



UNIVERSITÀ DI PARMA

ARCHIVIO DELLA RICERCA

University of Parma Research Repository

Student engagement and performance: evidence from the first wave of COVID-19 in Italy

This is the peer reviewed version of the following article:

Original

Student engagement and performance: evidence from the first wave of COVID-19 in Italy / Azzali, Stefano; Mazza, Tatiana; Tibiletti, Veronica. - In: ACCOUNTING EDUCATION. - ISSN 0963-9284. - 32:4(2023), pp. 479-500. [10.1080/09639284.2022.2081813]

Availability:

This version is available at: 11381/2925851 since: 2024-11-18T12:45:38Z

Publisher:

Published

DOI:10.1080/09639284.2022.2081813

Terms of use:

Anyone can freely access the full text of works made available as "Open Access". Works made available

Publisher copyright

note finali coverpage

(Article begins on next page)

02 May 2026

**STUDENT ENGAGEMENT AND PERFORMANCE:
EVIDENCE FROM THE FIRST WAVE OF COVID-19 IN ITALY**

Stefano Azzali,^a Tatiana Mazza^{b*} and Veronica Tibiletti^{c*}

^a Department of Economic and Management Sciences, University of Parma, Via Kennedy, 6, Parma, Italy. Full Professor in management and accounting.

E-mail: stefano.azzali@unipr.it

^b Department of Economic and Management Sciences, University of Parma, Via Kennedy, 6, Parma, Italy. Associate Professor in management and accounting.

E-mail: tatiana.mazza@unipr.it

^c Department of Economic and Management Sciences, University of Parma, Via Kennedy, 6, Parma, Italy. Associate Professor in management and accounting.

E-mail: veronica.tibiletti@unipr.it

*Corresponding Author

**STUDENT ENGAGEMENT AND PERFORMANCE:
EVIDENCE FROM THE FIRST WAVE OF COVID-19 IN ITALY**

Abstract

This study investigates the effects of student engagement and rapidity of completing exams on student performance before and during the first wave of COVID-19 in March 2020, examining the effect of the shift from face-to-face to online teaching and exams in a Master's in Business Administration degree at a university in Italy.

Prior literature mainly finds that student marks benefit from student engagement, but it has been unclear how COVID-19 affected this link. We find that COVID-19 reduced this benefit in the short term. Prior literature also finds that student performance benefits from passing the exam at the earliest opportunity but the effect of COVID-19 related changes on this remains unclear. We find that the link between higher exam marks and rapidity of completing exams was strengthened by COVID-19.

The research contributes to the debate on costs and benefits of COVID-19 on accounting education quality. It confirms that there are disadvantages, in terms of the lower efficacy of student engagement, and advantages, in terms of higher marks from more rapid academic progress.

Keywords: COVID-19, online courses, student performance, universities, face-to-face courses, student engagement

1. Introduction

This study aims to investigate the effects of student engagement and rapidity of completing exams on student performance, comparing the first wave of COVID-19 with the pre-COVID-19 period.

This study is important because it is one of the first research that measures with quantitative methods the effects of COVID-19 on the association between student engagement and rapidity of completing exams and performance. It is of interest to accounting educators because it investigates students that mainly attend accounting courses as part of a Master in Business Administration during a pandemic situation that affects the whole world.

Results suggest that COVID-19 had a negative effect on engagement and student performance. The sudden change from face-to-face to online learning made student engagement less effective in improving performance and obtaining high marks. On the other hand, we find that COVID-19 improved the positive association between student performances and the rapidity of passing exams.

The COVID-19 pandemic brought unprecedented shifts in higher education (Metcalf 2021) and academic years, 2019/2020 and 2020/2021, saw large-scale disruptions. Universities worldwide had to rapidly close their buildings, send students home, and shift to online instruction. While online education already formed part of the landscape prior to the pandemic, the COVID-19 crisis drove rapid shifts (Eringfeld 2021).

In response to the spread of COVID-19, the Italian Ministry of University and Research suspended face-to-face teaching, including lectures, seminars, internal internships, exams, and graduation ceremonies in all universities beginning Monday 24 February 2020.

University X informed students of emergency measures on 28 February 2020. Before the pandemic, only face-to-face teaching had been available in the course under investigation in this research. But in order to ensure educational continuity, distance learning tools, specifically Microsoft Teams and

the Moodle learning management system, were swiftly introduced. A major obstacle for students was access to digital technologies and Internet facilities (Sharma, Nand, Naseem & Reddy 2020). However, the Italian government and University X enacted schemes to provide free PCs and internet cards for student in need and ensure flexible and continuous access to course materials for all students.

This research studies the impact of the changes in teaching and exams on student performance in the Master's in Business Administration programme at University X. Setting the research in Italy allowed us to investigate this effect in one of the first countries to be heavily impacted by the pandemic. At University X, schedules and arrangements for the session of summer exams to be held remotely were published in April 2020. The arrangements required willing collaboration between teachers and students and a keen sense of responsibility was widely recognized.

Previous research has explored the determinants of Italian university student performance (Di Pietro 2004; Grilli and Rampichini 2007; Di Pietro and Cutillo 2008), and few studies have investigated the effect of COVID-19, mainly with qualitative methods. This research seeks to compare student engagement when teaching and exams were online, during COVID-19 between February and July 2020, with student engagement when teaching and exams were face-to-face pre-COVID-19 between February and July 2019.

Two hypotheses were developed. The first focused on the effect of teaching style (face-to-face or remote) on the association between student engagement and performance. Engagement is measured through the number of individual students' logins to Moodle, in face-to-face courses where slides, teaching materials, and assignments are posted on Moodle, and in online courses where a video of lectures recorded on Microsoft Teams are also posted on Moodle. The second hypothesis focused on the effect of teaching face-to-face or remote on the association between rapidity of completing exams and student performance. Note that Italian universities allow students who are dissatisfied with their mark to retake an exam several times, which means that the duration of an individual's university career can be shorter or longer. So, the rapidity of completing exams also reflects the speed with

which the student accepts a mark for an exam; maximum rapidity being when the student passes the exam and accepts the mark on the first available exam date. We expected that teaching and exam characteristics for online students during COVID-19 would affect the association between student engagement, rapidity of completing exams and exam marks.

Contributions

This study contributes to literature and to stakeholders in several ways. In the field of accounting education, the study contributes to the debate on costs and benefits of COVID-19 (Sangster, Stoner & Flood, 2020), and describes limitation and opportunities related to online teaching and exams during the pandemic, compared with face-to-face teaching and exam. The result of our first hypothesis supports the position that online education brings the risk of being “anti-humanist” (Eringfeld, 2021): reducing the human element in engagement the risk is to weaken student performance. The result of our second hypothesis (COVID-19 improves the positive association between student performance and the rapidity of completing the exams) supports the position that find benefits from online education, such as flexibility and cost reduction for both students and universities. Given that the end of COVID-19 pandemic is uncertain, and the future pandemics are predicted to occur, our findings should be of interest to university authorities and directors of university departments and Master’s programs for planning and development of future degree courses. Finally, our results may be useful for students that became aware that their engagement and the rapidity of completing exams are relevant for obtaining high marks in online, face-to-face, and blended system.

This study is organized as follow: section 2 provides a short background; Section 3 addresses the literature review and develops the hypothesis; Section 4 include the regression model and the sample; Section 5 provides empirical evidence while Section 6 discusses and concludes the study.

2. Background

The Master’s in Business Administration offered by University X is a two-year program providing

theoretical and practical basics of administration and management of private and public companies. The main subjects cover financial statements and corporate governance issues from the perspectives of business economics and corporate law.

There is no cap on enrolments on the Master's degree course, unlike other degree courses at Italian universities such as Medicine, where a limited number of places are available. But there is an entry test for applicants who have a mark of under 95/110 from their three-year Bachelor's degree course. The test verifies whether the applicant has the skills and knowledge in accounting, governance and business administration considered necessary to follow the master's program.

The number of students enrolling on the program increased significantly in recent years (Table 1), peaking in the academic year of our sample.

(Table 1 near here)

The academic year at University X is divided into two semesters. The first semester starts in September and ends in early December, and exams begin in mid-December. The second semester starts in February, and ends in mid-May, and exams are held from the end of May to the beginning of July, with the final exam date offered at the beginning of September. There is a total of seven possible dates for each exam, three dates between December and January and four between May and September. Students are permitted to take the exam for each subject on all seven dates and are not required to 'skip' any dates even if they fail. They are also permitted to enroll for an exam and not present, and in these cases the result is reported as 'absent'. They can also withdraw from an exam while it is underway if they realize that they are not sufficiently prepared. And as noted above, students who achieve a mark which they do not consider satisfactory can refuse to accept it and retake the exam on a subsequent date. The minimum mark for passing an exam is 18 out of 30, and the maximum mark is 30/30 with honors.

During the COVID-19 period, first-year students had four courses in their program for the second

semester. One of these courses started late, after the end of February, as the professor was absent with COVID-19, so just three courses were offered regularly: Business history, Financial management of companies, and Public sector planning, control, and budgeting. Second-year students had just one subject in their program, Advanced commercial law. The syllabus for each course provides information on the content and assessment method used in the exam. During the COVID-19 period, the syllabus was constantly updated, and students were notified of any changes to the program, the examination, and more generally, aspects undergoing change because of the pandemic. Exams previously held as written papers, for example, were converted into oral exams: examiners did not ask orally exactly the same questions as they had already set as written questions; they do completely new questions and methods of examination. Moreover, lessons and exam switched from face-to-face to online (Table 2). At University X, teaching staff used Moodle to supply teaching materials and interact with students. Microsoft Teams was used for delivering real-time lectures, consultations with students, and examinations. International literature shows that during the pandemic, different platforms were used to manage online lessons and exams; for example, Microsoft Teams in Italy and Zoom in Japan, Mexico, Nigeria, Norway, Poland, and Portugal (Sangster, Stoner & Flood 2020). In Italy, other platforms such as Blackboard and Google Meet were also used. Communications with students were made with WhatsApp in some countries (Macias et al., 2021).

(Table 2 near here)

3. Literature review and hypotheses development

Much prior literature investigates whether the level of student motivation, participation and engagement (“the time and effort students devote to activities that are empirically linked to desired outcome”, Koh, 2009) affects student performance, measured with their marks. This section first summarizes a sample of prior research from the USA, Australia, Netherlands, and Austria (3.1). It then focuses on the association between student engagement and performance, comparing face-to-face and online lessons and exams (3.2). Two innovative hypotheses are then put forward. The first,

(Hypothesis 1, H1), investigates the effect of COVID-19 on the association between student engagement and performance and the second, (Hypothesis 2, H2), investigates the link between the rapidity of completing exams and student performance.

3.1 Student Engagement and Performance

This section briefly summarizes the main literature on the level of student engagement and attendance in face-to-face and online learning environments and the effect on student success and performance, that include several recent studies (Precourt and Gainor (2019), De Barba, Kennedy & Ainley 2016, Sharma, Nand, Naseem & Reddy 2020; Conijn, Snijders, Kleingeld, & Matzat 2017; Mödritscher, Andergassen, and Neumann, 2013, Korkofingas and Macri, 2013, Yang, Quadir, Chen & Miao 2016). Precourt and Gainor (2019) explore the association between classroom participation and learning outcomes in 595 accounting students at a private United States university, and find that each component of engagement (frequency of participation, consistency of participation, and class attendance) is positively associated with exam performance. De Barba, Kennedy & Ainley (2016) investigate the role of student motivation and engagement in predicting performance in a Massive Open Online Course in Australia. They find that the strongest predictor of performance is participation number of clicks on lecture videos, followed by motivation. Sharma, Nand, Naseem & Reddy (2020) analyze student data to quantify the effectiveness of online presence on student performance using frequency and duration as indicators. They find that both frequency and duration have a significant impact on students' final marks. In other words, they find a positive relationship between the total number of times students access the topic and their marks and interpret re-visits as a factor contributing to reinforced learning. The number of times a student accesses a topic (student engagement) leads to learning through reinforcement. Online materials can allow multiple attempts to encourage students to earn better marks or provide additional supplementary notes in the form of videos accessed through topics/lessons. Conijn, Van den Beemt and Cuijpers (2018), investigating Massive Open Online Courses in Netherlands, find that frequency-based activity indicators are good

predictors of performance and can be used to identify points of improvement. Mödritscher et al. (2013) explore links between online usage patterns and learning results at Vienna University of Economics and Business. They find that specific indicators, such as the number of active learning course days and topic views, have a positive influence on learning results. Korkofingas and Macri (2013) study the relationship between the time spent by a student using the course website and the student's performance at a major Australian university and find a significant positive association between the two variables. Yang et al. (2016) investigates a blog-based university course in Taiwan, and find that online presence has a significant influence on learning performance.

3.2 Face-to-face vs online lessons and exams

This section reviews prior studies that compare student performance attending either online or face-to-face lessons and exams. Grossman and Johnson (2017) find that traditional educational programs, on campus and hybrid, lead to a higher proportion of graduates being hired than fully online programs. Mauldin et al. (2018) investigate certified public accountant perceptions of the preparation of entry-level accountants based on the instructional context of the degree earned by a prospective job candidate. The results indicate a strong preference among certified public accountants for candidates with a degree from a traditional campus with face-to-face courses. Wooten (2016) reported that integrating online testing in an auditing course at a United States university is positively associated with performance in terms of final exam scores. Another of their models shows a positive association between performance and number of online exam attempts. Davis, Rand & Seay (2016) study cost accounting and auditing courses at United States universities, and find that students with test proctoring (test overseen by an authorized, neutral, proctor, who ensures the identity of the test taker and the integrity of the test taking environment. In short, a proctor is a proxy for the instructor, who oversees a test) had lower exam marks than students with no proctoring. Moreover, students under remote proctoring had significantly lower exam scores than students under classroom proctoring. Lento (2018) examines student use of online platforms in an introductory accounting course which

used a learning management system and an online homework manager. He finds that cramming is associated with resources offered for self-study, while consistent usage behavior is associated with resources offered for course assessment. The regression results show that the online homework manager and dynamic learning resources were positively associated with final exam performance. Finally, students with attendance greater than 50% used learning resources significantly more than students who attended less than 50% of the class.

3.3 Effects of COVID-19 on the association between student engagement and performance

(H1)

The COVID-19 pandemic impacted severely on educational systems, including accounting education (Sangster, Stoner & Flood 2020). Lessons and exams shifted rapidly from face-to-face to online delivery, including in the majority of universities which had no consolidated experience in e-learning. The shift brought challenges in terms of psychological stress of teaching staff and students, and the urgent need to adapt assessment methods. It also brought benefits, such as the flexibility of online delivery. The pandemic necessitated the fastest and most extensive transformation of academic and assessment practices ever seen in modern times. Social distancing rules and the closure of campus forced universities adopt Emergency Remote Online Teaching (EROT) and online assessment. The abrupt migration to EROT disrupted both learning and core teaching activity and replaced the interactive, personalized and predominantly face-to-face experience typical of campus life (Yong, 2021).

Sangster, Stoner & Flood (2020) present a compilation of personal reflections from 66 contributors on the impact of, and responses to, COVID-19 in accounting education in 45 different countries, including Italy. They also make a call for future research on the “Impact of different delivery modes on student performance and achievement (marks, higher order learning, critical thinking, etc.)”. Ali, Narayan and Sharma (2021) reflect on student engagement in online learning of accounting during COVID-19 in two universities in New Zealand. They describe what worked well (e.g., Zoom,

synchronous and asynchronous channels) and what did not work well (e.g., engagement of at-risk students in live sessions). Ng (2021) discusses the role of accounting in a crisis, and describes the emerging response to COVID-19 of a New Zealand university which was seriously affected by a big fall in student enrollments because of travel bans.

Problems related to EROT arise for both instructors and students. Instructors were forced to follow new ways of working at short notice with little time for training and development (Yong, 2021). They faced the problems of lacking the traditional blackboard, keeping students' attention, preparing new materials and learning how to operate technological platforms (Macias, Patiño-Jacinto, & Castro, 2021). In some cases this subtracted from time used for research (De Boer, 2021). Macias, Patiño-Jacinto, & Castro, (2021), studying the effects of COVID-19 in 22 accounting programs offered in 11 Colombian cities, find however that the instructors quickly learned to use online tools and that EROT led to closer communication with students.

Students, on the other hand, often suffered for example from loneliness and a lack of self-motivation. EROT caught many "by surprise" which led to widespread uncertainty and fear (Yong, 2021). The invasion of private spaces was one of the first changes they perceived. During synchronous classes, noises from children, other relatives and pets were commonly heard (Macias et al., 2021). The use of proctoring led to lawsuits being brought by students objecting to violation of privacy, in the Netherlands (De Boer, 2021) and in Italy. Macias et al. (2021) find that for cultural reasons, proctoring was not unexpected or objected to by Latin American students. Yong (2021) evaluates the impact of COVID-19 on international students enrolled in one accounting course in New Zealand and finds different levels of adaptability. For example, during the lockdown, students from India were more vocal and sought assistance more than those from China. Other problems were related to the availability of technology availability, and this led to an inequality gap in countries such as Argentina (Perrotta, 2021).

On the basis of the literature mentioned in Sections 3.1 and 3.2, we assumed for the purposes of our study that student engagement has a significant effect on student performance, both in online (e.g., Yang, Quadir, Chen & Miao 2016; Conijn, Snijders, Kleingeld, & Matzat 2017; Sharma, Nand, Naseem & Reddy 2020) and face-to-face courses (Precourt and Gainor, 2019).

Prior research suggests that education technology significantly affects student performance, but it was carried out before the pandemic and does not consider the effects of COVID-19. Our study investigates changes in student engagement caused by COVID-19, where the shift to online attendance was rapid and unexpected. To the best of our knowledge, no study has as yet explored quantitatively the effects of this rapid shift on the link between with student performance in campus attendance and student performance in a pre-COVID-19 environment.

Few studies address the topic of performance after COVID-19, but only qualitatively. Wong and Zhang, (2021), investigate the student assessment in response to COVID-19 in Australia with a qualitative study. The student profile was almost entirely international, with 90% from China. The assessment includes lecture presentation (5% optional bonus), a class quiz (10%), a midterm test (30%), and a final examination (60%). As in this research, the final examination uses a Moodle-based assessment, where students paged from one question to another, typing their answers into boxes. They find that students performed substantially worse in this final exam during COVID-19, compared to previous sessions. White, (2021), reflect on the shift of assessments online during COVID-19 and the potential impact on academic integrity in Australia. She finds that students could have incentives against the academic integrity from online learning and assessment. On the other hand, she finds that online exams can appear to be cost effective, given that some questions are automatically graded, and this reduces the marking time. Moreover, she finds that marking online is faster than marking physical papers. Finally, she finds easier to read student writing and move between exam papers.

We do not thus make a prediction on the direction of the effect. Our first hypothesis asserts that characteristics of online teaching and exams during COVID-19 influenced the association between engagement and performance.

H1: COVID-19 affects the association between student engagement and performance

3.4 Effects of COVID-19 on the association between rapidity of passing exams and performance (H2)

Although obtaining a Master's degree should normally take two years, there are no regulations setting time limits for obtaining a degree (Clerici, Giraldo & Meggiolaro 2015). Given that students can take any amount of time, in semesters or even years, to pass the exam, accept their exam marks and complete their degree, it is frequent for them to be enrolled for longer than the officially indicated period. This entails significant costs both for students and universities. DesJardins, Ahlburg & McCall (2002) investigate factors related to timely degree completion and find that slow progress towards graduation has high costs for the individual as well as society, in terms of tuition costs and income loss for each year of tuition without any return on the initial investment. They call for research to investigate the temporal dimension of undergraduate studies. However, as noted above, Bachelor's and Master's degrees in Italy are subject to periodic evaluation by ANVUR (National Agency for the Evaluation of the University System and Research), as well as by the department and university itself. Evaluation focuses on a series of quantitative indicators specified by the MUR, the Ministry of Universities and Research (Biggeri and Bini 2004), and includes one indicator which is precisely a ratio relating to the speed of obtaining a Master's degree and the number of exams taken per academic year. Students are also encouraged to graduate on schedule in order to have better employment prospects, as businesses and professions prefer to recruit students who graduate on schedule and with high degree scores. This naturally impacts on the rate at which students accept their exam marks. Moreover, in Italy, universities, their departments and degree courses are regularly evaluated by ANVUR. Both qualitative and quantitative indicators are used. Quantitative indicators of teaching

quality capture the length of time taken to complete a degree course and the number of exams students pass every year. Course directors are thus encouraged to organize courses and exam dates so that the maximum number of students can attend and pass the exam in the shortest time, and within the two years expected by the Master.

Despite the key role of time on student performance there has been to date no research on the link between the rapidity of passing exams and student performance in terms of exam mark. On one hand we assume that a faster rate of taking exams, accepting marks and graduating is strongly and positively associated with better results and better job prospects. We also hypothesise that the highest performing students are more likely to wish to complete their degree courses in compliance with the official time schedule. On the other hand, other students such as those already in employment or studying part-time may not consider this a priority. For these students, it is likely that speed of completing exams is not positively associated with performance. However, on the basis of our sample composition, we assume that the rapidity of passing exams is a significant determinant of student performance.

We thus develop our second hypothesis testing the effects of COVID-19 on the association between rapidity of passing exams and student performance.

H2: COVID-19 affects the association between rapidity of passing exams and performance

4. Method

4.1 Regression model

On the basis of findings from the literature, we conducted the following ordinary least square regression model as a base model:

$$\text{Exam performance} = \beta_1 \text{ Student Engagement} + \beta_2 \text{ Rapidity of passing exams} + \beta_n \text{ control variable} \\ + \text{Academic year enrolment fixed effects}$$

We conducted the following ordinary least square regression model to test H1, introducing the interaction with COVID-19:

$$\text{Exam performance} = \beta_1 \text{ Student Engagement} + \beta_2 \text{ Student Engagement} * \text{COVID-19} + \beta_n \text{ control variable} + \text{Academic year enrolment fixed effects}$$

Table 3 shows the variable definitions. The dependent variable is the final exam mark (a continuous variable), as is commonly used in the literature, for example Admiraal, Huisman, and Pilli (2015) in the Netherlands. This is a continuous variable for each exam observation.

(Table 3 near here)

In order to test H1, we followed the methods reported in the literature to measure the level of student engagement i.e. student log-ins to the learning management system (Korkofingas and Macri 2013 in Australia; Mödritscher, Andergassen, and Neumann 2013 in Austria; Yu and Jo 2014; Sharma, Nand, Naseem & Reddy 2020 in University of South Pacific). The learning management system is a software-based system used for administering, documenting, tracking, reporting, and delivering educational courses. The Modular Object-Oriented Dynamic Learning Environment (Moodle) is widely used in higher education. Student engagement through access frequency can be measured for both face-to-face and online courses, where Moodle is used to post videos, slides, teaching materials, and daily assignments in e-learning courses. In educational literature, learning is the process of acquiring new or modifying existing knowledge, behaviors, skills, values, or preferences (Gross 2010), and can be measured by the number of actions undertaken to acquire knowledge. The frequency-based view is the simplest and most widely used approach to measure student engagement (Reed and Oughton 1997). User action frequency is a simple measure but provides useful information for identifying different behavioural patterns in learners (Carannante, Davino & Vistocco, 2020).

Next, we conducted the following ordinary least square regression model to test H2, introducing the

interaction with COVID-19:

$$\text{Exam performance} = \beta_1 \text{ Rapidity of passing exams} + \beta_2 \text{ Rapidity of passing exams} * \text{COVID-19} + \beta_n \text{ control variable} + \text{Academic year enrolment fixed effects}$$

In the summer session there are four possible exam dates, but this research focuses on the first three dates and does not cover the September date. Students can take the exam on the first date *or* on the second (or third). The second exam date can thus be a second attempt for some students, as well as a first attempt for students opting to take more time to prepare for the exam. Moreover, students may attempt the exam on the first date *and* on the second (or third) date when they are dissatisfied with the mark they receive at the first attempt. This student decision is one factor in slowing down their academic progress. The dependent variable in our regression is the final exam mark, a continuous variable, as in H1. The variable of interest is the rapidity of passing the exam, which includes mark acceptance, and is measured with an ordinal variable: 1 if the student passes and accepts the mark on the first exam date in the summer session, 2 if the student passes and accepts the mark on the second exam date in the summer session, 3 if the student passes and accepts the mark on the third exam date in the summer session. A higher value indicates a lower speed.

The control variables capture student demographics and exam or course-year levels. Clerici, Giraldo & Meggiolaro (2015) suggest that future studies use models with different levels of control for personal, background, and contextual factors, because student characteristics affect their academic progress. We therefore include the following control variables in our multivariate regression model: 1) Study constancy; 2) Time of day of study (morning, afternoon, evening, or night). This variable was included on the basis of research into circadian rhythms, which are natural, internal rhythms of the sleep-wake cycle which follow the rotations of the Earth. They can refer to any biological process which displays an endogenous, entrainable oscillation of approximately 24 hours. Gaynor, Lynn & Wasternack (2016) study the association between certified public accountant exam performance and

circadian rhythms, finding that a starting time for an exam between 10.00–12.00 is associated with higher exam scores. 3) Gender and age (Lassibille and Gómez 2009; Gaynor, Lynn & Wasternack 2016; Mastekaasa and Smeby 2008). Gaynor, Lynn & Wasternack (2016), for example, find that males perform better than females in certified public accountant exams; they also find that younger students perform better than older students; 4) Non-Italian students and students not from the area of city of University X (Arias Ortiz and Dehon 2011; Lyons 2004; Domingo and Nouri, 2016; Dolton, Marcenaro, & Navarro 2003). Domingo and Nouri (2016) for example show that native students perform better than transfer students and suggest that transfer students should receive additional institutional support to overcome the transfer shock; 5) Mark for school leaving diploma (Clerici, Giraldo & Meggiolaro 2015); 6) Subject area of high school diploma; 7) Withdrawal.

We also controlled for course and exam level variables, including: 1) Number of students enrolled for the exam, 2) Pass rate; 3) Average mark, 4) Resources. Masui, Broeckmans, Doumen, Groenen, & Molenberghs (2014) and Wladis, Conway & Hachey (2017) stress the importance of examining relationships at the course level. For example, Delialioglu & Yildirim (2007) investigate the number of topics (resources) visited, and Wladis, Conway & Hachey (2017) investigate the mark point average as a proxy for academic preparation.

4.2 Sample

The sample included students who passed the exams in the summer session for the four courses under analysis. To identify our population, we downloaded the students' IDs from the Esse3 system, which shows the exam mark. Next, we linked these data with data on study methods retrieved from Moodle and with demographic data retrieved from the Economics and Management Department. Data were processed and made anonymous. We excluded students who had not used Moodle for their study preparation. We used cohorts from two academic years for comparison to build a panel sample. Courses 1, 2, and 4 are for first year students, while Course 3 is for second-year students. Table 4

Panel A shows the percentage of students enrolled on the Master's degree (112 in 2018/2019 and 151 in 2019/2020) who used Moodle in the summer session to take and pass exams of Courses 1, 2 and 4 and the same percentages for two cohorts (120 in 2017/2018 and 112 in 2018/2019) who used Moodle in the summer session to take and pass the exams of Course 3. Effects are controversial: Course 1 shows almost no COVID effects, Course 2 shows improvements under COVID, and Course 3 and 4 show deteriorations. Possible reasons could be partially related to differences in exam methods under COVID (online oral exam for course 1, 2, 4, and online written exam for course 3). Control variables at course and exam level control for these differences in our multivariate model. Table 4 Panel B shows the distribution by year of exams passed based on enrolment year, which reflects the student-course observation basis of our analysis.

(Table 4 near here)

5. Results

5.1 Descriptive statistics

The average mark (Table 5 – Panel A) was 26 out of 30. Several students retook exams until they obtained the highest mark they thought they could achieve. About 33% of the sample obtained the top mark of 30 out of 30 (Table 5, Panel B). High marks like 29 and 28 were obtained by about 10-11% of the sample.

The sample is well balanced, with 55.8% of observations from after the COVID-19 pandemic and 44.2% from before the changes.

Students used Moodle for an average of 24 days, attending the online classes in Moodle for 35 days in the 75th percentile. Descriptive statistics showing whether students used online teaching materials more or less during the pandemic than they did pre-pandemic are reported in Table 5 – Panel C. They show that students used Moodle much more during COVID-19 (33 days average) than pre-COVID-

19 (13 days average). This reflects the shift from exclusively face-to-face to exclusively on-line teaching.

The average indicator for mark acceptance rate was 1.695. This indicates that not all students using Moodle passed the exam with a satisfactory mark on the first exam date. The median figure is 1, and the 75st percentile is 2. This indicates that 50% of the sample passed the exam and accepted the mark at the first opportunity, but a large part of the sample needed a second exam date to pass and accept the mark. Taking the exam on the second date might mean the student makes a second attempt after failure or not accepting the mark first time, or it might be that the student opts for the later date for other reasons. In any case, passing the exam on the second (or third) date rather than the first (or second) date slows student progress towards graduation.

Students tended to use Moodle on average for more than 10 consecutive days, indicating diligence or engagement in studying (study constancy). Students tended to study more frequently in the morning (44.8%), followed by the afternoon (41.6%). No student in our sample studied during the period 10 pm to 6 am so night study was dropped from the regression model.

The control variables show a gender-balanced sample, with 43.5% females, as in the Spanish sample of Lassibille and Gomez (2009) but unlike Mastekaasa and Smeby, 2008, where women made up 75%. The average age was 25, as in Clerici, Giraldo & Meggiolaro, 2015. Only 4.2% of the sample are non-Italian (do not hold Italian citizenship), presumably because exams and courses are delivered in Italian. Under half of the sample, 45.4%, are local or from the university city, as in Lassibille and Gomez (2009), which shows University X is attractive to non-local students. As in Clerici, Giraldo & Meggiolaro (2015), the average score in school-leaving diploma entry qualification is 79 out of 100. Only 9.1% of the sample hold a high school leaving diploma which is not in Business science (Classics, Languages, Education, or Arts and humanities). Table 5 – Panel D shows the average exam mark out of 30 for our control variables in the pre-pandemic and pandemic periods. For women, the average mark before COVID-19 was 26.5 and during COVID-19 it was 27.4. For men, the average

mark before COVID-19 was 25.3 and during COVID-19 26.4. Women's exam results improved under COVID-19, as did men's results, which were however generally lower than women's results. Younger students (22-28 years old – 95% of the sample) obtained better exam results under COVID-19 as did older students (29-49 years old – 5% of the sample) but older students' results were generally lower than younger students' results. Older students however saw a bigger improvement in exam results under COVID-19, probably because it was easier for those in employment to follow recorded online lectures because of time issues. Students from the local area showed improved exam results under COVID-19, as did non-local students, but non-local students' results were however generally lower than local students' results. Students who studied similar subjects at high school showed higher exam marks under COVID-19. Students holding high school in Classics, Languages, Education, and Arts and humanities showed improved exam results under COVID-19, perhaps as a result of greater diligence and engagement in new subject areas.

The average withdrawal rate from exams was very low at 0.111. There is high multicollinearity between withdrawal and not accepting a mark, so the latter variable is dropped from the regression. The average number of students enrolled for each exam was about 180, and the average number of resources for each subject on Moodle was about 31. For each exam the average pass rate was 84.4% and the average exam mark was 25.

(Table 5, Panels A, B, C, D about here)

5.2 Multivariate results

We first run a non-interacted model (Table 6, Model 1) to provide basis data for comparison, then test our hypotheses (Table 6, Model 2 and Model 3) by including an interaction with the time variable, 'COVID-19'.

We first test the association between our two variables of interest, student engagement/rapidity of passing exams and performance (Table 6 Model 1). Our results mainly confirm prior literature and

show that: a) student engagement is significantly and positively associated with student performance (Precourt and Gainor, 2019, De Barba, Kennedy & Ainley 2016, Sharma, Nand, Naseem & Reddy 2020, Conijn, Van den Beemt & Cuijpers 2018, Modricscher, Andergassen and Neumann 2013, Korkofingas and Macri, 2013, Yang, Quadir, Chen & Miao, 2016, Wooten, 2016); b) higher rapidity of passing exams is positively associated with exam mark. Our results in fact show that students who made greater use of the online material obtained better results than students who used it less, in both the pre-COVID-19 and COVID-19 periods. Similarly, students completing exams more rapidly also showed higher performance in terms of higher exam marks.

Regressions on control variables show that: 1) Higher study constancy is associated with better student performance; 2) Italian students perform better than non-Italian (Domingo and Nouri (2016)); 3) Higher scores in the school leaving qualification are associated with better student performance at Master's degree level; 4) Morning or evening study is not statistically differently associated with mark compared to afternoon study (Gaynor, Lynn & Wasternack, 2016).

We contribute to the literature by testing H1 and H2.

Like prior literature, our base model confirms benefits in terms of higher marks for students who show higher engagement, and H1 workings (Table 6, Model 2) show that COVID-19 impacted on the association between student engagement and performance. Regression coefficients show that the impact of COVID-19 was positive at $0.093 - 0.066 = 0.027$. This confirms that students who made more use of the online material obtained higher marks than students who used it less, both pre COVID-19 and during COVID-19. But the regression coefficient for student engagement (0.093) changed significantly by -0.066 . This suggests that during the COVID-19 period, the positive association between student engagement and performance was weaker. The use of online material proved to be less efficacious, and COVID-19 students did not benefit from teaching materials as much as pre-COVID-19 students who were able to attend face-to-face lectures. In other words, the pandemic weakened the benefit which students usually gain from engagement. It is important to note that this

weakening occurred in the early months of COVID-19, which suggests that students may have paid the price for the suddenness in the shift from face-to-face to online teaching. This finding extends prior literature on the association between student engagement and performance as it reflects crisis management at an Italian university.

Next, we contribute to the literature testing the effect of COVID-19 on the association between the rapidity of passing the exam and student performance (H2). H2 workings show that COVID-19 also had an effect on the association of this variable with student performance. The regression coefficient for the variable falls significantly when COVID-19 is introduced into the equation: $-0.359-1.424=-1.783$. This suggests that students gain higher marks when they take the exam on the first possible date. COVID-19 strengthens the association between rapidity of exam completion and student performance; it increases the positive effect of higher marks on rapidity of passing. This confirms our expectation: more rapid taking of exams and degree completion is strongly and positively associated with better results and job prospects. H2 workings show that students who prepared for an exam with diligence and high engagement who obtained a high mark on one of the first exam dates were helped by courses and exams being online during COVID-19.

(Table 6 near here)

Looking at control variables, study constancy has a negative coefficient and is statistically significant. This means that a high level of use of Moodle is associated with higher performance.

Comparing afternoon study with morning/evening study, we find positive coefficients which are not however statistically significant. In our sample students who study during the morning and the evening do better than students who study in the afternoon. This result confirms and extends the findings of Gaynor, Lynn & Wasternack (2016), but requires further investigation because it is not statistically extendable to the population. Other interesting results which are however restricted to our sample and non-statistically significant, include those relating to student gender, age and provenance. Unlike Gaynor, Lynn & Wasternack (2016) but consistently with Dolton, Marcenaro & Navarro

(2003), we find that female students perform better than male students both before and during COVID-19. Consistently with Gaynor, Lynn & Wasternack (2016), we find that older students in our sample perform less well than younger students both before and during COVID-19. Students living in the same city or area as the University (nearly 45% in our sample), compared to non-local students, show a non- statistically significant coefficient with a non-stable sign. In line with Domingo & Nouri (2016) we find that Italian students perform better than non-Italian students but given that courses studies are delivered and examined in Italian our sample comprises almost entirely students holding Italian citizenship (95.8 percent). We also find that the final mark of the High school leaving diploma as well as the average mark obtained in university exams, provides a good indication of student performance in a particular exam.

6. Discussion and conclusion

The COVID-19 emergency required crisis management in universities as in other organizations. Emergency measures shifted teaching and exams from face-to-face to remote in a very short space of time. Previous literature has investigated benefits and issues arising from the pandemic (e.g. Sangster, Stoner & Flood 2020, Eringfeld 2021, Wong & Zhang 2020, White, 2020, Ali, Narayan and Sharma, 2021), and planned online courses (e.g. Precourt and Gainor 2019, , Sharma, Nand, Naseem & Reddy 2020; Conijn, Snijders, Kleingeld, & Matzat 2017; Yang, Quadir, Chen & Miao 2016). But as yet there has been no research on the effects of COVID-19 on the association between student engagement (H1), rapidity of passing exams (H2) and student performance.

Prior literature mainly finds that higher student engagement brings benefit in terms of higher marks. This study finds that COVID-19 reduces this benefit (H1). The finding is associated with the early months of the pandemic and it appears likely that students paid the price of the suddenness of the shift from face-to-face to remote teaching and exams. Future research will be required in order to confirm the finding in other cases of university crisis management. One reason for the reduction in

benefit may be that while traditional education is considered to help students to become active subjects who know and act (Tan 2018), online education is considered anti-humanizing. This is consistent with the idea that a university is not just a space for learning but is also a community that fosters belonging and identity formation (Daniels & Brooker 2014). It is widely believed that the marketisation of education where education is increasingly sold to student consumers in a competitive market (Eringfeld 2021) conflicts with its aim of humanizing (Kahn 2017). The COVID-19 pandemic brought increased provision of online courses, where convenience and cost tend to be emphasized over quality and where there is by the nature of the course less human contact. In the emergency context of the COVID-19 pandemic, because less human contact can reduce the positive association between engagement and performance, online provision appears to have altered the relation between student engagement and performance. Findings related to hypothesis 1 support this view, as they show that COVID-19 had a negative effect on the relationship between student engagement and performance. It is important to note that these findings are however associated with a context of emergency which is not comparable with situations where online courses are the norm.

Our findings from hypothesis 2 are that more rapid taking of exams and completion of exams is strongly associated with better performance, both pre-COVID-19 and during COVID-19. However, COVID-19 increases the benefits of taking exams rapidly. This may be because online education is more inclusive and embraces diversity. In this view, the online university is an integral part of society, unlike the corporate-imperial university (Webb 2018), which closes itself off from outside audiences, privatizes access to resources, and capitalizes on tuition fees. More online education options—including podcasting, recorded lectures, open sources, and more time available for self-care and well-being—may contribute to more accessible education (Eringfeld 2021). In this view, the pandemic increased flexibility and access to education. By revealing the positive effect of COVID-19 on the association between rapidity of taking exams and student performance, our results also support this view.

Different context may have different results: for example, in the UK A-level (school leaver) results were much better under COVID-19 than pre-COVID-19. However, in the UK, teacher assessment replaced independent state level examinations during the pandemic, whereas our results are based on a situation where assessment was performed entirely by teachers, with the use of Moodle, which is the usual process. Our data does not allow more detailed investigation of the difference between written and oral assessment. Other aspects of assessment methods (e.g. ongoing vs final) and differences between student age ranges (e.g. school vs university) are clearly important for education in accounting, as in other fields, but lie beyond the scope of this research.

Accounting educators all over the world benefit from these results learning that phenomenon like the pandemic both improve and worsen students' performance, considering student engagement and rapidity of passing exams. From one hand, accounting educators need to be aware that COVID-19 increases the risks of marketization and anti-humanization of education. From the other hand, COVID-19 improving the inclusiveness, flexibility and the accessibility of accounting students, can increase the students' performances, and can reduce the costs for students and universities.

Findings of this study have implications for universities and students. It is likely that the effects of COVID-19 on accounting higher education will not be limited to the pandemic period, and a full return to face-to-face lessons and exams is not likely in the short term. At the time of writing, most universities are using a blend of face-to-face and remote teaching that aims to maximise benefits and minimize risks. In this context, our findings may be useful for course directors in planning a blended system of delivery. A desirable solution giving the best of both worlds would be to deliver face-to-face teaching and also make synchronous and asynchronous (live and recorded) lectures available online for a fixed period. This would ensure the humanising benefits of education as well as maximising availability for non-attending students. The 'new normal' of blended teaching and learning is in fact one of the areas for which Yang and Huang (2021) call for future research. They also call for further research into the development of 'asynchronous' online teaching resources,

training for information-based teaching capability, the globalization of higher education, the use of big data in online education, the ‘new infrastructure’ of online education, and the promotion of equity in education by online methods.

COVID-19 strongly affect methods of student assessment, and online assessment presents a number of issues and critical aspects relating to quality. Our results reveal benefits in terms of performance, but it is clear that online assessment does not assure the same quality as face-to-face exams. Our results have implications for students too: student engagement and rapidity of completing exams are important for obtaining the highest possible marks in online, face-to-face, and blended systems. A blended system used in accounting education may balance the risks of anti-humanization with benefits associated with student engagement, flexibility, and performance.

This study has some limitations. First, we excluded students who did not use Moodle for their study preparation, and this could bias the results. Second, we measured attendance during the e-learning period using Moodle log-ins as a proxy because the data were readily available, but other measures could be developed. Thirdly, we include both exam mode and attendance at lessons in the concept of “student engagement”. Future research is required to separate the impact of online or face-to-face exam modes from the impact of online or face-to-face lesson attendance on student performance, and to examine in more detail whether these impacts occur to different degrees in written papers and oral exams. Finally, as we investigate a single program at just one university in a country where the university system differs from that in other countries, the findings are not generalizable.

Early online courses required significant financial investment in technology, and most universities thus committed to a single, predominant program and course delivery mode, which was mainly asynchronous. More affordable technology has expanded the options, and synchronous modes of implementing course material delivery are now more widely available (Howell, Williams, & Lindsay 2003; Bonnici, Maatta, Klose, Julien, & Bajjaly 2016). The move also occurred in Italy during the COVID-19 pandemic. The sample analyzed in this study was from the first cohort of students to be

offered exclusively online courses in Italian universities, but in future academic years students will be offered different options. Future research is required to support the development of a blended approach to education, combining virtual and face-to-face courses.

REFERENCES

- Admiraal, W., B. Huisman, and O. Pilli. 2015. "Assessment in Massive Open Online Courses." *Electronic Journal of e-Learning* 13: 207–216. <https://issuu.com/academic-conferences.org/docs/ejel-volume13-issue4-article431>
- Ali I., Narayan A.K., and Sharma U. 2021. "Adapting to COVID-19 disruptions: student engagement in online learning of accounting, *Accounting Research Journal*, 34, (3): 261-269
- Arias Ortiz, E., and C. Dehon. 2011. "The Roads to Success: Analysing Dropout and Degree Completion At University." *ECares Working Paper 2011-025*.
- Biggeri, L., and M. Bini. 2004. "Evaluation at University and State Level in Italy: Need For a System of Evaluation and Indicators." *Tertiary Education and Management* 7: 149–162.
- Bonnici, L. J., S. L. Maatta, M. K. Klose, H. Julien, and S. Bajjaly. 2016. "Instructional Style and Learner-Centered Approach: A Cross-Institutional Examination of Modality Preference for Online Course Delivery in a Graduate Professional Program." *Studies in Higher Education* 41(8): 1389–1407. doi: 10.1080/03075079.2014.977860
- Carannante, M., Davino, C., & Vistocco, D. (2021). Modelling students' performance in MOOCs: a multivariate approach. *Studies in Higher Education*, 46 (11), 2371-2386.
- Clerici, R., A. Giraldo, and S. Meggiolaro. 2015. "The Determinants of Academic Outcomes in a Competing Risks Approach: Evidence From Italy." *Studies in Higher Education* 40 (9): 1535–1549. doi: 10.1080/03075079.2013.878835

- Conijn, R., A. Van den Beemt, and P. Cuijpers. 2018. "Predicting Student Performance in a Blended MOOC." *Journal of Computer Assisting Learning* 34 (5): 1–4. doi:10.1111/jcal.12270
- Conijn, R., C. Snijders, A. Kleingeld, and U. Matzat. 2017. "Predicting Student Performance from LMS Data: A Comparison of 17 Blended Courses Using Moodle LMS." *IEEE Transactions on Learning Technologies* 10 (1): 17–29. doi:10.1109/TLT.2016.2616312
- Daniels, J., and J. Brooker. 2014. "Student Identity Development in Higher Education: Implications for Graduate Attributes and Work-Readiness." *Educational Research* 56 (1): 65–76. doi:10.1080/00131881.2013.874157
- Davis, A. B., R. Rand, and R. Seay. 2016. "Remote Proctoring: The Effect of Proctoring on Grades." *Advances in Accounting Education: Teaching and Curriculum Innovations* 18: 23–50. <https://doi.org/10.1108/S1085-462220160000018002>
- De Barba, P. G., Kennedy, G. E., & Ainley, M. D. (2016). "The role of students' motivation and participation in predicting performance in a MOOC". *Journal of Computer Assisted Learning*, 32 (3): 218-231.
- De Boer, H. (2021). COVID-19 in Dutch higher education. *Studies in higher education*, 46(1), 96-106
- Delialioglu, O., and Z. Yildirim. 2007. "Students' Perceptions on Effective Dimensions of Interactive Learning in a Blended Learning Environment." *Journal of Educational Technology & Society* 10 (2): 133–146.
- DesJardins, S. L., D. A. Ahlburg, and B. McCall. 2002. "A Temporal Investigation of Factors Related to Timely Degree Completion." *Journal of Higher Education* 73 (5): 555–581.
- Di Pietro, G. 2004. "The Determinants of University Dropout in Italy: A Bivariate Probability Model with Sample Selection." *Applied Economics Letters* 11: 187–191.

- Di Pietro, G., and A. Cutillo. 2008. "Degree Flexibility and University Drop Out: The Italian Experience." *Economics of Education Reviews* 27: 546–555.
- Dolton, P., O. D. Marcenaro, and L. Navarro. 2003. "The Effective Use of Student Time: A Stochastic Frontier Production Function Case Study." *Economics of Education Review* 22: 547–560.
- Domingo, M. S., and H. Nouri. 2016. "How Do Transfer Students in Accounting Compare Academically to 'Native' Students?" *Global Perspectives on Accounting Education* 13 (21): 21–35.
- Eringfeld, S. (2021) "Higher Education and its Post-Colonial Future: Utopian Hopes and Dystopian Fears at Cambridge University During COVID-19." *Studies in Higher Education* 46(1): 146–157. doi: 10.1080/03075079.2020.1859681
- Gaynor, G., S. A. Lynn, and O. Wasternack. 2016. "Debits, Credits, and Circadian Rhythms: The Effect of CPA Exam Start Time on Performance." *Advances in Accounting Education* 19: 37–60.
- Grilli, L., and C. Rampichini. 2007. "A Multilevel Multinomial Logit Model for the Analysis of Graduates' Skills." *Statistical Methods and Applications* 16: 381–393.
- Gross, R. 2010. *Psychology: The Science of Mind and Behaviour*. 6th ed. London: Taylor & Francis.
- Grossman, A. M. and L. R. Johnson. 2017. "How Employers Perceive Online Accounting Education: Evidence from Kentucky." *Journal of Accounting Education* 40: 19–31. doi: 10.1016/j.jaccedu.2017.06.002
- Howell, S. I., P. B. Williams, and N. K. Lindsay. 2003. "Thirty-Two Trends Affecting Distance Education: An Informed Foundation for Strategic Planning." *Online Journal of Distance Learning Administration* 6 (3). <http://www.westga.edu/~distance/ojdla/fall63/howell63.html>

- Kahn, P. E. 2017. "The Flourishing and Dehumanization of Students in Higher Education." *Journal of Critical Realism* 16 (4): 368–382. doi:10.1080/14767430.2017.1347444
- Koh, G. (2009), "What student affairs professionals need to know about student engagement", *Journal of College Student Development*, 50, (6): 683-706
- Korkofingas, C., and J. Macri. 2013. "Does Time Spent Online Have an Influence on Student Performance? Evidence for a Large Business Studies Class." *Journal of University Teaching & Learning Practice* 10 (2).
- Lassibille, G., and M. L. N. Gómez. 2009. "Tracking Students' Progress Through the Spanish University School Sector." *Higher Education* 58 (6): 821–839.
- Lento, C. 2018. "Student Usage of Assessment-Based and Self-Study Online Learning Resources in Introductory Accounting." *Issues in Accounting Education* 33 (4): 13–31.
- Lyons, A. 2004. "A Profile of Financially At-Risk College Students." *Journal of Consumer Affairs* 38 (1): 56–80.
- Macias, H. A., Patiño-Jacinto, R. A., & Castro, M. F. (2021). "Accounting education in a Latin American country during COVID-19: proximity at a distance". *Pacific Accounting Review*. 33(5): 636-651
- Mastekaasa, A., and J. C. Smeby. 2008. "Educational Choice and Persistence In Male- and Female-Dominated Fields." *Higher Education* 55: 189–202.
- Mauldin, S., R. L. Braun, C. Viosca, and M. N. Boldt. 2018. "CPAs' Evaluations of Accounting Graduates: An Empirical Investigation of Face-to-Face and Online Degrees." *The Accounting Educators' Journal* 28: 99–115.
- Masui, C., J. Broeckmans, S. Doumen, A. Groenen, and G. Molenberghs. 2014. "Do Diligent Students Perform Better? Complex Relations Between Student and Course Characteristics,

Study Time, and Academic Performance in Higher Education.” *Studies in Higher Education* 39 (4):621–643. doi: 10.1080/03075079.2012.721350

Metcalf, A. S. (2021) “Visualizing the COVID-19 Pandemic Response in Canadian Higher Education: An Extended Photo Essay.” *Studies in Higher Education* 46 (1): 5–18. doi: 10.1080/03075079.2020.1843151

Mödritscher, F., M. Andergassen, and G. Neumann. 2013. “Dependencies Between E-learning Usage Patterns and Learning Results.” Edited by Stefanie Lindstaedt and Michael Granitzer. 13th International Conference on Knowledge Management and Knowledge Technologies, Graz, Austria, 1–8.

Ng, F. (2021). Accounting at your service: university survival, recovery and revolution from COVID-19. *Pacific Accounting Review*. 33 (5): 652-664

Perrotta, D. (2021). Universities and Covid-19 in Argentina: from community engagement to regulation. *Studies in Higher Education*, 46(1), 30-43.

Precourt, E., and M. Gainor. 2019. “Factors Affecting Classroom Engagement and How Engagement Leads to a Better Learning.” *Accounting Education* 28 (1): 100–118.

Reed, W. M., and J. M. Oughton. 1997. “Computer Experience and Interval-Based Hypermedia Navigation.” *Journal of Research on Computing in Education* 30 (1): 38–52. doi:10.1080/08886504.1997.10782212

Sangster, A., Stoner, G., & Flood, B. (2020). “Insights into accounting education in a COVID-19 world”. *Accounting Education*, 29 (5): 431-562.

Sharma, B., R. Nand, M. Naseem, and E.V. Reddy. 2020. “Effectiveness of Online Presence in a Blended Higher Learning Environment in the Pacific.” *Studies in Higher Education* 45 (8): 1547–1565. doi: 10.1080/03075079.2019.1602756

- Tan, C. 2018. "To be More Fully Human: Freire and Confucius." *Oxford Review of Education* 44 (3): 370–382. doi:10.1080/03054985.2017.1391763
- Webb, D. 2018. "Bolt-Holes and Breathing Spaces in the System: On Forms of Academic Resistance (or, Can the University be a Site of Utopian Possibility?)." *Review of Education, Pedagogy, and Cultural Studies* 40 (2): 96–118. doi:10.1080/10714413.2018.1442081
- White, A. (2020). May you live in interesting times: a reflection on academic integrity and accounting assessment during COVID19 and online learning. *Accounting Research Journal*.
- Wladis, C., K. Conway, and A. C. Hachey. 2017 "Using Course-Level Factors as Predictors of Online Course Outcomes: A Multi-Level Analysis at a US Urban Community College." *Studies in Higher Education* 42 (1): 184–200. doi: 10.1080/03075079.2015.1045478
- Wong, L., & Zhang, Y. (2020). COVID-19 pivot: a reflection on assessments. *Accounting Research Journal*.
- Wooten, T. (2016), "Leveraging Online Testing to Enhance Student Learning." *Advances in Accounting Education: Teaching and Curriculum Innovations* 19: 141–163.
<https://doi.org/10.1108/S1085-462220160000019006>
- Yang, B., & Huang, C. (2021). Turn crisis into opportunity in response to COVID-19: experience from a Chinese University and future prospects. *Studies in Higher Education*, 46(1), 121-132.
- Yang, J. C., B. Quadir, N.-S. Chen, and Q. Miao. 2016. "Effects of Online Presence on Learning Performance in a Blog-Based Online Course." *The Internet and Higher Education* 30: 11–20. doi:10.1016/j.iheduc.2016.04.002
- Yong, S. (2021). A reflective commentary about teaching international non-accounting postgraduates amid COVID-19. *Pacific Accounting Review*. 33 (5), 616-624

Yu, T., and I. H. Jo. 2014. "Educational Technology Approach Toward Learning Analytics: Relationship Between Student Online Behavior and Learning Performance in Higher Education." *Fourth International Conference on Learning Analytics and Knowledge* 269–270. Indianapolis: ACM.

Table 1. Number of enrolled students for each academic year

Academic year	Enrolled students (N)
2015/2016	97
2016/2017	113
2017/2018	120
2018/2019	112
2019/2020	151

Table 2. Student Engagement (Face-to-face and Online) pre-COVID-19 and during COVID-19

Course	Year	Attendance		Exam	
		<i>Pre-COVID-19</i>	<i>COVID-19</i>	<i>Pre-COVID-19</i>	<i>COVID-19</i>
Business history	1	Face-to-face	Online	Face-to-face Written	Online Oral
Financial management of companies (Includes financial reporting analysis)	1	Face-to-face	Online	Face-to-face Written	Online Oral
Public sector planning, control, and budgeting (Includes management accounting)	1	Face-to-face	Online	Face-to-face Written	Online Written
Commercial law—advanced course (Includes bookkeeping and accountancy regulations)	2	Face-to-face	Online	Face-to-face Two options*	Online Oral

*(1) 1st part written, 2nd part oral (only for attending students); (2) Oral

Table 3. Variable definition

Variables	Definition
EXAM PERFORMANCE = Mark	Continuous variable from 18 to 31 where 18 is the pass mark, 30 is the maximum mark, and 31 means 30 with 'honors'
PERIOD COVID-19	0 = Academic Year 2018–2019 1 = Academic Year 2019–2020
Student Engagement	Number of days in which the student uses and logs on to Moodle in a course in the period analyzed
Rapidity of passing exam	1 - student passes and accepts the mark on the first exam date in the summer session 2 - student passes and accepts the mark on the second exam date in the summer session 3 - student passes and accepts the mark on the third exam date in the summer session A higher value means a lower speed
Study constancy	Average number of days that student logged on to Moodle
Morning study	Propensity to study during the morning = number of times a student logged into the course during the morning / number of log-ins for a course
Afternoon study	Propensity to study during the afternoon = number of times a student logged into the course during the afternoon / number of log-ins for a course
Evening study	Propensity to study during the evening = number of times a student logged into the course during the evening / number of log-ins for a course
Night study	Propensity to study during the night = number of times a student logged into the course during the night / number of log-ins for a course
Female	1 if the student is female; 0 if the student is male
Age	Number of years old
Non-Italian	1 if the student is not Italian; 0 if the student is an Italian citizen
City or area	1 if the student lives in the same city or area as the university; 0 otherwise
Mark for school-leaving diploma	Final mark (out of 100) of the high school leaving diploma
Subject area of High school leaving diploma	1 - High school leaving diploma in Classics, Languages, Education, or Arts and humanities 0 High school leaving diploma is in Business and Economics
Withdrawal	Number of times the student enrolls in the exam but does not sit the exam (absent) or withdraws. There are 3 exam dates in the summer session (excluding the date in September) so the variable can range from 0 to 3.
Students enrolled	Number of students enrolled in the course / exam. Variable at course-year level. Shows the same value for all students in the same course-year. A higher value indicates a course / exam taken by a higher number of students.
Pass rate	Percentage of students who pass the exam (number of students pass / number of students enrolled). Variable at exam level. Shows the same value for all students on the same exam date.
Average mark	Average mark of all students enrolled for and taking the same exam. Variable at exam level. Shows the same value for all students on the same exam date.
Resources	Number of resources on Moodle for the course. Variable at course-year level. Shows the same value for all students in the same course-year.

Table 4. Panel A – Sample by courses (C1, C2 C3, C4) in Pre Covid-19 (pre-C) and during Covid-19 (C)

	C1		C2		C3		C4	
	<i>Pre-C</i>	<i>C</i>	<i>Pre-C</i>	<i>C</i>	<i>Pre-C</i>	<i>C</i>	<i>Pre-C</i>	<i>C</i>
Number of students using Moodle that passed the exam and accepted the mark in the summer session	89	123	60	112	81	55	85	107
Total number of students enrolled from Table 1 in the relative academic year	112	151	112	151	120	112	112	151
Percentage of students using Moodle that passed the exam and accepted the mark in the summer session	79%	81%	54%	74%	68%	49%	76%	71%

C=Course. Observations for regressions: $89 + 123 + 60 + 112 + 81 + 55 + 85 + 107 = 712$

Table 4. Panel B – Sample by year

Year of enrolment	Observations = Number of students × Number of courses
2016/2017	4
2017/2018	101
2018/2019	294
2019/2020	303
Total	712

Table 5 – Panel A - Descriptive statistics

	Mean	SD	P25	Median	P75
Mark	26.367	5.946	25.000	28.000	30.000
PERIOD					
COVID-19	0.558	0.497	0.000	1.000	1.000
VARIABLES FOR HYPOTHESIS TESTING					
Student Engagement	24.163	20.337	8.000	18.000	35.000
Rapidity of passing exam	1.695	0.816	1.000	1.000	2.000
CONTROL VARIABLES					
Study constancy	9.778	13.139	3.047	5.359	10.675
Morning study	0.448	0.192	0.333	0.458	0.568
Afternoon study	0.416	0.187	0.316	0.400	0.516
Evening study	0.136	0.140	0.031	0.106	0.190
Night study	0.000	0.000	0.000	0.000	0.000
Female	0.435	0.496	0.000	0.000	1.000
Age	25.028	3.458	23.000	24.000	25.000
Non-Italian	0.042	0.201	0.000	0.000	0.000
Local	0.454	0.498	0.000	0.000	1.000
High degree mark	79.295	11.133	70.000	79.000	87.000
High degree title	0.091	0.288	0.000	0.000	0.000
Withdrawal	0.111	0.356	0.000	0.000	0.000
Students enrolled	179.594	34.804	157.000	175.000	220.000
Pass rate	0.844	0.141	0.727	0.905	0.966
Average mark	25.001	3.861	23.106	26.269	28.606
Resources	30.669	35.657	0.000	25.000	47.000

Table 5 – Panel B – Frequency table for the dependent variables: exam performance

Mark	N	Percentage	Cumulative percentage
Fail	25	3.51	3.51
18	19	2.67	6.18
19	8	1.12	7.3
20	11	1.54	8.85
21	14	1.97	10.81
22	12	1.69	12.5
23	24	3.37	15.87
24	41	5.76	21.63
25	41	5.76	27.39
26	42	5.9	33.29
27	62	8.71	41.99
28	83	11.66	53.65
29	73	10.25	63.9
30	234	32.87	96.77
30 with honours	23	3.23	100

Table 5 – Panel C – Analysis by period for the two variables of the hypotheses

Variables for Hypothesis Testing	Pre-COVID-19	During COVID-19
Student Engagement (Mean)	12.88	33.11
Rapidity of passing exam (Mean)	1.69	1.70

Table 5 – Panel D – Student performance: average mark by student characteristics

Average mark for the following students' characteristics	Pre-COVID-19	During COVID-19
Female	26.5	27.4
Male	25.3	26.4
Younger (22-28 years old – 95% of the sample)	26.0	27.0
Older (29-49 years old – 5% of the sample)	22.0	24.8
Same City or area as the university	25.7	27.2
Different City or area	25.9	26.6
School leaving diploma in Classics, Languages, Education, or Arts and humanities	25.2	28.1
School leaving diploma in Business Economics	25.8	26.7

Table 6. Regression

	Student Performance as dependent variable Model 1		Student Performance as dependent variable Model 2		Student Performance as dependent variable Model 3	
	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value	Estimate	<i>p</i> -value
Student engagement	0.041***	0.002	0.093***	0.000	0.038***	0.004
Student engagement *COVID-19 H1			-0.066***	0.009		
Rapidity of passing exam	-1.242***	0.000	-1.262***	0.000	-0.359	0.422
Rapidity of passing exam*COVID-19 H2					-1.424***	0.008
Study constancy	-0.049***	0.002	-0.041**	0.013	-0.057***	0.001
Morning study	0.489	0.647	0.607	0.569	0.544	0.609
Afternoon study	comparison		comparison		comparison	
Evening study	0.599	0.685	0.583	0.692	0.495	0.736
Female	0.257	0.521	0.313	0.434	0.216	0.589
Age	-0.037	0.537	-0.022	0.713	-0.025	0.682
Non-Italian	-4.384***	0.000	-4.310***	0.000	-4.220***	0.000
Local	-0.049	0.894	-0.062	0.867	0.006	0.986
High						
Mark for School leaving diploma	0.076***	0.000	0.079***	0.000	0.076***	0.000
Subject area of High school leaving diploma	0.299	0.647	0.426	0.514	0.269	0.680
Withdrawal	-0.335	0.560	-0.359	0.530	-0.309	0.589
Students enrolled	-0.015	0.180	-0.010	0.346	-0.009	0.439
Pass rate	-3.071	0.146	-3.975*	0.062	-7.014***	0.007
Average mark	0.621***	0.000	0.683***	0.000	0.904***	0.000
Resources	0.005	0.670	0.013	0.255	0.031**	0.039
Academic year enrolment fixed effects	included		included		included	
Adjusted R^2	0.348		0.354		0.354	
<i>N</i>	712		712		712	

***, **, * Indicate statistical significance at the 0.01, 0.05, and 0.1 levels (two-tailed), respectively.