
Strengths, weaknesses, opportunities, and threats of online teaching during the COVID-19 pandemic: results of a Delphi survey

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Abstract: The COVID-19 pandemic forced the global population to modify social habits. In particular, during 2020 the majority of educational institutions worldwide had to shift from the traditional face-to-face to the online teaching methodology, leading to a consequential debate – among instructors, citizens, media, and government – about its advantages and disadvantages. To realise a comprehensive evaluation of online teaching during the COVID-19 pandemic, the following research question has been formulated: “What are the strengths, weaknesses, opportunities, and threats of online teaching that emerged during the COVID-19 pandemic?” In order to provide an answer, a three-round Delphi study was implemented involving 12 editorial board members of the *International Journal of Information and Operations Management Education*, whose opinions were mediated and synthesised in a SWOT analysis. From the SWOT analysis, a series of strategies has been developed to help policy makers and instructors in adopting a *strategising* view towards online teaching.

Keywords: online teaching; COVID-19; pandemic; face-to-face teaching; strengths, weaknesses, opportunities, and threats; SWOT; university; learning; knowledge; strategic decision making; strategy.

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1 Introduction

COVID-19 (or SARS-CoV-2) is a respiratory disorder generated by a new Coronavirus strain, which was identified for the first time in Wuhan City, Hubei Province, China (Casella et al., 2020; Sohrabi et al., 2020). COVID-19 was announced to the World Health Organization (WHO) on 31st December 2019; a month later, the WHO affirmed that COVID-19 had become a global health emergency (Gallegos, 2020; Ramzy and McNeil, 2020) and on 11th March 2020 the WHO elevated COVID-19 to the status of global pandemic (Sarda et al., 2020). The danger related to COVID-19 is represented by its ability to be spread very easily among people; in fact, collected data indicate that this virus is spreading faster than seasonal influenza; as a result, crowded places as well as close and prolonged interactions between individuals represent the major causes of contagion (Gatto et al., 2020; Yen et al., 2020).

As a consequence, many governments around the world have decided to stop the physical attendance of students at schools and universities as a precaution in order to marginalise the spread of the virus (Bayham and Fenichel, 2020; van Lancker and Parolin, 2020; Zhang et al., 2020). This has brought about the shift from traditional face-to-face to online lectures (Basilaia and Kvavadze, 2020; Crawford et al., 2020). This radical and sudden social-technological change has affected society, dividing public opinion about the pros and cons stemming from the temporary momentary abandonment of the classic face-to-face teaching in favour of online tuition (Sahu, 2020).

However, from general literature reviews on the adoption of online teaching at university level (Bartley and Golek, 2004; Castle and McGuire, 2010; Driscoll et al., 2012; Ghazi-Saidi et al., 2020; Glazier et al., 2020) and online investigations among educational experts (Financial Times, 2020; Forbes, 2020; UNICEF, 2020; The New York Times, 2020a), it appears there is no unanimous consensus on what the positive and negative aspects of the use of online teaching are at university level. In particular, several scholars argued differently on: the fields of study that benefit the most from online teaching, the cognitive and affective factors that influence learning outcomes, and the macro-environmental factors (i.e., the availability of IT infrastructures) that are more likely to influence the implementation of online education (Adnan and Anwar, 2020; Cristofaro et al., 2020; Moazami et al., 2014; Nguyen et al., 2012; Paul and Jefferson, 2019; Yen et al., 2018). Moreover, this heterogeneity of opinions crossed the boundaries of the academic and expert media worlds; in fact, different views emerged from public opinion with regard to students and their families' need to receive subsidies for the purchase of technological equipment to avoid being excluded from online teaching (Corriere della Sera, 2020; Times Higher Education, 2020; The New York Times, 2020b).

Due to these contrasting views and debates, the following research question has been formulated: "what are the strengths, weaknesses, opportunities, and threats (SWOT) of online teaching that emerged during the COVID-19 pandemic?" To offer an answer, a three-round Delphi study involving 12 editorial board members (EBMs) of the *International Journal of Information and Operations Management Education (IJIOME)* has been implemented. EBMs' statements have been mediated and synthesised in a SWOT analysis to group together all the different aspects that emerged from the collected opinions. Results show that online teaching has, among other traits, the capacity to fill the existing gap between attending and non-attending students and raises the opportunity of increasing the number of people that can afford to enrol in higher education. However,

online teaching suffers from the inability to carry out live practice classes as well as having cheating and plagiarism behaviours; the major threat, instead, seems to be that the massive use of online teaching may jeopardise the role of universities as knowledge providers.

Thanks to these results, this work provides useful insights on policymakers and Academia about the impact of online teaching both on individuals (students and instructors) and society as a whole. From the SWOT analysis, in particular, a series of strategies has been developed according to the suggestions of Koontz and O'Donnell (2012). Specifically, policy makers should not look at online education merely as a temporary tool to overcome specific problems (like those related to the COVID-19 pandemic); conversely, they should perceive this solution as an opportunity to bring higher education to a greater number of people who are unable, perhaps due to physical disabilities, to continue their studies (Teague, 2015). This has the benefit of increasing knowledge and its dissemination, thus the progress of society. From this assumption, the duty of policymakers can be to provide all citizens with equal opportunities to access online education by, for example, investing in the widespread presence of broadband and supplying ad hoc technological devices for the less well-off (Cristofaro, 2020a). It is suggested that the academic world can adopt a neutral approach towards online teaching that considers both its benefits and downsides. Indeed, instructors at the university level should take into account that online education has the added value of allowing better time management between teaching and research duties, cutting out travel between home and work, as well as involving guest lecturers from all over the world to strengthen the value of their courses. Leveraging on these points may lead to an increase in research quality and course value (Cristofaro, 2017), which can mitigate the universities' drop in prestige due to the decrease in on-campus life. In sum, this work proposes a *strategising* view towards online teaching.

The structure of the work is as follows: in the second section, readers are provided with an online teaching theoretical framework, which forms the basis of this study. The third section explains the Delphi methodology that was implemented. In the fourth section, opinions of the EBMs are mediated and synthesised in a SWOT matrix, which is commented on in detail, also referring again to the EBMs' quotes. Finally, the work concludes with a broad discussion of the results, providing implications for policy makers and academics.

2 Theoretical framework

In the last twenty years, the advancement of technology has deeply transformed the nature of higher education, leading to the birth and dissemination of so-called *online teaching* (Daymont et al., 2011; Yukselturk and Yildirim, 2008). Online teaching can be defined as a global ecosystem of academic content released in a virtual environment using the internet as the main way to teach and study (Singh and Thurman, 2019). Among the most recognised benefits, the adoption of new technology solutions for teaching granted the opportunity for communities, organisations, and institutions to overcoming technical and logistical problems that are typical of traditional, i.e., face-to-face or on-campus, teaching (Li and Irby, 2008; Pham et al., 2020). This allows students freedom from not being conditioned by their current location for the provision of knowledge, thus bringing an 'apparent' *learning democratisation*. At the same time, the

introduction of these new forms of education highly depends on the advancement of technology and its accessibility by teachers and students. Indeed, as demonstrated by Woo and Reeves (2007) and Bryant and Bates (2015), the application of online teaching follows the growth and access to educational and conference platforms, characterised by the ability to provide an efficient and effective social constructivist learning environment (Azhari et al., 2020).

Stemming from the above contrast, several scholars have investigated the benefits and counter-values of delivering online, rather than on-campus, education. For instance, Kanuka et al. (2007) found that students are usually inclined to show higher levels of cognitive performance when they are involved in well-structured and interactive circumstances; a few years later, Gu et al. (2012) proposed that the students' learning outcome is positively enhanced when software programmers have a clear idea of the students' learning style and, consequently, they are able to design the overall online learning systems with the appropriate features in order to meet the students' needs.

With regard to the instructors', Bao (2020) recently analysed the application of online education at Peking University, proposing five factors that have a high impact on teaching processes, enabling professors to adequately deliver large-scale online education. The first factor proposed by Bao (2020) concerns the 'appropriate relevance': it emerged that the amount, difficulty, and duration of teaching content should converge with the online learning attitude of students. The second factor regards the 'effective delivery': due to students' limited concentration, it is imperative to adapt the teaching speed to ensure productive delivery of knowledge. The third factor deals with 'sufficient support': faculty members should provide students with prompt feedback following their performance during lectures. The fourth factor is related to 'high-quality participation': to increase the effectiveness of online teaching, it is crucial to enact some initiatives aimed at boosting students' participation. The fifth, and last, factor concerns 'contingency plan preparation': it is crucial to create contingency plans in order to overcome possible problems of a technical and/or practical nature while performing online teaching.

Apart from in-depth studies on online teaching *per se*, another important stream of education and learning research has addressed the following question: *under which conditions is online teaching more effective than face-to-face teaching?* In this regard, from a literature review aimed at comparing these two teaching styles, several interesting points emerged. For example, Moazami et al. (2014) randomly split 40 students into two groups (the grade point averages of all participants using the Mann-Whitney U test; $P > 0.05$), in order to compare their knowledge and retention levels after successfully attending a course on 'rotary instrumentation of root canals'; the same professor presented the course, but in one case it was delivered online while, in the other case, it was delivered traditionally, in person. During the analysis of these two samples, it appeared that – even if the online course encountered many technical and practical challenges – the overall feedback from the instructor and students' perspectives was definitively positive and successful. In fact, at the end of the course, the performance of the students was evaluated through the comparison of the students' exam performance, which showed that people who were following the online course were achieving higher grades than those who attended the face-to-face lectures. On the contrary, Paul and Jefferson (2019) pointed out lack of significant difference in students' knowledge improvement between the two methods when the subjects studied are not related to science, technology, engineering, and mathematics (STEM) majors; this assumption was recently confirmed by Cristofaro et al. (2020) in their research aimed at investigating the

outcomes deriving from the use of simulation games to support traditional face-to-face teaching. Regardless of the performance outcome, Adnan and Anwar (2020) have investigated the attitudes of undergraduate and postgraduate students, from Pakistani universities, who were using online education due to the COVID-19 pandemic. The outcomes of their study have highlighted that online education is not able to bring the desired results in an underdeveloped country like Pakistan, as the large majority of students do not have the opportunity to access the internet due to the status of their wealth. Thus, the absence – even for a short period of time – of traditional lessons has a dramatic impact on students' learning outcomes, consequently affecting their future path in life.

According to the above, the results of the previous studies do not agree with each other on the positive and negative aspects of online teaching compared to face-to-face teaching; thus, further investigations on the topic are necessary and this study is specifically placed in this perspective.

3 Methodology

In line with the aim of this study, the Delphi research method (Linstone and Turoff, 1975; Yeung et al., 2007; Olawumi and Chan, 2018) has been implemented in order to collect the views of teaching experts – at university level – about the SWOT of online teaching during the COVID-19 pandemic. The method perfectly fits with this study. The Delphi process, indeed, is a perspective and systematic research method to obtain comments from a group of experts on a specific subject or question and is considered as a powerful tool for strategic management (Loo, 2002) – in line with the SWOT analysis that has been implemented for data analysis (later explained). In particular, the Delphi process has a structure to predict and help decision making through a three-round survey, which encompasses data gathering and concludes with group agreement (Landeta, 2006; Khosravi et al., 2020; Sarvari et al., 2020). The Delphi method includes survey or questionnaire rounds using a basic set of questions, from which questions are formed for the next rounds. Yet, the Delphi keeps the responders anonymous and hides each answer from other responders on the panel (Dalkey and Helmer, 1963; Olawumi and Chan, 2019). Most of the time, convenient sampling is the most used technique, and the quality, rather than the number, of panellists is important (Okoli and Pawlowski, 2004; Olawumi and Chan, 2019). Accordingly, participants in the Delphi survey are experts, critics, and panellists who must have knowledge and experience in a same subject, the time to participate, and effective communication skills (Yeung et al., 2007). There is no explicit or firm rule on how to choose the experts, or how many, for the Delphi process. The number of the responders, indeed, depends on the factors of the homogeneous and heterogeneous types of the sample, target of the Delphi survey, duration of data gathering, domain of the problem, and acceptability of the answers (Chan et al., 2010; Chan and Choi, 2015). The number of participants is usually less than 50 and most of the time is around 10 to 20 (Sarvari et al., 2020).

For this study, the Editor-in-Chief (EiC, No. 1), associate editors (AEs, No. 3) and EBMs (No. 25) of *IJOME* have been contacted. Potential panellists have been chosen according to convenience sampling because the leading researchers of this article are also EBMs of the journal. Thanks to their appointment as AEs or EBMs, the involvement of

these panellists has been considered suitable because this implicitly endorses recognition of their expertise in *information and operations management education*. The first round of the Delphi study occurred from 27th July to 6th August and consisted of asking potential panellists to identify the SWOT of online teaching during the COVID-19 pandemic (Appendix A). Each outlined variable is an object of a specific open-ended question with answers restricted to 150 words. The second round took place in September 2020, from 2nd September to 12th September and consisted of summarising the answers from round 1 and formulating them into a series of more specific questions for panellists to answer (Appendix B). Finally, in round 3, from 21st September to 29th September, answers from rounds 1 and 2 were submitted to the panellists again in the form of a SWOT matrix; thus, panellists were able to see the average reply of their peers and asked whether or not they would like to adjust their answers. The use of SWOT analysis as the method of data analysis and synthesis is justified following similar implementations for evaluating teaching programmes and methods (e.g., Balamuralikrishna and Dugger, 1995; Lateh, 2011; Orr, 2013; Polat et al., 2019). In particular, the SWOT matrix is a strategic planning tool largely used among practitioners to evaluate the SWOT of a project, or in a company or in any other situation in which an organisation or individual must make a decision, to achieve a goal. The analysis concerns the internal environment (considering strengths and weaknesses) and external environment (considering threats and opportunities). This technique is attributed to Albert Humphrey, who led a research project at Stanford University during the 1960s using data provided by the Fortune 500 (Gürel and Tat, 2017).

Moreover, through the implementation of a thematic analysis, specific themes – presented in the form of bullet points within the SWOT matrix – emerged for each of the four areas of the matrix. In general terms, thematic analysis is a widely used qualitative research technique consisting of analysing written, verbal, or visual communication messages (Downe-Wamboldt, 1992). Within this work, an inductive analysis, by which themes are free to emerge, was implemented (Braun and Clarke, 2006). Each author analysed the provided answers individually and the inter-rater reliability between them was high (Cronbach's alpha = 0.94); however, when disagreeing, deeper delving into the analysis was required in order to come out with a shared vision of the sentence meanings and related theme. From the SWOT matrix, a series of potential strategies for the management of online teaching were subsequently built. In particular, this has been done by following the rationale suggested by Koontz and O'Donnell (2012): combining S-W-O-T factors to create S-O (also called *maxi-maxi*), S-T (also called *maxi-mini*), W-O (also called *mini-maxi*), and W-T (also called *mini-mini*) strategies.

4 Results

To carry out this investigation, a sample of 12 EBMs of IJIOME has been tested. Table 1 and Table 2 report the descriptive statistics of the sample and information on the respondents' country of origin, respectively.

Table 1 Descriptive statistics of the EBM sample

<i>Variables</i>	<i>Categories</i>	<i>No. of observations</i>	<i>%</i>
Age	31–40	4	33
	41–50	5	42
	>50	3	25
Gender	Male	8	67
	Female	4	33
Years of experience	1–10	3	25
	11–20	3	25
	>20	6	50

Table 2 Country of origin of the EBM sample

<i>Country of origin</i>	<i>No. of observations</i>	<i>%</i>
Australia	1	8.3
Egypt	1	8.3
Italy	2	16.7
Sweden	2	16.7
UK	1	8.3
USA	5	41.7
<i>Total</i>	<i>12</i>	<i>100</i>

From the analysis of sample's socio-demographic characteristics, it emerges that respondents are prevalently middle-age men with an extensive experience in academia (50% with more than 20 years) as teachers and researchers. In geographical terms, the sample population is mainly based in the USA (about 42%) and Europe (40%). Thus, opinions of respondents mostly reflect the perception about the adoption of online teaching in Western countries.

Opinions of respondents that emerged through the first two rounds of the Delphi study were mediated and synthesised in a SWOT analysis, proposed in Table 3, which has been finally proposed for the third round to stimulate a final and comprehensive conversation on the adoption of online teaching during the COVID-19 pandemic. The SWOT matrix is discussed in the following sub-sections, according to its four quadrants; meanwhile, a more comprehensive discussion is provided within the last section of this work.

Table 3 SWOT analysis of online teaching during the COVID-19 pandemic

<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> • <i>Flexibility</i> → The possibility to record lectures and seminars to watch and re-watch, anywhere and anytime, filling the previous existing gap between attending and non-attending students. • <i>Work-life balance</i> → Better time management – e.g., avoiding commuting time from the place of residence to the workplace – and, therefore, a better balance between private and professional/student life. • <i>More external guests</i> → Ease of participation by distinguished guest experts from other countries/institutions. • <i>Courses' and teachers' digitalisation</i> → Massive improvement in the use of IT tools that, otherwise, would have taken a longer time span to be implemented and be familiarised with. • <i>Bring work world closer</i> → Students become confident with an environment that reflects the one they will face in their future jobs, made by virtual meetings and conference calls. • <i>Risk-free comparison</i> → An environment that encourages frank exchanges, neutralising status indicators, and social distractors. 	<ul style="list-style-type: none"> • <i>Socio-economic barrier</i> → Adversely affects the learning outcomes of students with a lower socio-economic status. • <i>Technical skills barrier</i> → Lack of expertise in using online teaching tools and lack of confidence in actively interacting through a digital platform. • <i>Questions-answers asynchronicity</i> → Students usually prefer to interact through chat rather than intervene directly during the lecture; from that, instructors cannot answer students' questions in real-time with a consequent decrease in the quality of learning outcomes. • <i>Uncontrollable external variables</i> → Bad Internet connections and noises coming from external environment dramatically affect the ability to teach and learn. • <i>No body-language interactions</i> → Inability to have an instant comprehension – through the students' body language – about the level of understanding of new concepts and involvement by students. • <i>No practical classes</i> → It is quite impossible to carry out laboratory tests, business case discussions, and the like, consequently generating a decrease in the overall quality of the teaching provided. • <i>Cheating and plagiarism</i> → Difficulties in the application of adequate protocols to assess students' learning often affected by cheating and plagiarism. • <i>Harder for undergraduates</i> → Undergraduate students are often newbies to online courses; thus, online education seems to be of more interest for mature students. • <i>Not for all courses</i> → Unequal performances among different fields of education, especially, it seems not to be fully efficient for STEM courses.

Table 3 SWOT analysis of online teaching during the COVID-19 pandemic (continued)

<i>Opportunities</i>	<i>Threats</i>
<ul style="list-style-type: none"> • <i>Social sustainability</i> → An increasing number of people can afford to join higher education (e.g., students with different types of disabilities) and universities are able to access a diverse student target. • <i>Environmental sustainability</i> → Pollution reduction, thanks to a smaller number of people that will move from home to universities and vice versa. • <i>Economic sustainability</i> → People may spend less on travel costs and universities but, in the long term, will save money that can be reinvested in other areas. • <i>Competency-based education</i> → Allows students to advance in learning at their own pace and complete the course only when they feel they have fully acquired the related knowledge. • <i>Personalised learning and tutoring</i> → Advances the development and implementation of new tools for learning and tutoring such as artificial intelligence (AI) and personal learning assistants (PLA). • Improve virtual-based assignments → Professors could engage students in interactive solutions – e.g., simulation games – potentially increasing the learning outcomes. • University courses' content-comparison → The value of university courses will become more comparable with each other because the focus of students will be more and more on the provided contents and not on related physical services (e.g., campus infrastructures). 	<ul style="list-style-type: none"> • <i>Investment shifting</i> → Universities are pushed towards shifting their investments from physical facilities to IT solutions to provide excellent online services. • <i>Revenue and investment reduction</i> → Students may no longer want to enrol at traditional universities (i.e., with face-to-face courses and physical facilities) if they are going to act as online universities; thus, universities will face revenue reduction in terms of enrolment fees (apart from the reduced revenues in terms of housing, parking, dining, etc.) with a consequent reduction of teacher hiring, research funds, and the overall university system reputation. • <i>Undermined university role</i> → Established universities see their knowledge provider role jeopardised due to the difficulty in conveying their value (mainly connected with physical facilities and on-campus life). • <i>Undermined student learning quality</i> → Due to difficulty in conveying feelings during online teaching, the low level of investments, and the number of low-quality online education providers, the overall quality of student learning seems to be jeopardised.

4.1 Strengths

While speaking about the strengths of online teaching, respondents touched on different aspects, such as the flexibility of lectures and seminars, mainly given by the opportunity of watch and re-watch, anywhere and anytime, filling the previous existing gap between attending and non-attending students. Another theme pointed out by the respondents was the fact that holding online classes involves several advantages especially concerning the opportunity to have better time management and, therefore, better balance between private and professional life. Indeed, *Respondent 12* claimed: “working from home made it possible to reconcile some (not all!) private life aspects with job life. Teachers and students did not have to waste time traveling from home to university (and vice versa) and getting ready for classes.” Another crucial favourable aspect concerned the

opportunity to enrich the teaching activity through the participation of guest lecturers who, being based in different geographical areas, would have been limited in their active participation without the adoption of online teaching – despite *Respondent 11* stated that: “guest speakers enjoy the physical presence, online does not ‘sell’ it as much.” Moreover, all respondents agreed on the fact that online teaching brought a massive improvement in the use of digital solutions that, otherwise, would have taken longer to be adopted. In this vein, *Respondent 7* stated: “we have been forced to use distance learning and digitalise our courses. This was done during a very short period. If it hadn’t been for the COVID-19 pandemic, this would have taken several years; now we did it in just a couple of months.” This is reinforced by *Respondent 6* who added: “online teaching made teaching possible during the pandemic. Many students and teachers learnt about facilities such as Zoom for the first time. Some have become used to those facilities and have taken to the freedom and convenience that asynchronous teaching and learning offer. After the pandemic, one is likely to find an increase in the adoption of online teaching.” A connected element claimed by respondents regarded the idea that online education could encourage current students to be more accustomed to working in a multinational business context in which much of the work, at both executive and managerial levels, is done through video conferences and remote working. This theme is closely related to another view highlighted by *Respondent 2*: online teaching allows “a risk-free environment that encourages a frank exchange, minimises the potential for confrontation, and neutralises status indicators and social distractors.”

4.2 Weaknesses

Regarding the weaknesses of online teaching, there are several interesting themes that the respondents highlighted. Firstly, the adverse effect it has on learning outcomes of students with a lower socio-economic status. Indeed, almost all respondents agreed that the lack of access to online teaching platforms and unavailability of reliable technological infrastructures – due to the socio-economic situation of students (and/or their families) as well as the degree of development of the area they inhabit – are important inhibitors of online teaching and, as a consequence, learning outcomes are negatively affected. Moreover, considering the technical point of view, one main weakness of online teaching concerns the lack of know-how in using technological tools and lack of confidence in actively interacting through a digital platform. On this point, *Respondent 5* affirmed: “some faculty had never taught online; so, they were struggling with putting things online and becoming familiar with the technology.” Relatedly, *Respondent 12* also pointed out instructors’ inability to have any ‘in time’ interaction with their students. Obviously, this asynchronicity between students’ questions and instructors’ answers negatively influences teaching effectiveness. This happens because many students prefer writing in the channel chats rather than directly intervening during the lecture. In this regard, *Respondent 12* claimed: “students interested in asking questions, making comments, and the like, in most cases prefer to write on the platform chat. Even this tool decreases the engagement because – if you are showing a PowerPoint presentation – often you are not able to see the chat and, consequently, your answers to students’ questions are usually ‘out of time’ with respect to the addressed topics.” In addition to the already identified technical issues, several respondents clearly referred to the existence of uncontrollable external variables, i.e., the inability to manage noise coming from an external environment (e.g., people’s voices, baby cries, cell phones rings) as well as the problems

of using IT devices *per se* (i.e., bad internet connections and, above all, also the obsolescence of a platform); these variables dramatically influence the quality of teaching and learning outcomes. On this point, *Respondent 5*, who usually flipped his classrooms and created video lectures that students could/should watch before having a synchronous online discussion, said he had difficulties with internet reliability: “basically, we ended up having audio but not video. Frequently, I would see that a student would disconnect to reconnect moments later indicating internet reliability issues on their side as well.” Learning outcomes, of course, are also affected by the involvement and willingness of students themselves in being part of online lectures; however, the ability of teachers to recognise, also through the students’ body language, the level of understanding of new concepts and the involvement during the lectures and seminars is not the same as with face-to-face teaching. In this regard, *Respondent 3* asserted: “I believe my biggest strength is being in front of the classroom to keep students engaged and entertained. Being in person also allows me to read students’ body language and determine if they are confused, uninterested, or lost during the lecture. Online classes take all of these strengths away from me and I don’t have any training to make online work well.” Furthermore, the willingness to participate sometimes also depends on the ability of the teacher to carry out practical lectures, which usually involve students more than theoretical ones. However, it resulted that online education is limited in its ability to carry out practical classes – e.g., business case discussions – generating a consequential decrease in the overall quality of the teaching provided. In this regard, *Respondent 9* pointed out: “for quantitative courses, online teaching may not be ideal for some students who do not have strong foundational quantitative knowledge. Proctoring exams online can be a challenge sometimes, moving the group projects and those in-class discussions to online may negatively affect the outcome.” Another theme that emerged from the collected opinions concerns the difficulties that instructors are encountering in the application of common and adequate protocols to assess students’ learning outcomes. This mainly applies to written tests that – despite having the benefit of reducing the time for student assessments due to the automatic corrections provided by virtual platforms – are often affected by cheating and plagiarism. In particular, *Respondent 8* affirmed: “the student evaluation and the monitoring of their progress may be reduced and it could be inaccurate.” *Respondent 1* introduced another important weakness about learning outcomes: “the undergraduate students are often newbies to online courses, representing for them a big limit, while, on the other hand, they seem to be more feasible for mature (i.e., postgraduates) students.” On this point, *Respondent 8* particularly said: “online teaching is not recommended for undergraduate students in terms of interacting and learning outcome.” Although, this weakness is may be connected with the type of course that is taught online. Indeed, several respondents claimed that online teaching seems not to perform equally across all fields of education; especially, it seems not to be fully efficient in STEM courses. Another explanation for the better fit of online teaching with more mature students is due to the greater amount/complexity of personal/educational issues to manage (e.g., first jobs, specialised courses, etc.), as stated by *Respondent 5*.

4.3 Opportunities

From the analysis of the opportunities, many noteworthy ‘social themes’ emerged. In this regard, *Respondent 12* pointed out that: “the opportunities concerning the utilization of online education will affect three main areas: 1) social sustainability, online teaching will

allow reaching a larger number of students thanks to its flexibility, enhancing the educational and cultural level of people; 2) environmental sustainability, online teaching will positively impact the reduction of pollution caused by a smaller number of people that will move in the cities during the day; 3) economic sustainability, people may face less travel cost while also universities, in the long term, will save costs that can be reinvested in other fields (e.g., new IT architecture, etc.).” Yet, always regarding the opportunities enhanced by online teaching, *Respondents 3, 5, and 6* advanced that online teaching will:

- a reduce learning gaps of students with disabilities
- b let students advance at their own pace leading to a competency-based education.

Connected with the first point, the massive adoption of online teaching has opened the path to the increasing experimentation, at the university level, of personalised learning and tutoring, especially through the use of artificial intelligence (AI) and personal learning assistants (PLA). In sum, it seems that online teaching can lead to a democratisation of learning. Moreover, its quality can improve in terms of new contents/skills to be provided/enhanced that could have not been possible in face-to-face teaching. In this vein, *Respondent 11* declared that: “online teaching can definitely be helpful to foster the adoption of simulation gaming and other virtual-based assignments that can facilitate the learning outcomes”, while *Respondent 4* highlighted that: “there is an opportunity to make student learning outcomes equivalent irrespective of the course delivery method, especially, online education can be useful for the faculty members to create an equal minimum instructional quality benchmark in order to have a common base for assessing students’ results.”

4.4 Threats

In analysis of the threats, if the need for online teaching progressively increases due to the health crisis, universities are asked to shift their investments from physical facilities to IT solutions to provide excellent online services. This must be a *shift*, and not an addition, of investments to those already made due to the fact that, as reported by *Respondents 3, 6, and 7*, the university scenario will dramatically change if physical distancing remains. Many students, who usually go to university to seek real-life experiences, will leave established universities because they cannot perceive the value added compared to pure online universities. Indeed, as declared by *Respondent 1*: “it would be more difficult in attracting [also] foreign students who pay fees, since they mostly pay for the physical experience in the country and access to industry networking. Distance learning is not their preference.” On the same point, *Respondent 5* added: “the university is also a place of getting socially connected, being part of social networks, clubs, etc. With COVID, most of that is shut down, making it harder to socially interact. These younger and new students have a higher need to get to know others and this happens better in a face-to-face environment. This is a main reason why, despite general restrictions to teach face-to-face, we made exceptions for freshman courses.” The reduced number of enrolments will consequently reduce teacher hiring, research funds, and the overall university system reputation. In this vein, *Respondent 4* (similarly to *Respondents 1 and 8*) said: “online courses may lead to a decrease in hiring of the new faculty. Students’ loss of interest in online education may lead to a significant drop in

student enrolment numbers, which may prove to be unsustainable for universities, at least in the USA. With reduced numbers of students on the campuses, it may decrease the prestige of the universities and may also have a negative impact on the faculty motivation.” In short, established traditional universities will suffer from the shift due to online teaching competition, as also pointed out by *Respondent 5*: “one threat of online teaching is that it moves universities to a more online environment and with it into a different game with different competitors. I have noticed that for us, students mainly want face-to-face instruction. Administrators may now want to do more things online (and assume scaling opportunities) but students, so far, do not seem on board with this.” Therefore, the university role, as a provider of knowledge, is undermined in comparison with pure online universities and it also depends on the intrinsic effectiveness of the knowledge transmission, which is negatively affected by the difficulty in conveying feelings within virtual classrooms. On this point *Respondent 5* declared: “the affective domain of teaching is often not part of the specific learning objectives but this shows that perhaps it should be in general, and maybe even more so when going into an online environment.” From that, due to the detachment of online teaching, the low level of investments, and the number of low-quality online education providers, the overall quality of students learning is likely to be undermined. To overcome this, *Respondent 11*, suggested that: “the use of online teaching should not exceed 50% of the total amount of a course’s hours for campus-based universities because they should not jeopardize their business model and compromise their added value (i.e., the transmission of knowledge). In brief, the positive influence of online teaching derives from its complementary use with respect to other means; indeed, if this is used as the unique means of teaching, it will suffer from distinct drawbacks with respect to face-to-face lectures, it would not be free-of-drawbacks teaching.”

5 Strategies and conclusions

This work attempts to answer the following research question: “what are the SWOT of online teaching that emerged during the COVID-19 pandemic?” To fill this gap, a three-round Delphi study – involving 12 teaching experts – has been implemented. Answers collected over the first two rounds have been used to make a SWOT analysis of online teaching during the COVID-19 pandemic that was re-proposed to the respondents in the third round to confirm its contents or for respondents to provide suggestions, if any.

A series of SWOT emerged from the SWOT analysis. Subsequently, through the combination of the S-W-O-T factors – following the suggested rationale of Koontz and O’Donnell (2012) – the following different strategies have been developed for the management of online teaching:

- S-O strategies (also called *maxi-maxi*):
 - 1 Increasing the possibility of following lectures in a flexible way through online teaching may generate a greater number of students being involved in higher education. This flexibility will allow students with learning disabilities to proceed at their own pace as well as, in general, help to build a stronger competency-based education.

- 2 The forced massive improvement in the use of IT tools will increasingly promote the adoption of interactive solutions (e.g., simulation gaming), AI and PLA for a more personalised and specialised learning and tutoring.
 - 3 The presence of a risk-free environment that encourages frank exchanges among students and teachers, and that allows distinguished guest speakers from different institutions/countries to easily take part in lessons, will lead to a democratisation of education.
- S-T strategies (also called *maxi-mini*):
 - 1 Implementing online education will make it easier to invite distinguished guest speakers from other institutions/countries to a virtual lecture, which otherwise could have been more complicated through the traditional teaching method. This could positively affect the academic offering and reduce the number of student dropouts who mainly join the university to seek real-life experiences.
 - 2 Recording lectures and seminars (to watch and re-watch anywhere and anytime) gives the opportunity, to students who cannot attend university courses on a daily basis, of enlarging the proportion of people that could be interested in attending higher education courses. This reduces the threat of suffering from a lack of financial resources due to decreasing numbers of students seeking the deep university experience. The financial resources gained through this amplification of the student base can be used for new hirings and research investments.
 - W-O strategies (also called *mini-maxi*):
 - 1 Due to the fact that students usually prefer to interact through chat rather than intervene directly during the lecture, students with speaking disabilities can feel even more included.
 - 2 The inability to carry out live practical classes – i.e., a test laboratory – could be overwhelmed by the multitude of interactive virtual-based solutions – e.g., simulation games, international competitions, etc. – which will tremendously increase the students’ involvement and, thus, the overall learning outcomes.
 - W-T strategies (also called *mini-mini*):
 - 1 Investing in more advanced online IT solutions will allow universities to develop new protocols for a right and fair assessment of students’ learning, which is often affected by cheating and plagiarism.
 - 2 Moreover the needed investments in IT solutions will lead to increasing the expertise in using online teaching tools and lessen the lack of confidence in actively interacting through a digital platform. Both these strategies can reduce the jeopardised role that, in a virtual environment, established universities are assuming and escape the competition with low-level providers of online teaching.

The above-mentioned strategies represent important practical implications for both educators and university policy makers. Generally speaking, educators are called to reorganise themselves and their educational approach according to the specific online teaching features; whilst, university policy makers are encouraged to revise policy

settings and investment planning according to cost efficiency, instruction quality improvement, and prestige gains/losses belonging to online teaching.

Moreover, the emerged strategies are in line with the conclusions reached by past literature on these topics. Indeed, for improving the effectiveness of online teaching, it is fundamental to understand that the outcomes of online education depend not only on the individuals' predisposition towards this new teaching methodology, but also on the external environment, which plays a pivotal role in shaping teaching and learning outcomes (Bryant and Bates, 2015; Woo and Reeves, 2007). Noticeably, the results obtained from the SWOT analysis clearly demonstrate the non-uniformity of opinions about online education. For instance, many respondents are inclined to exalt the positive effects while many others highlight the negative ones, in line with the contradictory results achieved by previous studies on this subject (Castro Sánchez and Chirino Alemán, 2013; Gu et al., 2012; Gupta et al., 2014; Han and Prybutok, 2012; Paulraj et al., 2011). In particular, it has been reported that online education may not be effective for all type of courses, for example STEAM ones, in line with prior studies that did not find a systematic dominant role of online education compared to traditional education for nursing courses (McCutcheon et al., 2015). What did not clear emerge as a weakness of online education, but it is thought to be a latent element, is the increased Faculty load, which was demonstrated by prior studies. In particular, Tomei (2006) showed as online teaching demanded a minimum of 14% more time than traditional instruction, most of which is spent in presenting instructional content. In fact, despite instructors recognised the lack of expertise in using online teaching tools and lack of confidence in actively interacting through a digital platform, they did not explicitly report an increased load of their own activities. Notwithstanding, here it is assumed that the increase of faculty load has occurred, also in light of the presence of uncontrollable external variables (e.g., bad internet connections and noises) and lack of body-language interactions that ask for the development of different approaches to teaching that instructors maybe did not experimented before.

In terms of future research, online education deserves further clear and neutral investigation – such as carried out in this work – in order to *strategise* the approach to it, and this can easily be done in the near future. In fact, due to the unprecedented massive and forced usage this teaching methodology has sustained over the past 6–12 months due to the COVID-19 pandemic, it is possible to assume that scholars will significantly investigate online education. Indeed, they will have an enormous amount of information available, which will need to be studied in order to have a clearer picture of the pros and cons deriving from the partial, or total, application of online teaching. In particular, due to the equally forced implementation of the online education around the world, scholars will have the formidable opportunity to investigate different students' cognitive and affective aspects (see Cristofaro, 2020b) through qualitative and quantitative analyses. In addition, through the use of cross-cultural investigation, scholars can consider how the different social variables characterising the various communities around the world can positively or negatively affect online education. Consequently, those variables can be positioned in relation with the students' cognitive aspects, closing the triangulation between all the afore-mentioned elements. According to a strategic point of view, it would be interesting to study the mutation of competition among traditional and pure online universities to find out if and how they have modified their (dynamic) capabilities and scopes. In sum, the internal dynamics of the educational sector that have been pushed by the massive adoption of online teaching deserve future investigation. Yet, another

avenue for future research for the impact of online teaching during COVID-19 pandemic could be in investigating its relevance for professional qualifications. On the one hand, indeed, online education – due to its inner flexibility – facilitates the attendance of mandatory courses for professional qualifications (e.g., chartered accountant, chartered engineer, etc.) but, on the other hand, practice lectures – that are usually provided in professional qualifications' courses and which are fundamental for the effective pursuit of the profession itself – may be negatively affected by the lack or difficulty in 'really' practicing provided contents. From that, future research can further investigate the impact of online education on professional qualifications, trying to identify the impact of the COVID-19 pandemic as well as the remedies to be implemented as to preserve the value added of practice.

Despite the rigor with which this investigation was conducted, some limitations must be recognised. *Firstly*, the size of the sample population used to carry out the analysis is small. In fact, even if the 12 respondents are well qualified (an average of 22 years' academic experience), it still is a small sample with its associated limitations. *Secondly*, the results have not been tested in relation to the country of origin of the related respondent; thus, there is an absence of a cross-cultural analysis in order to assess the information collected in a proper way. *Thirdly*, the analysis did not question the effectiveness of online teaching according to STEM and non-STEM courses, despite their proved difference (Hu and Wu, 2019). Obviously, these limitations may also be considered as a useful starting point for further investigation in this field.

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Appendix A

Delphi study first-round questions

- 1 In your opinion, what are the strengths (intrinsic positive factors) of online teaching that emerged during the COVID-19 pandemic?
- 2 In your opinion, what are the weaknesses (intrinsic negative factors) of online teaching that emerged during the COVID-19 pandemic?
- 3 In your opinion, what are the opportunities (extrinsic positive factors) of adopting online teaching after the COVID-19 pandemic?
- 4 In your opinion, what are the threats (extrinsic negative factors) of adopting online teaching after the COVID-19 pandemic?

Appendix B

Delphi study second-round questions

- 1 Is the use of online teaching positively affecting students' learning performance, especially non-attending students?
- 2 Has the engagement of students increased or decreased during online lectures?
- 3 Is online teaching a method that can work for most students' learning styles?
- 4 What are the pros/cons of the opportunity, for a larger proportion of people, to join university courses (based on online teaching)? Let us try to refer also to the labour market.
- 5 Is online teaching jeopardising the quality of lectures and universities' standing?