Still Open During the Covid-19 Lockdown: an Analysis of Online Students' Engagement with the Virtual Campus

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Abstract

The global pandemic caused by the Covid-19 outbreak and the subsequent mandatory lockdown made university students spend more time at home, changing their daily habits including studying, as a consequence of the forced self-confinement. In this article we describe the changes observed in the connection patterns to the institutional learning management system of the students enrolled in a Spanish online university during the lockdown. Our results show that the students were more likely to connect to the virtual campus, they did so more evenly over the days of the week, and more concentrated in a few hours in the central part of the days. Interestingly, the changes in students' connection patterns were not associated with their socio-demographic characteristics, although they were affected by their academic trajectory and their academic enrollment.

Keywords:

Introduction

In 2020, a global pandemic caused by the worldwide spread of the Covid-19 coronavirus shattered all aspects of everyday life. Higher education was not an exception, as most institutions were forced to switch from face-to-face to remote instruction in a very short period of time, without any methodological support and, in some cases, with scarce resources (Abou-Khalil et al., 2021). Students were locked in their homes fulfilling the mandatory self-confinement enforced by governments, while higher education institutions had to transition to a fully online scenario and use the available means (mainly the institutional website and some video conferencing tools), and do so without the proper pedagogical knowledge and support (Crawford et al., 2020). On the other hand, online universities were already providing students with online teaching before the pandemic crisis, and their adaptation to the new situation caused by the mandatory lockdown was not so dramatic. Nevertheless, all face-to-face activities such as the final evaluations had to be completed online, and some additional flexibility measures had to be offered to students in order to help them to keep their path throughout the academic semester.

In the case of online universities, there was an important factor that also shaped the impact of Covid-19 on students' study habits and academic engagement. A large majority of the students in these institutions are non-traditional students (Sánchez-Gelabert, Valente, & Duart, 2020), that is to say, compared to traditional ones, they are adults, with professional and family commitments (Samra, Waterhouse, & Lucassen, 2021). During lockdown, some of these commitments were also affected, so the students had more available time to study and participate in the proposed learning activities (Gonzalez et al., 2020). On the other side, the main challenge faced by the institutions in which they were enrolled was to ensure the additional support needed to meet their increased academic demands during self-confinement, and maintain their engagement throughout the semester.

In this article we analyse the change in the connection patterns of the students of an online distance university during the lockdown period by posing the following research questions:

- RQ1: Did students change their attendance due to the Covid-19 lockdown?
- RQ2: Are there differences in their weekly and daily connection patterns during the lockdown period?
- RQ3: Regarding persistence throughout the semester, are there differences between groups?

Methodology

Context

This study was carried out at the Open University of Catalonia (UOC), an open, distance, and fully online university in Spain. Most of the students attending at the UOC are adults with a profile that hardly could fit into the traditional university system. In this sense, they value the UOC as an opportunity to start their academic trajectory or finish their previous studies, in a very innovative environment characterized by a pedagogical model that promotes continuous assessment (Sangrà, 2002). The underlying asynchronous model allows students to enrol part-time in their studies and follow their own pace according to the schedule of planned learning activities, empowering them to accommodate any competing demand or adverse circumstance they may face in their lives (Kember, 1999). Regarding the global pandemic, on 31 January 2020, the Spanish government confirmed the first Covid-19 infection. In the following days, the number of cases exponentially increased due to community transmission, which forced the declaration of the "state of alarm" and a complete lockdown on March the 14th. This enforced lockdown was periodically extended until June the 21st. Therefore, during the Spring 2020 semester all Spanish students, enrolled in traditional and online institutions, had to remain self-confined at their homes. This situation had an important impact in their daily routines, affecting their lifestyle habits and, from the perspective of our aims in this study, changing the connection patterns to the Virtual Campus.

Data

Students' connections to the virtual campus and their enrollment data were gathered from the institutional Learning Record Store (Minguillón et al., 2018). Three academic semesters were analysed, namely Spring 2020 (affected by the pandemic crisis), Spring 2018 and Spring 2019, which were used as a reference to establish a pre-Covid scenario to compare with. We focused on students taking an official undergraduate program, and excluded students residing outside of Spain given that the lockdown restrictions were different in other countries. Table 1 shows students' demographic characteristics and enrollment data for the selected semesters. All three populations of students show a similar distribution according to their demographic and academic characteristics, being mainly non-traditional, adult part-time learners (Sánchez-Gelabert, Valente, & Duart, 2020).

Table 1: Students' socio-demographic and academic characteristics in the selected academic semesters

		Spring 2018	Spring 2019	Spring 2020
Students	Total	27,009	29,428	31,502
Gender	Male	12,439 (46.06%)	13,473 (45.78%)	14,227 (45.16%)
	Female	14,570 (53.94%)	15,955 (54.22%)	17,275 (54.84%)
Age	18-24 years old	3,970 (14.70%)	4,664 (15.85%)	5,468 (17.36%)
	25+ years old	23,039 (85.30%)	24,764 (84.15%)	26,034 (82.64%)
Academic trajectory	Freshmen	3,389 (12.55%)	3,809 (12.94%)	3,696 (11.73%)
	Rest of the students	23,620 (87.45%)	25,619 (87.06%)	27,806 (88.27%)
Academic enrollment	Part-time (< 30 credits)	24,526 (90.81%)	26,543 (90.20%)	28,183 (89.46%)
	Full-time (≥ 30 credits)	2,483 (9.19%)	2,885 (9.80%)	3,319 (10.54%)

The teaching period of any academic semester at the UOC lasts 103 days, with an initial short week 0 starting on Wednesday, and fourteen complete weeks (Monday to Sunday). Self-confinement started March the 14th, 2020, and corresponds to the day 25 of the Spring 2020 semester. Although the lockdown was officially declared at 00:00, it must be noted that the Spanish population was *de facto* self-confined at their homes the day before (day 24 of the academic semester). Therefore, in order to define two periods and being able to compare students' connection patterns to the institutional LMS, in this research we have considered a pre-lockdown period that comprises from day 1 to day 23, and a following lockdown period from day 24 to day 103.

Measures

In order to analyse the changes in connection patterns, we used three different measures as a proxy to the students' engagement with the virtual campus: Attendance, weekly / daily connections, and persistence. Attendance was measured as the percentage of unique students connected to the virtual campus each day of the academic semester. Connection patterns were measured as the total number of connections to the Virtual Campus per specific time period, namely day of the week (from Monday to Sunday) and hour of the day (from 00 to 23), after normalizing by the total number of enrolled students. Finally, persistence was measured as the averaged

percentage of days that students have connected to the virtual campus divided by the total number of days since the beginning of the academic semester, as an indicator of the students' involvement level.

Results and discussion

RQ1: Changes in students' attendance between pre-lockdown and lockdown periods

Figure 1 shows the percentage of different students connected to the virtual campus per day, comparing Spring 2020, Spring 2019, and Spring 2018.
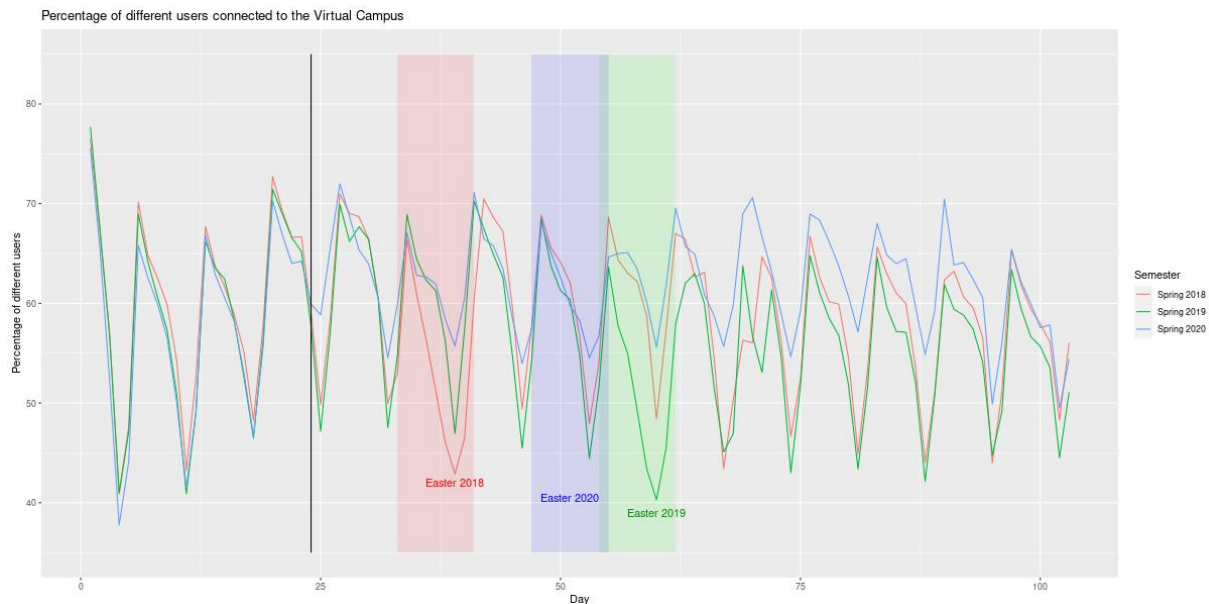

Figure 1. Percentage of different students connected to the virtual campus by day

Figure 1 reveals two interesting facts. First, all semesters showed the same weekly connection patterns during the pre-lockdown period, marked by a black line on day 24. After day 24, during the lockdown period, a clear difference can be seen in the case of Spring 2020, as students kept up or even increased their attendance around 55% and 70% (marked with a blue line). Interestingly, Spring 2019 and Spring 2018 showed a different pattern with a constant decrease in both cases that roughly ranged between 45% and 65% (red and green lines). Similar results regarding the changes in connection patterns were described in Favale et al. (2020). Second, Spring 2020 (marked with a blue area) exhibited a different pattern during the Easter week, showing no impact on the students' connection to the virtual campus that could be reasonably attributed to the mobility constraints that kept them self-confined at home in comparison to the previous semesters (red and green areas) in which students took a few days off and were less likely to connect. Table 2 shows the average number of total connections to the virtual campus for each academic semester, splitting the users' connections according to the pre-lockdown (P) and lockdown (L) periods. Comparing both time periods, the average number of daily connections per student increased substantially in Spring 2020 during the lockdown (+0.19). On the other hand, for the two previous semesters, the difference was minimal or even reversed (+0.05 and -0.02, respectively).

Table 2: Total and daily average (inside the parentheses) number of student connections to the virtual campus

Semester	Total (daily)	Pre-lockdown period (P)	Lockdown period (L)	Difference (L-P)
Spring 2018	173.27 (1.68)	38.29 (1.66)	136.98 (1.71)	+0.05
Spring 2019	161.63 (1.57)	36.83 (1.60)	126.27 (1.58)	-0.02
Spring 2020	163.95 (1.59)	33.40 (1.45)	131.58 (1.64)	+0.19

To sum up the evidence presented in this section, our results show an increase in students' attendance between the pre-lockdown and the lockdown periods, a change that could be reasonably attributable to the consequences of the self-confinement experienced by the students in the Spring 2020 semester.

RQ2: Changes in students' weekly and daily connection patterns during the lockdown period

We analysed the impact of self-confinement during the lockdown period on the students' connection patterns, measured weekly (days of the week) and daily (hours of the day). Figure 2 (left) shows the percentage of connections to the virtual campus during the lockdown period (days 24-103) according to the day of the week. Although the three semesters included in our analysis followed the same pattern, the difference between the day in which students were more connected (Monday) and the less connected (Saturday) was clearly lower in Spring 2020 than in 2018 and 2019 (3.87% vs 7.39% and 6.55%, respectively), when the self-confinement probably blurred the difference between weekends and weekdays (Favale et al., 2020). On the contrary, Spring 2019 and Spring 2018 exhibited a different, almost identical pattern. Regarding the hour of the day, Figure 2 (right) shows that there were also differences between Spring 2020 and the previous semesters. In fact, students were more connected between 10:00 and 19:00 and less connected during the rest of the day in Spring 2020, a trend that is consistent with the changes in household energy consumption observed during the lockdown (Santiago et al., 2021).
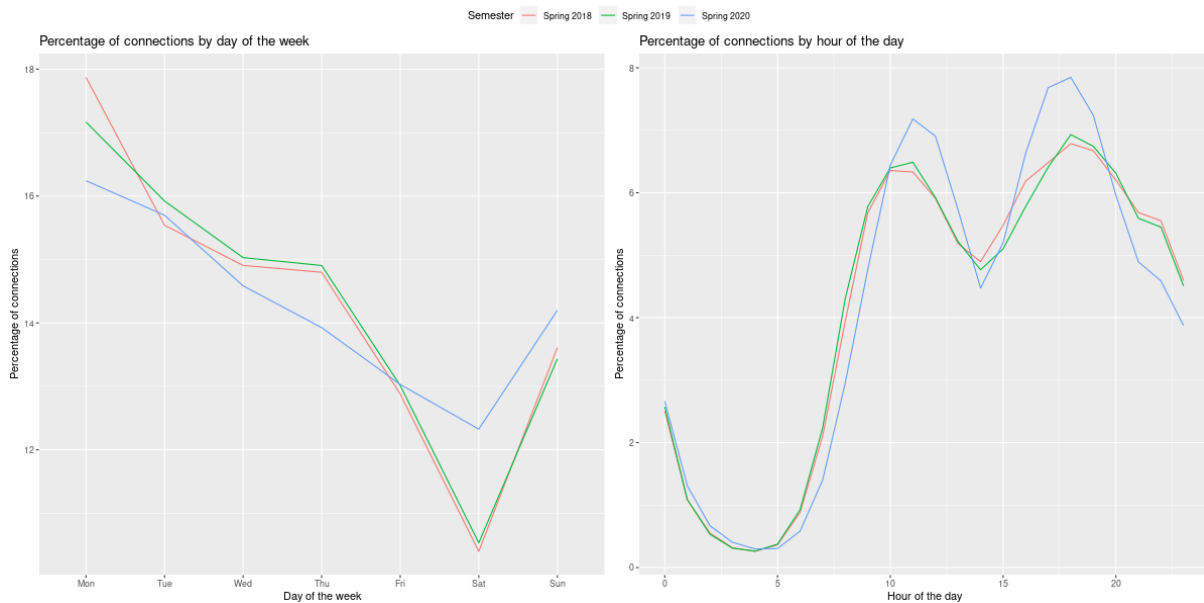

Figure 2. Percentage of student connections to the virtual campus by day of the week (left) and hour of the day (right)

In light of these results, we can conclude that there were differences in students' weekly and daily connection patterns in the Spring 2020 semester, a change in their connection habits that could be reasonably explained because of the increase in available time over the whole week and, particularly, the central part of the days. Additionally, taking into account the blurring of the perceived distinction between weekends and weekdays during the lockdown, the gap between Mondays and Saturdays previously observed was significantly reduced.

RQ3: Differences in students' persistence between pre-lockdown and lockdown periods by group

Finally, we also compared the differences in persistence for the different groups of students shown in Table 1. Due to space limitations we only show the most interesting results. However, it is worthwhile to note that women and men did not show substantial differences in their behaviour, although women slightly increased their connection rate to the virtual campus during the lockdown period. Regarding the students' age, both traditional (i.e. 18-24 years old) and non-traditional (i.e. 25+ years old) students showed a quite similar behaviour, although the younger students showed a more diverse behaviour, and were slightly more connected to the virtual campus than their counterparts during the lockdown period. Taking into account their academic trajectory, Figure 3 shows an interesting difference between freshmen and more advanced students. Actually, freshmen were the only group in which persistence declined during the Spring 2020 semester, but less than in the two previous semesters. Due to its definition, persistence shows greater fluctuations (due to differences in the number of connections per day of the week) at the beginning of the semester, stabilizing at the end, where it becomes almost a straight line.
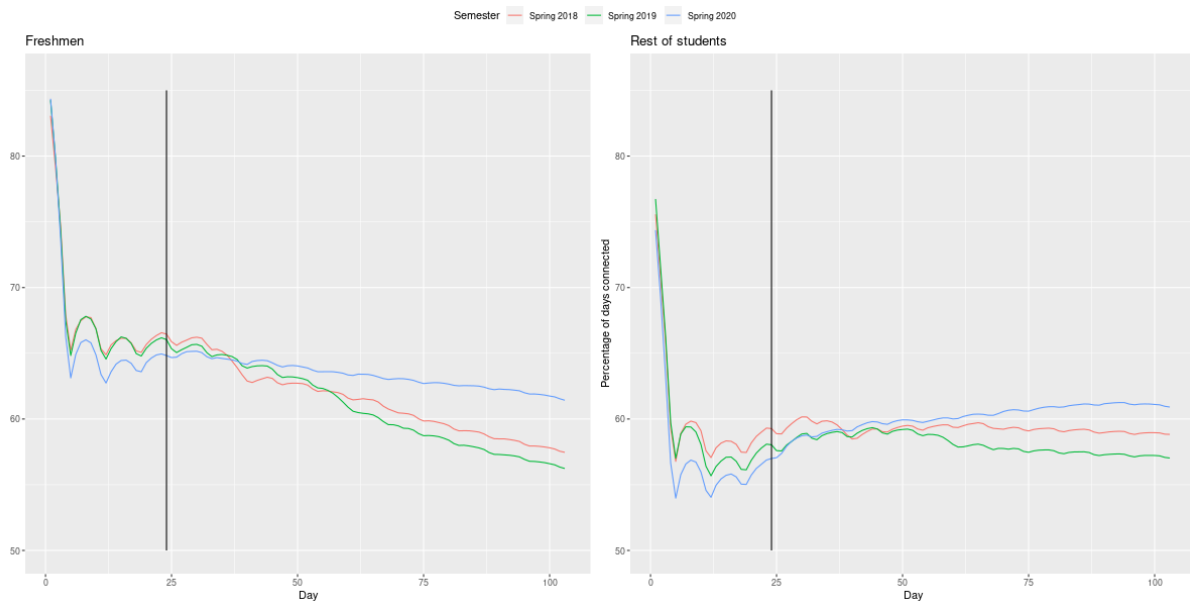
Figure 3. Average percentage of days connected to the virtual campus by academic trajectory

Finally, Figure 4 shows an interesting difference between part-time and full-time students. As expected, full-time students were more connected to the virtual campus over the three semesters than their part-time counterparts. However, although their persistence was almost constant in the second half of the previous academic semesters, full-time students kept increasing their connection patterns roughly up to a 75% in Spring 2020, that is to say, they were connected three out of four days on average. Interestingly, part-time students kept their persistence levels or even slightly improved them in Spring 2020, a distinctive behaviour that contrasts with previous semesters, in which these students showed a slight decrease in their connection to the virtual campus over the same period.
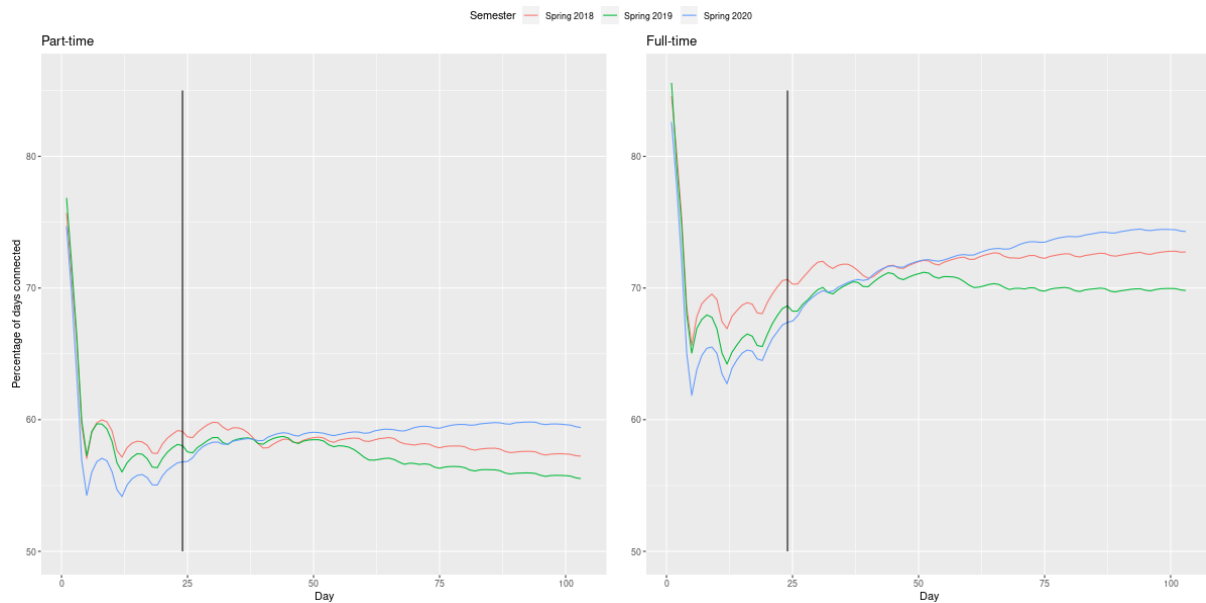

Figure 4. Average percentage of days connected to the virtual campus by academic enrollment

Therefore, we can answer RQ3 as follows: the period of confinement affected all students regardless of the group to which they belonged, but freshmen students were the only ones who did not increase their persistence.

Conclusions

In this paper we have analysed the changes in the connection patterns to the institutional learning management system of the students enrolled in an online distance university during the Covid-19 lockdown. Before summarizing our results, it must be noted that our approach has some limitations. First, students' engagement is a much more

complex phenomenon than just getting connected to the virtual campus, which in fact acts as a proxy measure of students' study habits. Second, no data was available on the employment status or the family obligations that our students had during the self-confinement. Despite such limitations, we can draw some interesting conclusions. From an institutional point of view, facing the Covid-19 crisis was not a haunting issue as the University was already operating in a remote teaching scenario compared to other traditional institutions that had to adapt their everyday functioning in a very short period of time and, in some cases, with scarce resources. Nevertheless, an adaptation to the situation was still required as far as the students and the teaching staff were affected by a pandemic crisis that had personal implications for them and their families. In this sense, it must be acknowledged that the students showed a positive reaction and decided to increase their engagement, changing (mainly, by increasing) their connection patterns to the virtual campus. As we have evidenced, Spring 2020 students were more connected than their counterparts from previous semesters, and also did so more continuously by changing their daily and hourly connection pattern. Actually, their persistence increased over the semester, but for freshmen, the group that showed the greatest impact of self-confinement during the lockdown.

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