

## Online graduate activities during the pandemic at the University of São Paulo, Brazil

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### Abstract

The pandemic caused by SARS-COV-2 virus required changes in the academic procedures and routines in general. In March 2020, the University of São Paulo (USP) decided to temporarily replace face-to-face classes by remote online learning using digital platforms. Due to its considerable number of faculties (approximately 6000) and graduate students (approximately 30,000) from the 267 Graduate Programs, USP had to face the challenge of dealing with new forms of learning, as well as new ways to make feasible thesis and dissertation defenses. In order to evaluate the changes required during the pandemic, the University Provost for graduate affairs conducted a survey, by using forms containing questions in order to allow the academic community the identification of the best and most efficient practices used by faculty members, as well as weaknesses that should be overcome. This article presents and discusses the results of this evaluation, considering 1454 answers about defenses and 2656 answers about online courses. The results showed that most of the faculty members and students approved the procedures adopted, but some improvements regarding remote defense sessions and learning strategies were necessary. The article also presents some immediate actions performed by USP in order to overcome the challenges presented during remote activities.

**Keywords:** Online classes; Online defenses; Pandemic; COVID-19; Education.

## 1 Introduction

A new disease caused by the Severe Acute Respiratory Syndrome 2 virus (SARS-COV-2)—named coronavirus disease 2019 (COVID-19) by the World Health Organization—emerged in December 2019 in Wuhan, China (Guo et al., 2020). On March 11, 2020, the World Health Organization officially declared the existence of a pandemic caused by this virus (World Health Organization [WHO], 2021). Due to the circumstances surrounding the Coronavirus pandemic, on March 17, the President of the University of São Paulo (USP) decided to temporarily suspend academic activities, replacing face-to-face classes with emergency remote teaching on all campuses, using available digital platforms at the university. This announcement suddenly changed academic procedures and routines in general.

The USP has overcome numerous challenges in improving the quality of different academic areas, which has brought remarkable results, evidenced by the constant evolution of its indicators in the academic rankings that evaluate universities worldwide (Times Higher Education [THE], 2020; Shangai Ranking, 2020). With eight campuses across the State of São Paulo, the USP is a public, tuition-free university and the major institution of higher learning and research in Brazil, responsible for the education of a large portion of Brazilian Master's and Ph.D. students. USP has graduate programs in all areas, and its objective is to form highly qualified human resources for teaching, research, and scientific and technological development.

During the Master's or Ph.D. Program, the students attend courses and develop the project for their dissertation or thesis. The Master's or Ph.D. degree is conferred after the fulfillment of all course demands, including the qualifying exam and the defense of the dissertation or thesis. The graduate courses at USP are mostly offered by the university's teaching and research units, but there are also inter-unit graduate courses, generally with an interdisciplinary approach, which carry out their activities in the various units forming the graduate course depending on the main research subject.

The social isolation caused by the Coronavirus pandemic, led faculty members (approximately 6,000) and graduate students (approximately 30,000) from the 267 Graduate Programs at USP, to face the challenge of managing new forms of learning. Since social isolation measures were adopted, university activities were adapted to the reality of quarantine, seeking new strategies aimed at ensuring the high quality of graduate programs, and minimizing the potential loss caused by the cessation of face-to-face activities.

In addition to health and safety, a critical priority of the USP graduate academic programs was to ensure the educational progress of the students by mobilizing quality virtual courses. From March 2020, face-to-face teaching was changed to emergency remote teaching, and 1,119 virtual courses (Universidade de São Paulo, Pró-Reitoria de Pós-Graduação [USP-PRPG], 2021a) were offered. The faculty members experienced different online tools using new strategies and models of remote connection platforms to carry out the courses in an online format.

A second concern that emerged during the social isolation period was the maintenance of the quality of graduate thesis defenses that would now be held remotely. This demanded new logistic and technical support, to ensure the quality of these processes. From March to October, a total of 1,585 defenses, including Doctoral Thesis and Master's Dissertations, took place in the university units—evidence of the enormous commitment of faculty members, students, and technical support workers to the continuity of graduate work.

To assess the activities conducted by graduate students during social isolation caused by the Coronavirus, a team of the University Provost for graduate affairs prepared questionnaires to allow the academic community to identify the best and most efficient academic practices used

by faculty members, as well as weaknesses that should be overcome. Defenses of Doctoral Thesis and Master Dissertations in an online format were also evaluated. This evaluation became a necessary and indispensable instrument to reflect on the implementations, to make adjustments and maintain academic excellence in the new scenario.

This study presents an assessment of the satisfaction rate of faculty members and graduate students with online courses, and online graduate thesis defenses held from May to October 2020 at USP.

## 2 Background and Related Work

In order to find studies similar to the one conducted in the present article aiming at understanding the state of the art and enriching the discussions, we conducted a narrative exploratory analysis of the literature, mainly aiming to identify the challenges faced by the transition between face-to-face and remote education, regardless of the circumstances in which such transition occurred.

The coronavirus pandemic in most countries has resulted in the closure of schools and universities. To mitigate the effects of the closures and to facilitate the continuity of education, emergency remote teaching has been widely adopted. The transition to remote education has transformed institutions and families, in ways not previously imagined. For these reasons, the health pandemic and quarantines caused a paradigm crisis in our regular face-to-face or in-person systems of teaching and learning. Although remote education tools have long been available, the urgency and scale of implementation required were unprecedented.

Surrounded by the turmoil of the pandemic, education became a point of hope for millions of people, as the duty to complete the academic year provided a focus and an escape from sadness. Therefore, the technology has reduced the distances and helped the institutions and families to continue the learning process of the students within “the new normal”. From 2010 to 2012, studies in the USA (Esani, 2010; Hixon et al., 2012) reported that many educators were just beginning to transform their face-to-face teaching to an online environment (Hixon et al., 2012).

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From 2010 to 2012, studies in the USA (Esani, 2010; Hixon et al., 2012) reported that many educators were just beginning to transform their face-to-face teaching to an online environment (Hixon et al., 2012). The transition to remote education is challenging (Esani, 2010) and had to be done within a few weeks across the world. In addition, students, educators and their families faced confinement, management of home offices, care of elderly relatives, supervision of small children in homeschooling, and the economic impact of the health crisis. The sudden need for remote education also forced some educators to face their phobia of technology directly as had already been pointed out by Nimrod (2018). Never two different worlds -- the digital and the analogic -- were brought together so fast as during the pandemic. Conversely, some said that the pandemic would have a positive influence over remote education, finding that it was as effective as face-to-face methods in the USA as we can apprehend from the studies of Chiasson et al. (2015), Esani (2010), Hixon et al. (2012) and Nimrod (2018).

The impact of the pandemic on emergency remote teaching at the College of Medicine at the University of Riyadh was analyzed by Rajab et al. (2020). From 208 responses from students and faculty members, 41.8% reported little or no previous online teaching/learning experience; the main challenges reported were communication (59%), student assessment

(57.5%), use of technology tools (56.5%), pandemic-related anxiety or stress (48%), time management (35%), and technophobia (17%). However, 70.7% of the respondents were more confident in online medical education after using the technology during the pandemic, and 76% intended to continue to use it, showing a positive impact of online education during the pandemic. A survey on emergency on line learning with responses of 270 students (Aguilera-Hermida, 2020) reported that a majority preferred face-to-face education, and that the students felt more motivated before the stay-at-home pandemic mandate. They reported more frequent use of learning technology and skills improvement, but decreased in some skills, such as completing assignments on time and being successful in classes. Moreover, the students reported a decrease in concentration, levels of engagement, class attendance, interest, and enthusiasm. Students revealed that their biggest challenge was concentrating on studies in the home environment, indicating that there were many distractions. Similar results were demonstrated in the study made by Gillis & Krull (2020) with students of the USA, who evaluated the transition to remote education regarding instructional methods, student perceptions of effectiveness/enjoyment/accessibility of those techniques, barriers, and race/class/gender inequalities. The results showed increased anxiety and decreased motivation, especially for non-white, female, and first-generation college students. The results revealed a tradeoff between synchronous interaction, enjoyment, and accessibility, while asynchronous techniques were rated by almost all students as accessible but less enjoyable. The authors suggested creating flexible course options and maintaining open lines of communication with students and faculty members (Gillis & Krull, 2020).

Demuyakor (2020) investigated the levels of satisfaction with online learning at higher educational institutions in China, and how the students were dealing with these “new initiatives”. Most of the students supported the initiatives and had adequate knowledge of the Coronavirus pandemic. The results showed that there was a high cost to remote learning, and sometimes slow connectivity within the dormitories of various universities made remote learning more difficult.

An online survey in the UK found that the impact on the academic community was profound. The results were based on the findings from a survey of 1,148 academics working in universities and representing all the major knowledge fields and career hierarchies. The respondents related how their role as educators was afflicted by the rapid transition to online modalities and “entry-level” use of digital pedagogies. They suggested that online migration engenders significant dysfunctionality and disturbance to their pedagogical and personal lives. Moreover, online migration is a significant challenge for student recruitment, market sustainability, the academic labor-market and local economies (Watermeyer et al., 2021). In a private Brazilian university, a survey was conducted to measure the students’ concern levels during the first semester of the pandemic. Most of the students reported being anxious. While they felt able to continue education through distance learning, relatively few enjoyed it. Students were also concerned that the learning of clinical material and professional training would be impaired (Peloso et al., 2020). By using responses from 362 professors and students from 13 European countries, Tartavuela et al. (2020) found that universities and students were very quick to adapt to using a mix of synchronous and asynchronous interaction and assessment methods despite the reduced interaction. Most believed that remote learning would continue to be used after the return to regular education.

The experiences of undergraduates taking courses that transitioned to online instruction during the Coronavirus pandemic were captured by a survey, considering 1,008 undergraduates aged 18 years and older from USA colleges (Means et al., 2020). Only 17% of respondents said that they were very satisfied with how well they were learning during the pandemic. Half or more of the students perceived that some aspects of the course were negatively affected by the

change to remote instruction. Most of the students thought that the courses were about the same, better, or much better after the online migration, in terms of understanding what was expected (Means et al., 2020).

In Brazil, it is important to highlight the 2020 ordinance of the Ministry of Education that presented the guidelines for remote education due to the Covid-19 pandemic (Brasil, 2023) and in the same year papers started analyzing the challenges associated with change from face-to-face to the emergency remote teaching (Arruda, 2020; Gusso et al., 2020). Arruda (2020) highlighted that in Brazil, the implementation of emergency remote education in higher education had a significantly reduced number of people without access to digital technologies, which made it possible to see the moves towards implementing remote education at undergraduate and graduate levels. The author compared some institutions around the world, and quoted USP, which initiated a remote education emergency on March 24th, 2020 to over 60,000 students. Deus et al. (2020) investigated how emergency remote education was conducted by professors in the field of Computer Science in Brazil, concluding that additional public policies to support the routines of these professionals' are necessary. In a similar study, but considering the student perspective, Antolin & Antolin (2021) evaluated the challenges of Engineering students at a Brazilian public university. Similarly to the results reported in this present study, the authors found that the students could master the learning tools and presented a good performance; they also stated be prepared to continue in the remote learning in case of necessity. However, topics such as interaction and social aspects were pointed out as challenges to obtain a more significant and less excluding teaching.

### **3 Materials and Methods**

As previously mentioned, USP needed to quickly assess issues regarding actions and technologies adopted in an emergency situation. For this, specific questionnaires were defined, aimed at obtaining answers on the interest issues. At USP, each Unit has a Graduate Committee, responsible for coordinating the activities of the Programs under its jurisdiction. This committee is chaired by a professor with postgraduate experience. A group of volunteers formed by three faculty members involved in graduate study coordination and three workers (responsible for assisting students and professors at the University Provost for graduate affairs) was formed to define the first version of the questionnaires. The division into categories and the respective questions were first outlined based on the experience of the members of this group. Initially, it was defined that questionnaires about defenses and courses would be separated, since the target publics of the policies adopted in these two contexts were different. Within each of these categories, common and specific questions were created for teachers and students, considering that their interests and perceptions could be different. A first version of the questionnaire was made available to the Postgraduate Council, formed by all the presidents of the Graduate Committee in each USP Unit and student representatives, with approximately 60 members. Based on the contributions received, the final questionnaires were prepared and the form of distribution was defined.

#### ***3.1 Participants***

This cross-sectional study was approved by the Institutional Review Board of the University of São Paulo (process number CAAE 40322720.8.0000.5467). Data obtained were collected anonymously, and participants were identified using a numerical code, avoiding gathering any personal information. Students and faculty members identified their graduate programs from a list and the course using alphanumeric codes. The tasks related to this study were voluntary.

Students and faculty members of all master's and Ph.D. graduate courses (USP-PRPG, 2021b) at USP, Brazil received an invitation to voluntarily participate in the survey. Questionnaires assessing the quality of all theses and dissertations defenses, as well as qualifying exams (n=2,812) conducted between May and October 2020, were sent to students (n=2,812) and their advisors (n=2,812) and approximately 8,400 members of the Examination Committee. Questionnaires assessing the quality of online courses and educational activities were sent to faculty members (n=1,099) (Table 2) and students (n=95,81) (Table 3) who were enrolled in the courses offered/taken remotely from March to July 2020.

### 3.2 Evaluation methods

The University of São Paulo needed to quickly assess issues regarding actions and technologies adopted on an emergency basis. Three different questionnaires (composed in Google Forms) were prepared for a small time of six people and then evaluated by a group of approximately 60 faculty members involved in graduate study coordination. The questionnaires had the objective of understanding the perceptions in the following domains: 1) Assessment of the quality of online thesis defenses—the respondents' perceptions (Table 1); 2) Assessment of online courses—faculty members' perceptions (Table 2); and 3) Assessment of online courses—students' perceptions (Table 3). The questions were composed based on the policies in progress, aiming to maintain and/or improve them. For this reason, the questionnaires were not inspired by others previously applied.

For the assessment of the answers, a working group formed by coordinators of six graduate programs read and categorized all results; preliminary results were presented to the graduate studies coordinators and the resulting spreadsheets were sent to each graduate program. The objective of the later action was to provide data that would enable each program and faculty members to improve their implementation of online defenses and courses.

The results were categorized according to the nine areas of knowledge, as follows: 1) Agrarian Sciences, 2) Social Applied Sciences, 3) Physical and Earth Sciences, 4) Arts, Language and Linguistics, 5) Health Sciences, 6) Engineering, 7) Biological Sciences, 8) Humanity Sciences, and 9) Multidisciplinary. Suggestions were categorized into groups, and comments were classified as advantages, disadvantages, or neutral. The overall results were also descriptively assessed.

**Table 1:** Questionnaire for the assessment of online defenses (Source: data of the research).

1. What type of exam was performed?	<ul style="list-style-type: none"> <li>● Master's qualifying exam</li> <li>● Master's defense</li> <li>● Ph.D. qualifying exam</li> <li>● Ph.D. defense</li> </ul>
2. What was your participation?	<ul style="list-style-type: none"> <li>● Candidate</li> <li>● Chairman of the Committee/ advisor</li> <li>● Member of the Examination Committee</li> </ul>
3. What was the video conference platform used?	<ul style="list-style-type: none"> <li>● Google Meet</li> <li>● Skype</li> <li>● Zoom</li> <li>● e-disciplinas (Moodle)</li> <li>● other</li> </ul>
4. Were there any technical problems before or during the session?	<ul style="list-style-type: none"> <li>● Yes</li> <li>● No</li> </ul>
5. If you have reported a technical problem in question 4, please describe it (them) here:	

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6. Do you believe that the video conference system was adequate during the pandemic?	<ul style="list-style-type: none"> <li>● Yes</li> <li>● No</li> </ul>
7. What is your overall assessment of the online defense session?	<ul style="list-style-type: none"> <li>● Poor</li> <li>● regular</li> <li>● good</li> <li>● very good</li> <li>● excellent</li> </ul>
8. Please provide comments/criticisms/suggestions regarding the online defense sessions	

**Table 2:** Questionnaire for the assessment of the online courses: the perception of faculty members (Source: data of the research).

1. What was the video conference platform used?	<ul style="list-style-type: none"> <li>● Google Meet</li> <li>● Skype</li> <li>● Zoom</li> <li>● e-disciplinas (Moodle)</li> <li>● others</li> </ul>
2. Do you believe that online classes helped students to learn the content of this course?	<ul style="list-style-type: none"> <li>● I believe that learning was equivalent to the face-to-face modality</li> <li>● I believe that the learning was less effective than the face-to-face modality</li> <li>● I believe that learning was more effective than the face-to-face modality</li> </ul>
3. What strategies did you use in this course for the online modality?	<ul style="list-style-type: none"> <li>● Videos recorded and previously made available</li> <li>● Real-time classes</li> <li>● Real-time classes with recording and later availability</li> <li>● Sessions to solve doubts in real-time</li> </ul>
4. How do you assess the adequacy of the strategies mentioned in the previous question?	<ul style="list-style-type: none"> <li>● Poor</li> <li>● regular</li> <li>● good</li> <li>● very good</li> <li>● excellent</li> </ul>
5. Were there any technical problems during the online activities?	<ul style="list-style-type: none"> <li>● Yes</li> <li>● no</li> </ul>
6. What is your overall assessment of the non-face-to-face activities?	<ul style="list-style-type: none"> <li>● Poor</li> <li>● regular</li> <li>● good</li> <li>● very good</li> <li>● excellent</li> </ul>
7. If you have reported a technical problem in question 5, please describe it (them) here:	
8. Please provide comments/criticisms/suggestions regarding the non-face-to-face courses	

**Table 3:** Questionnaire for the assessment of the online courses: the perception of students (Source: data of the research).

1. Did you participate in the online activities for this course?	<ul style="list-style-type: none"> <li>● More than 85% of activities</li> <li>● More than 70% of activities</li> <li>● Between 50 and 70% of activities</li> <li>● Less than 50% of activities</li> </ul>
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2. What classroom activities did you participate in?	<ul style="list-style-type: none"> <li>● I watched videos made available by the teacher</li> <li>● I read textual material provided by the teacher</li> <li>● I attended classes in real-time</li> <li>● I delivered activities/exercises that were worth attending</li> <li>● I participated in real-time questions</li> <li>● I delivered activities/exercises that were not worth attending</li> <li>● I participated in study groups with colleagues</li> <li>● Other</li> </ul>
3. What was the video conference platform used?	<ul style="list-style-type: none"> <li>● Google Meet</li> <li>● Skype</li> <li>● Zoom</li> <li>● e-disciplinas (Moodle)</li> <li>● other</li> </ul>
4. Do you believe that online classes helped you to learn the content of this course?	<ul style="list-style-type: none"> <li>● I believe that my learning was equivalent to the face-to-face modality</li> <li>● I believe that my learning was less effective than in the face-to-face modality</li> <li>● I believe that my learning was more effective than in the face-to-face modality</li> </ul>
5. What strategies did you use in this course for the online provision?	<ul style="list-style-type: none"> <li>● Videos recorded and previously made available</li> <li>● Real-time classes</li> <li>● Real-time classes with recording and later availability</li> <li>● Sessions to resolve doubts in real-time</li> </ul>
6. How do you assess the adequacy of the strategies mentioned in the previous question?	<ul style="list-style-type: none"> <li>● poor</li> <li>● regular</li> <li>● good</li> <li>● very good</li> <li>● excellent</li> </ul>
7. Were there any technical problems during the online activities?	<ul style="list-style-type: none"> <li>● yes</li> <li>● no</li> </ul>
8. Considering this course in the non-face-to-face modality	<ul style="list-style-type: none"> <li>● I would perform better if it was in face-to-face modality</li> <li>● I canceled because I considered that I would not be able to obtain the desired performance in online modality</li> <li>● the online modality did not change my performance</li> </ul>
9. Considering the duration of classes in the non-face-to-face modality	<ul style="list-style-type: none"> <li>● I prefer short classes because I can concentrate better</li> <li>● I prefer short classes because they consume less Internet</li> <li>● I prefer classes that occupy the same period as face-to-face classes because my time is occupied in a useful way</li> <li>● The duration does not matter to me</li> </ul>

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10. Tick the statement(s) with which you agree	<ul style="list-style-type: none"> <li>● Online classes have helped me to be quarantined because they keep me active</li> <li>● Online classes have hindered me in my day-to-day quarantine</li> <li>● Online classes are more interesting than face-to-face classes</li> <li>● I have more concentration problems in online classes than in face-to-face classes</li> <li>● I believe that most faculty members are striving to create quality online classroom activities</li> <li>● I was not able to follow the classes in person properly because I was not in a suitable environment.</li> </ul>
11. If you have reported a technical problem in question 7, please describe it (them) here:	
12. What is your overall assessment of the non-face-to-face activities?	<ul style="list-style-type: none"> <li>● Poor</li> <li>● regular</li> <li>● good</li> <li>● very good</li> <li>● excellent</li> </ul>
13. Please provide comments/criticisms/suggestions regarding the non-face-to-face courses	

## 4 Results and Discussion

In this section, we present the results regarding the perception of candidates, advisors, and examination committee members of the online defense sessions during the pandemic. We also evaluate the online courses offered during the pandemic. As mentioned, faculty members were not obliged to offer courses; however, there were a great number of courses offered. Less than 10% of the face-to-face courses active on March first, 2020, did not migrate to the emergency remote teaching modality.

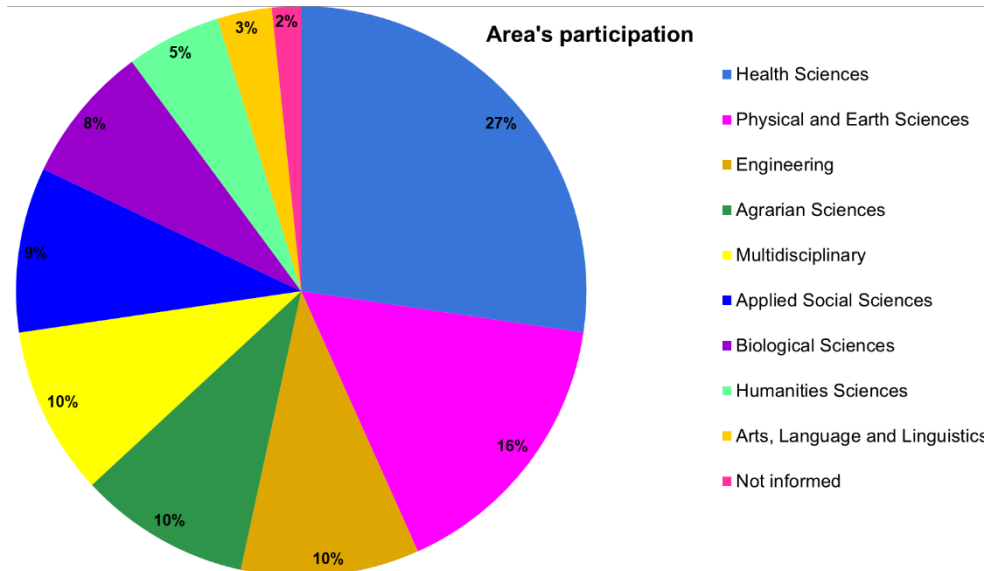
### 4.1 Online defense sessions

Questionnaires assessing the quality of all thesis and qualification exam defenses were sent to students, advisors, and examination committee members (around 8,000 participants in the defenses). We received 1,454 answers, being 31% of answers from students, 30% from advisors, and around 39% from other participants, which resulted in a total average of 18% of respondents of the prospective universe of around 8,000 participants in the defenses.

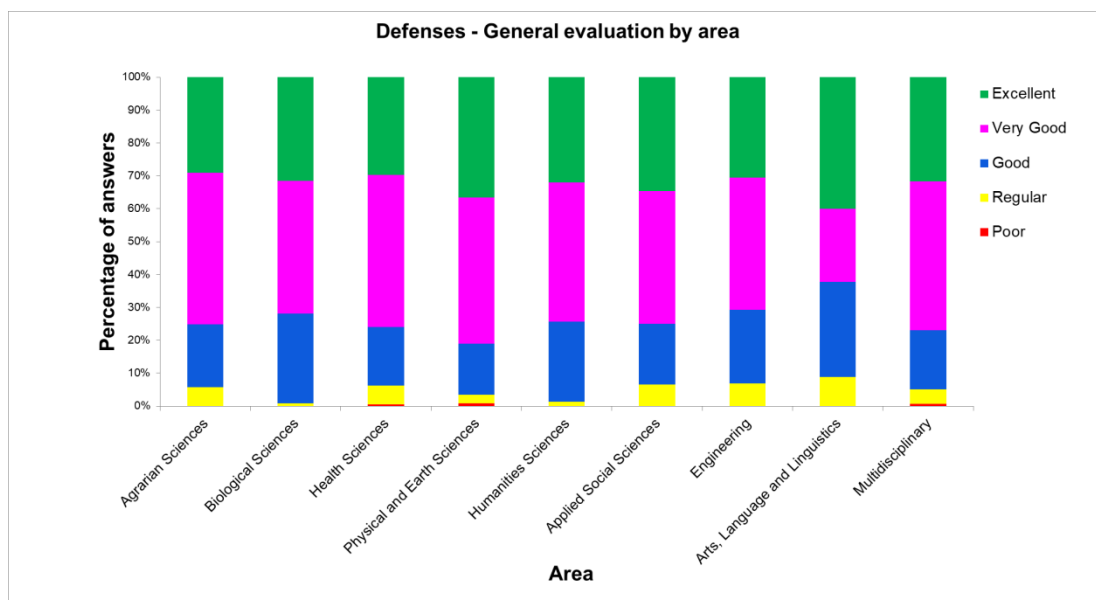
The results showed that most individuals agreed that defenses using video conference systems occurred without loss of overall quality (99.6%), and these sessions were approved by 95% of the respondents. Google Meet/Hangout and Zoom were the most used platforms for the online defense sessions, representing 79% and 13% of the individuals, respectively. The former is provided by the USP, and the latter is acquired by some schools that have the autonomy to decide upon and acquire technologies.

Figs 1 and 2 show the knowledge areas of the respondents and the evaluations of each area. Health Sciences and Physical Sciences indicated greater participation, while Humanities departments were less participative. Fig 2 shows that the total number of individuals who classified the online defenses as positive (Excellent, Very Good or Good) was more than 90% in

all areas, with no variation according to knowledge field. Biological Sciences presented the most positive evaluation, and Arts, Language, and Linguistics presented the least positive evaluation.



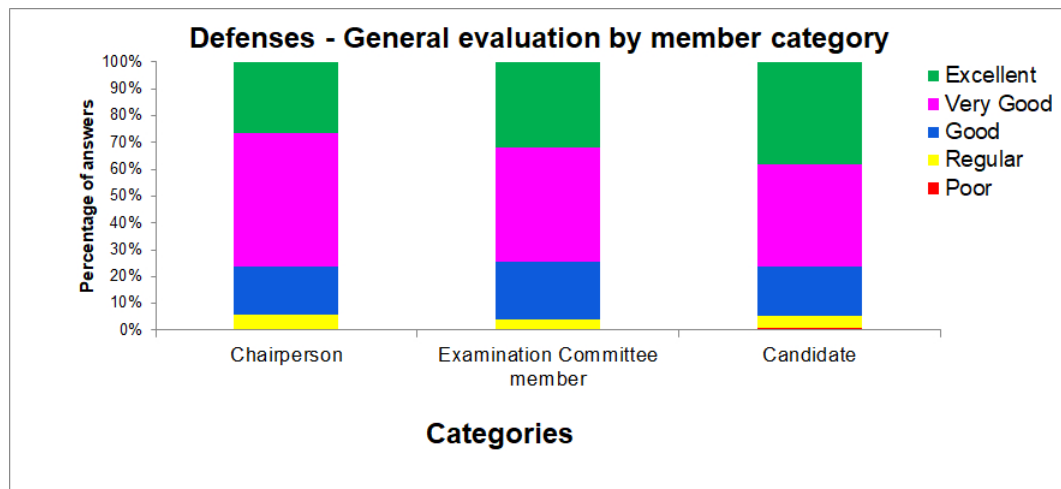
**Figure 1:** Knowledge areas of the individuals who evaluated the online defense sessions.



**Figure 2:** Evaluation of online defense sessions by knowledge areas.

In the USP, the Examination Committee is formed by three to five members, depending on the exam type and program. Each committee has a chairperson (a role commonly played by the advisor). Fig 3 shows that there is almost no variation regarding evaluation depending on the individual's role, which is, most advisors, candidates, and examination committee members evaluated the online defense sessions during the pandemic as positive. This evaluation maintains the same values, considering the requirements for the master's and Ph.D. levels. However, some

problems, such as limited access to the Internet and lack of protocols, were topics cited by some volunteers, which merit further discussion (Section 5).



**Figure 3:** Evaluation of online defense sessions according to participant categories.

The form presented in Table 1 allowed the insertion of comments regarding technical and more general issues, and 57% of answers included comments. Technical comments (17%) focused on Internet problems such as stability, velocity, and connection loss. These are profoundly serious issues since the Internet does not have the same technical parameters in all Brazilian territories, so delay and instability were concerns in all sessions. The more general issues (52% of the answers) pointed out the advantages (26%) and disadvantages (8%) of online defenses, and some respondents even gave suggestions (7%) to increase the effectiveness of the sessions as we present in the next paragraphs.

The most cited advantages of online defenses were greater flexibility and a greater focus on the questions from the members and answers from the candidate. The economy in budget and time was also considered an advantage, which allowed the participation of renowned scientists who would not have been able to travel to another country for a defense session. The streaming of the defense sessions facilitated larger group participation in the session room. There was a perception that more people watched the online defenses, increasing the public participation.

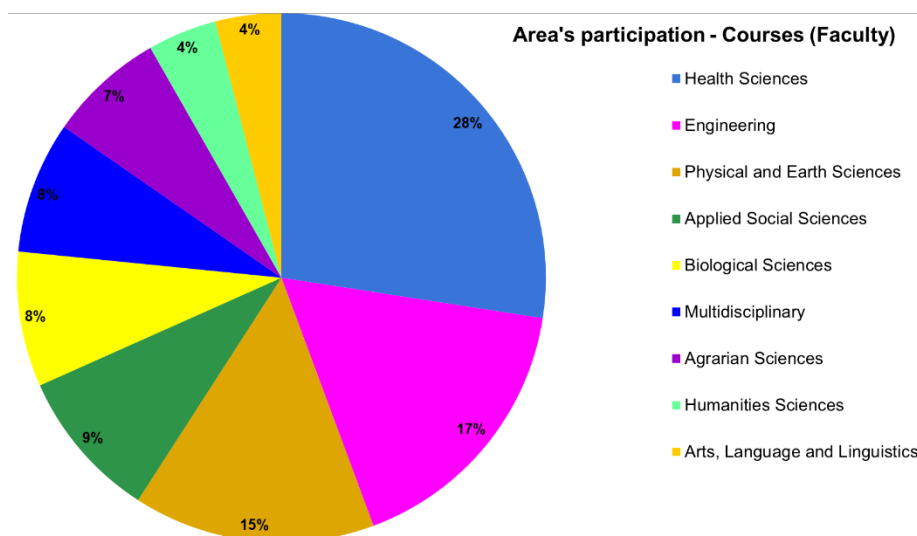
The main disadvantage was the perception that there was a lack of emotion since it was more formal. Other disadvantages cited were as follows: the candidate could not see the audience, relatives, and friends; the corporal language from the audience and candidate is also missed, and the scientific interaction among all the members and other students is smaller in the online format. About 11% of the comments that said “the online defense was fine for this pandemic situation” were considered neutral.

The suggestions provided by the participants concerned the procedure during the sessions. Although participation in a video conference was an earlier practice at USP, it was not extended to all the examination committee members, usually being limited to two members, since the advisor and student should be physically in the room for the defense act. Therefore, the need for a protocol to maintain a homogeneous pattern, at least internal to each graduate program was mentioned by more than half of the respondents. The support of a computer technician during the session to quickly solve problems was also a repeated suggestion. It was also suggested that actions such as technical training on the meeting platforms and proactive measures from the Graduation Dean to provide the Internet and computers to those students in need of it, should be taken.

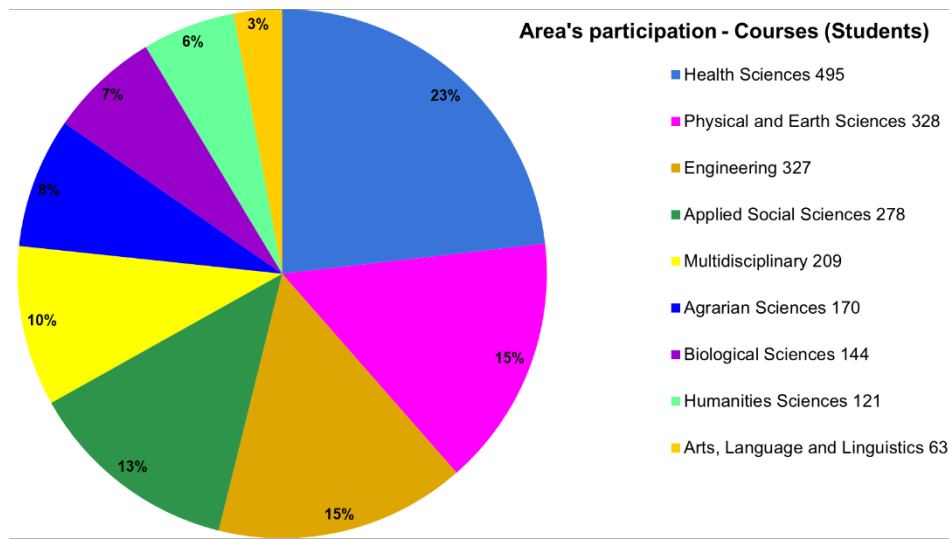
## 4.2 Online courses

We also evaluated the online courses offered during the pandemic. Usually, the classes' terms at the USP are from March to June and from August to December. Some schools also offer short-term courses that vary from one to twelve weeks and, in some cases, during the university vacation period. As mentioned, the faculties were not obliged to offer courses during the pandemic; however, there were a great number of courses offered: more than 1,119 courses that involved 1,099 faculty and 9,581 students. All faculty members involved in those courses were invited to respond to the forms sent from June 1st (so a few courses had just finished their classes), to middle September (four or more weeks after the classes ended and when the second semester had already started). We received 521 answers from faculty members and 2,135 answers from students (Tables 2 and 3), that corresponded to 47% of faculty members and 22% of the students enrolled in any course in the first semester of 2020. The number of respondents in the present study is greater than those reported by Rajab et al. (2020), who obtained answers from 16% of their questionnaires, showing the involvement of USP faculty and students. The percentage of course answers is also greater than the number of answers related to the defense form. This is expected because the faculty and students are still involved in the graduate programs, while after the defenses, candidates and other examination committee members may no longer be involved with USP.

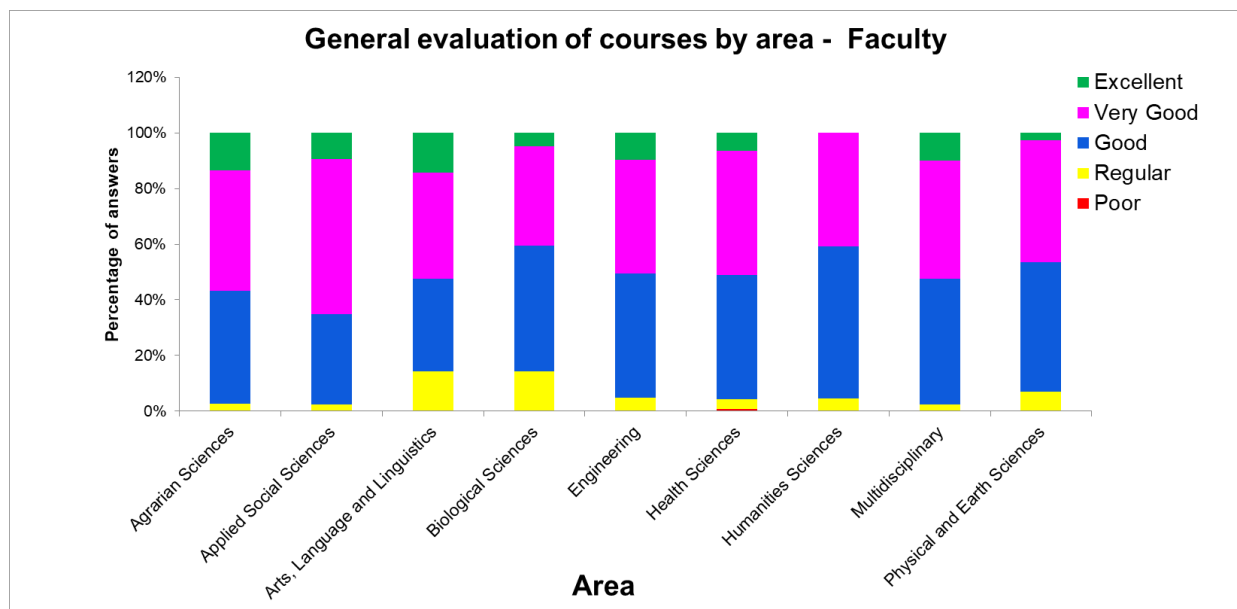
Figs 4 and 5 show the participation of the different knowledge areas in the evaluation, considering, respectively, faculty and students. Figs 6 and 7 show the evaluation of each area, respectively for faculty and students who answered the survey. Health Sciences, Engineering, and Physical and Earth Sciences demonstrated greater participation, while areas from the Humanities were less participative. Fig 6- also shows that the total number of faculties who classified the non-face-to-face courses as positive (Excellent, Very Good, or Good) was more than 90% in almost 80% of the areas, except for Biological Sciences and Arts, Language and Linguistics, which presented the worst scores (around 85% of approval). Agrarian Sciences, Social Sciences, and Multidisciplinary areas were those with more positive evaluations according to faculty. Similar numbers among the answers from students (Fig 7) who classified the online courses as positive (Excellent, Very Good or Good) were more than 90% in almost 70% of the areas, except for Biological Sciences, Humanities and Physical and Earth Sciences, which presented the worst scores (between 85% and 90% of approval). Agrarian Sciences and Arts, Language, and Linguistics were those with more positive evaluations by the students.



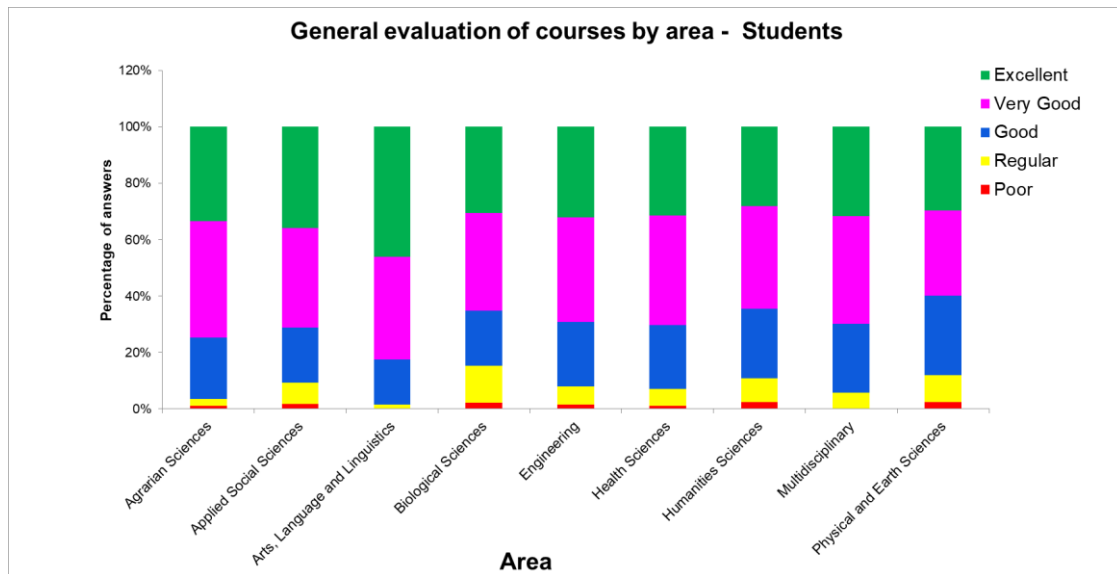
**Figure 4:** Participation of the knowledge areas in the research about courses (faculty). Total faculty respondents: 521 from 23 schools



**Figure 5:** Participation of the knowledge areas in the research about courses (students). Total students respondents: 2,135 from 23 schools



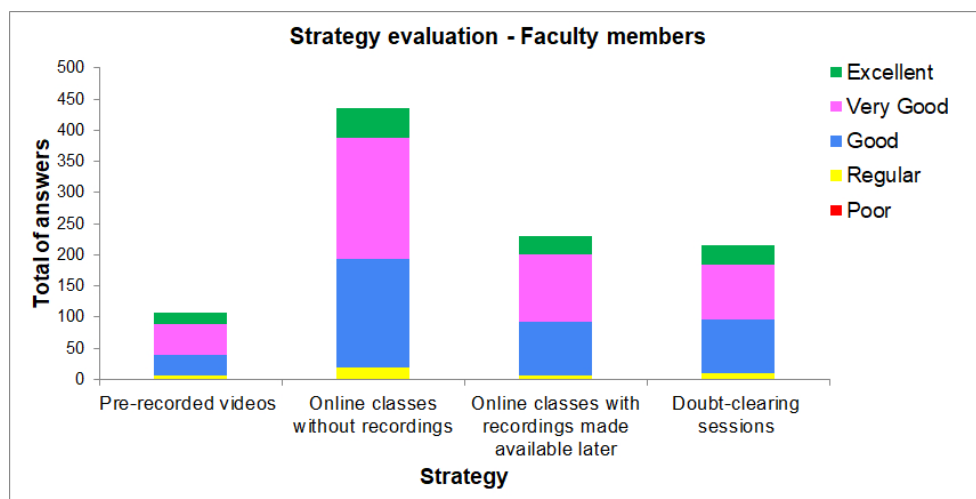
**Figure 6:** General evaluation of courses considering knowledge areas (faculty). Total faculty respondents: 521 from 23 schools



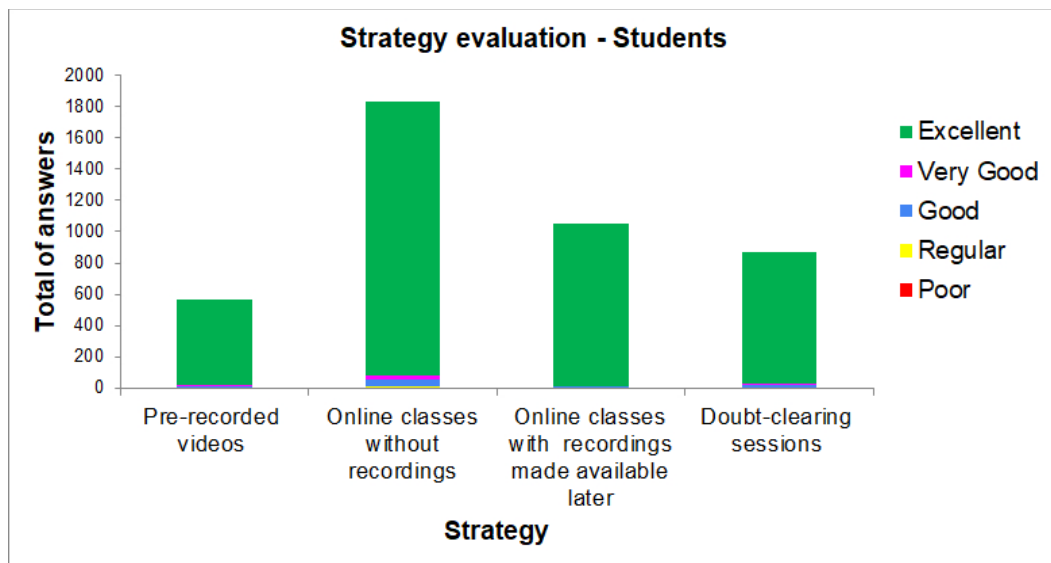
**Figure 7:** General evaluation of courses considering knowledge areas (students). Total students respondents: 2,135 from 23 schools

From Figs 6 and 7- we notice that the online courses were well received by the graduate community at USP. Most of the faculties (67%) opted for online classes as the main strategy (with or without recordings made available later). However, pre-recorded videos and doubt-clearing sessions were also used by 11% and 22% of the faculties, respectively. A course can use more than one strategy simultaneously. In Fig 8-, the evaluation of the courses regarding the strategy used is presented. The faculty respondents did not indicate which strategies were more effective. All the main strategies used received approval by the faculty members (Excellent, Very Good or Good) above 95%.

In Fig 9, the evaluation of the courses by students regarding the strategy used is presented. The data show that most of the students evaluated all the strategies as “Excellent”. Although it seems there is a slight advantage to online classes with recordings made available later, all the strategies obtained more than 95% “Excellent” scores. This suggests that the students were less critical than faculty members. Although the faculty members evaluated their strategies positively, the percentage of “Excellent” evaluations was considerably smaller when compared to the students’ evaluations. This result supports those obtained by Watermeyer et al. (2021), which expressed some of the concerns of the academic community in the UK regarding their role in the teaching-learning process, which almost instantaneously changed to emergency remote teaching classes.



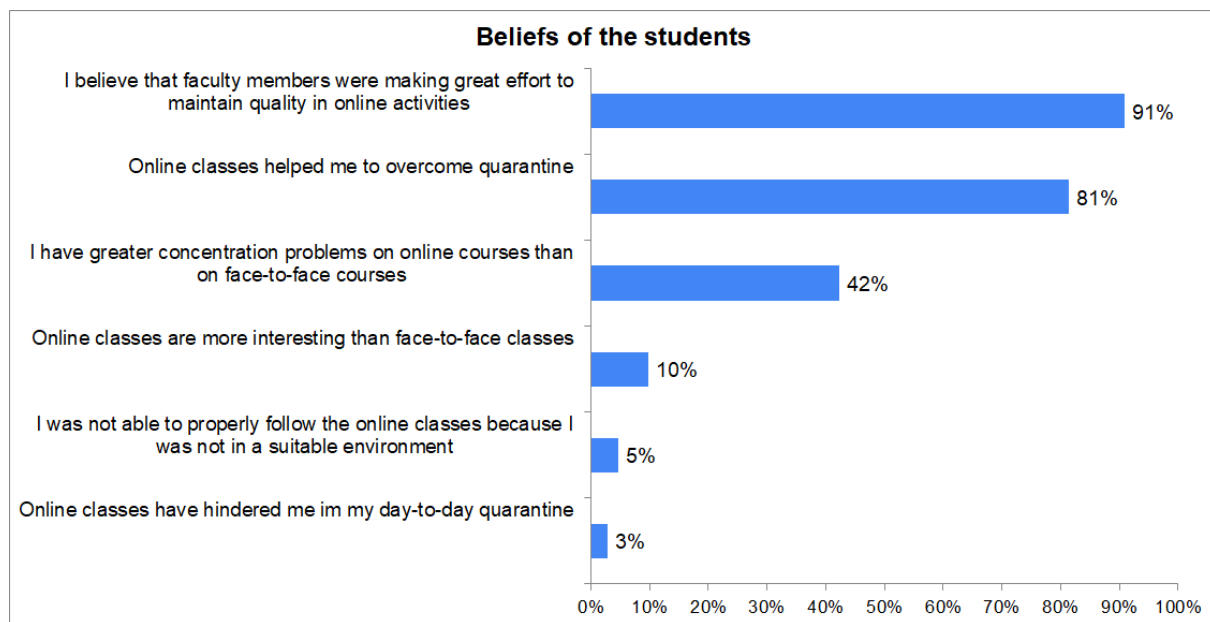
**Figure 8:** Evaluation of the strategies used by faculties in online courses.



**Figure 9:** Evaluation by the students of the strategies used by faculties in the online courses.

While recognizing that no strategy is perfect, effective implementation requires engagement of students in the teaching-learning process. From the questionnaire answers, it is evident that faculties were successful, since 95% of the students stated that they participated in more than 85% of the activities offered in the emergency remote teaching courses. The most cited activities referred to by the students were: reading the available content on the platform (88%) and participation in the online classes (87%). Activities required for attendance were completed by 63% of the students, who prepared the seminars and exercises independently. Participation in doubt-clearing sessions and meetings with colleagues were the least cited activities (58% and 40%, respectively). A student could indicate more than one activity. Regarding the online class duration, more than half of them (54%) preferred shorter classes because they could concentrate better. Although limited access to the Internet was a challenge cited in the questionnaire, this does not seem to be an important factor in defining the preference for shorter classes.

Finally, we present some statements from the students to analyze their beliefs about online teaching and learning during the pandemic. Fig 10 shows that 91% of the students who answered the survey believed that the faculty members made a great effort to maintain quality in online activities. Moreover, 81% stated that online classes were a key factor in helping them overcome the challenges of the quarantine. Although they approved of the emergency remote teaching courses and stated that they did not have difficulty following the courses, only 10% considered that they were more interesting than the face-to-face courses, and 42% stated that they had greater problems concentrating on non-face-to-face courses. Our results support those of other surveys (Aguilera-Hermida, 2020; Peloso et al., 2020; Rajab et al., 2020).



**Figure 10:** Beliefs of the students during the pandemic regarding non-face-to-face activities.

The forms included fields for comments regarding technical issues, such as the Internet and online course platforms, and other fields such as criticisms and suggestions related to emergency remote teaching courses. From these fields, we realized that almost 40% of the faculty members indicated that they had experienced technical problems. Most of them were related to Internet connection loss and velocity, while others had problems with their personal computers and notebooks, difficulties in using technologies, and teaching-learning platforms used by USP. Most of the faculty members commented that the experience was positive and suggested continuing with online classes and/or promoting a hybrid system because this could have favored students who also work or were away from the campuses. It also permitted the participation of professors from other universities in classes and other activities. A considerable number of faculty members mentioned that with more training and greater support from the university, the results could be better. The platform used for the synchronous classes was also a topic commonly discussed, with some choosing Zoom instead of Google Meet because it had more tools related to teaching, in their opinion. The difficulty of transforming whiteboards into digital tools is a reality for some courses.

The main concerns of faculty members were related to the difficulty in transforming practical, lab, and field trip classes into virtual activities and how the lack of these practical classes could compromise the quality of the students' formative experiences. Another concern was the diminished interaction with and among the students online, mainly when the classes had more than 20–25 students. Faculty respondents believe that online classes cannot substitute for face-to-face classes entirely.

Approximately 52% of the students' answers had no comments. Considering the global average evaluation of the courses, 69% of the forms stated that the online experience was "Excellent" and "Very good", and only 8.5% stated that the experience was "Regular" or "Poor". Approximately 19% of the students reported on technical issues, mostly concerning Internet stability—with "crashes", lack of synchronization between visual and sound, and instabilities of the Moodle platform when the number of students was high, cited as the main problems. A few students reported problems with their equipment, obsolescence, and even its nonexistence for completing the tasks. Most USP schools have computer rooms for students which helps students who cannot afford personal equipment. The USP rector tries to remedy this



problem by paying for some Internet access by modem (around 350 in the first semester of 2020) and by lending some institutional computers to students.

Similarly, in the analysis presented to faculties, all the students' comments were read and classified into advantages, disadvantages, neutrals, and suggestions. Comments can usually be classified into more than one type. For instance, in the following comment:

*I like the online classes very much. I believe that some classes and activities can be done in this format. It saves time. However, I believe that face-to-face interaction is totally different from online interaction, and I miss it a lot ...*

The student points to advantages (*I like the online classes very much. I believe that some classes and activities can be done in this format. It saves time....*) and disadvantages (*However, I believe that face-to-face interaction is totally different from online interaction, and I miss it a lot*). We classified comments like *It is OK for this pandemic situation* as neutral. After this initial classification, we created two broad topics: the teaching-learning process and personal.

In the survey of the teaching-learning process, advantages included the efforts of the faculty members and USP administration, methods such as providing recorded classes (this was the most cited comment), short classes, synchronous doubt-clearing classes, availability of more exercise lists, class material available in advance, more time to perform tests and exercises, and good interaction with colleagues and teachers. Disadvantages were more focused on the lack of laboratory and field trip classes, the deficiency of materials, lack of blackboard, lack of recorded classes, very long synchronous classes, the feeling that face-to-face classes are more enriching, some teachers' unfamiliarity with technology, and new learning strategies, the diminished interaction with colleagues and teachers, and, finally, the lack of library access.

Concerning personal issues, the advantages of online classes were related to saving time and money, the possibility of participating in courses of other campuses of USP, studying from their hometown, continuing to work during the course's semester, positive experience with online classes, and being in an environment that helps concentration. The disadvantages most frequently cited were the lack of concentration and adequate space for studying and participating in online classes, limitations with internet connection, anxiety, loss of focus, and tiredness.

The suggestions made by the students focus on strategies from schools and professors to deal with laboratory work, field trips, and practical classes. They asked for hybrid courses in which theoretical classes were kept online, and practical and exercise classes were face-to-face. Regarding teaching-learning strategies, there were several suggestions such as recording classes, shorter classes, rethinking strategies for evaluation of learning processes, the use of more interactive platforms, the use of digitizer tablets as a virtual whiteboard, and more comprehensive planning of online activities. Students also asked for training on how to study using only non-face-to-face classes. Related to technology, students suggested that training should also be extended to professors. There was also a strong concern about the lack of equality regarding access to the Internet and equipment for all students and asked for practical support from the university.

As a final consideration, this was a cross-sectional study and had some limitations: The study does not permit generalization, as it was conducted specifically with students and faculty members of a public Brazilian university (USP). The percentage of answers corresponds only to those involved in courses and defenses during the study period. Another limitation is that some students may have experienced problems with Internet access during data collection.

### ***4.3 Actions of the Office of the Graduate Studies developed from the results obtained***

The answers obtained in the open questions facilitated some important and timely actions from the Office of Graduate Studies.

The first action was to provide a website USP-PRPG (2021c) with information about decisions and instructions during the pandemic. All documents related to the authorization for emergency remote teaching courses and the flexibilization of some deadlines were visible on the homepage. Moreover, the list of remote courses was widely disclosed (USP-PRPG, 2021a), which increased the number of students, in some cases, to 70% compared to previous, face-to-face courses. The website still includes links for webinars with experts to discuss issues related to the pandemic (such as the “new normal” and vaccines) and training for faculty members.

The ample agreement and satisfaction with the use of online defense sessions are understandable, given that this facility had been in place since the beginning of the 2000s. Before the pandemic, the candidate and a member of the examination committee were required to be present at the defense site. However, during the pandemic, remote defenses were allowed for all members, including the candidates and advisors. During the first semester, 1,585 Master's and Ph.D. defenses occurred at USP. During 2020, USP formed about 70% of the average student's defense when comparing with the average defenses numbers at USP in the last three years. These numbers indicate a successful graduate system even using online defenses and keeping social distance for the entire survey period.

As suggested by many individuals who answered the questionnaires, a defense protocol document was composed and divulgated to all schools. This document suggests actions to be performed before, during, and after the defense sessions. Tasks such as sending an electronic dissertation/thesis to all examination committee members and creating a public online session were included in this document. Instructions about how to use the video conference tools and how to fill in the official documents after the session were also included.

With the support of the information technology department of the USP, two important actions were performed: (1) a technical team proposed a new document flow in the information system, using electronic signatures to move these documents through the system thereby optimizing the defenses process; (2) as the heterogeneity of access to technology was evidenced during the pandemic, a survey about the students' needs was conducted. From this, all students with limited access to the Internet received a chip to expand their access. Some schools also lent equipment—mainly notebooks—to students using them at home.

Considering the different areas of the university as well as the heterogeneous knowledge of technology by faculty members, two important actions were made effective. First, a virtual help desk was created to meet teachers and settle doubts about the platforms used for classes. A public call was divulged to graduate students and, after a concurred selection process, 16 monitors were selected to accomplish this work. They were trained, and since October 2020, have been available during office hours. Second, by analyzing the students' answers, it was possible to realize that the choice of teaching strategies was impactful. The possibility of recording classes and allowing students to use them is very positive, as online classes are shorter than face-to-face classes. The interaction with students and professors was an issue considered to have both positive and negative aspects, with the negative aspects surpassing the positive. Thus, the Graduate Dean decided to increase online courses for training teachers not only to use technology but also to discuss new strategies of teaching and evaluating students in the online context.

Considering the results, discussions, and actions performed by the university, it is possible to state that the USP and the activities of the Graduate Studies Department were not interrupted by the pandemic. Actions were quickly taken to ensure adequate courses and defenses to meet

the challenges posed by the pandemic. In consequence, other positive results were realized: students could save time and continue or finalize their studies; schools could save money on travel and accommodation for defenses and, at the same time, a quality increase was perceived in some examination committees since the physical barriers were overcome; students had access to a wide range of courses, considering that they could participate in online classes on any campus of the university; and the quality of some courses increased with the participation of professors from other countries.

## 5 Conclusions

The sudden move from face-to-face to emergency remote teaching activities was largely approved by the students and faculty. The results showed a markedly high percentage rate of “Excellent”, “Very good”, or “Good” evaluations (average over 90%). The strategies varied; nevertheless, shorter classes and synchronous recorded classes for later availability were the best-evaluated strategies. The online defense sessions were also very well evaluated by more than 90% of participants in all knowledge areas. One of the most common suggestions was the maintenance of this possibility for all participants in the future, despite the lack of ceremonial closure that a thesis defense represents for graduate students.

The pandemic showed that the USP community was able to overcome challenges in such adverse situations. Faculty members, students, and technical workers were collaborative and resilient, facilitating the continuity of the activities. Despite all the difficulties in adapting to the new reality, challenges were overcome, and many students could complete their studies. A quality increase in some courses and defenses was recognized by some participants.

The survey will be continued to compare the activities in the emergency situation (first semester of 2020 presented in this paper) with the same situation after the initial intervention (first semester of 2021).

## Special Edition: Teaching Methodologies and Technological Support Tools for Remote Teaching in the Post-Pandemic Era

This publication is part of the special edition “Teaching Methodologies and Technological Support Tools for Remote Teaching in the Post-Pandemic Era” led by Guest Editor Prof. Dr. Marciel Aparecido Consani (University of São Paulo).

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