions were consequential for their engagement with online classes and likely for their educational performance as well.

In general, those who encountered more frequent problems with the internet connection were less engaged in online classes. They felt less captivated, attentive, clarified, interested and engaged in the learning processes compared to their colleagues who did not have such problems. The same happened to students who did not have an appropriate device and did not benefit from an appropriate space for taking part in online classes. The lack of an appropriate space for learning, as well as problems caused by the internet connection and lack of an appropriate device made these students feel less focused, clarified, participative and able to actively engage in learning compared to the time when they attended face-to-face classes. Moreover, students who reported spending more of their time doing housework activities participated less in class discussions and felt less attracted by online classes.

On the other hand, the shift to online learning seems to have benefited the educational engagement of students who have dependents in their care. We assume that this category of students benefitted more than the rest from the increase in discretionary time as a consequence of not travelling to and from face-to-face classes, time which they could allocate to studying. Interestingly, none of the other traditional factors known to create disparities in student engagement appear to play a consistent influence in the online environment. Instead, our results suggest that the move to emergency online teaching created new disparities (due to the forced change in students' usual learning environments) that appear to significantly affect students' engagement, with potential negative consequences on their academic performance.

Relying on data gathered at the early stage of the shift to emergency online teaching, our study offers a preliminary assessment of the challenges raised

by this novel experience and the way in which these changes have impacted students' engagement with their studies. Future studies could take these results as a starting point for an in-depth analysis of ways to improve the experience of online learning and foster student engagement. In particular, we see the relevance of further research into strategies of improving the process of online teaching, which would allow at-risk categories of students to maintain and increase their levels of academic engagement. Future studies could also focus on possible mitigating factors for the demobilizing effect of the lack of appropriate technology.

Acknowledgements

The authors would like to thank all the students who took part in the study, as well as the colleagues from various universities who helped disseminate the survey. We also thank the two anonymous reviewers who provided insightful comments on our paper. Finally, we are grateful to the Lucian Blaga University of Sibiu for its support in disseminating the survey institution-wide.

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