

Scientific seminars in lockdown: Lessons for a post-pandemic time in defense of a permanent platform for science dissemination in the world

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Abstract

In an academic semester, living in social isolation and under restrictions of the pandemic, we organized weekly multidisciplinary seminars from a postgraduate course program in Curitiba, Southern Brazil, integrating students from different regions of Brazil and South America. Outstanding researchers from Brazil, Germany, France, Argentina, Mexico, Portugal, England, and United States' institutions gave seminars on chronic and infectious diseases with immunological, pharmacological, biochemical, cellular, and molecular biology point of views. The meetings were longer than traditional seminars, containing a part with scientific debate and other with a humanization or deconstruction of the researcher including trajectory, hobbies, scientific, and social thoughts. To facilitate learning and conceptualization, the seminars were available through YouTube and we applied weekly questionnaires to be answered rescuing scientific and motivational topics to give companionship and support to the students in pandemic times. Here, we are defending the creation of permanent platforms for scientific diffusion, with higher accessibility, connecting centers of different levels and giving academic excellence and opportunities for young researchers. Feedback received from participants indicates that this seminar structure can increase confidence and improve their perception of scientific processes and inspire researchers with development trajectories. We have discussed multidisciplinary, scientific excellence, regional isolation and economic inequality, integration, humanization, and the value of science in society.

KEYWORDS

e-learning, integration, online learning, scientific seminars

Bruna Sabatke and Izadora Volpato Rossi contributed equally to this work.

1 | INTRODUCTION

The pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected millions of people globally and caused profound changes in all

aspects of human life and brought new challenges to society, whether economic, social, environmental or in health. Protective measures, such as quarantine and social isolation were necessary to adapt and find new forms of communication for pandemic reality. A variety of tools and applications leverage the technology and power of online platforms to share slides, photos, PowerPoint presentations and more have previously been used for a variety of activities, but innovations in the use of these tools are evolving in the age of social distancing. There are many applications and software for video conferencing and screen sharing. Thus, the use of technology reduces distance and maintains interpersonal relationships.¹

Whether in the workplace or education, video conferencing platforms were a solution to keep activities moving. The use of these online platforms is evolving rapidly.² Google Meet, for example, has had increased usage by 25 times during the pandemic. Microsoft, on the other hand, recorded a 70% increase in the number of Skype users in just 1 month. Zoom, which became popular enough, surprised by an incredible 169% growth in the period, and recorded the company's revenue in the first 3 months of 2020.^{3,4}

Science also adapted quickly with events, congresses and other activities that were face-to-face, now take place online.^{5,6} Scientific seminars also live this reality. The use of video conferencing platforms made it possible for students from different regions of the world to integrate and share the same online environments. The screens have narrowed the boundaries and created the opportunity to stimulate the learning of young scientists in times of isolation. We had the opportunity in an academic semester within a doctoral course to open seminars on the topics of chronic and infectious diseases for an experience of approximation and expansion in the midst of a pandemic and social isolation. Our seminars were presented by national and foreign researchers and we aimed to integrate and bring students and researchers closer from different regions and institutions. We have humanized the seminars, maintaining a presentation of scientific data as in a classical seminar and adding conversations with lecturer researchers who shared their ideas and culture, moving away from the traditional mold of scientific presentations. In this model, we encourage collective discussion, participation, reducing distance, and promoting integration that are discussed in defense of permanently holding virtual scientific seminars.

2 | MATERIALS AND METHODS

2.1 | Online seminars

Online seminars were organized inviting different moderators and speakers. The seminars were held weekly for

18 weeks. The public (students and researchers) was invited via email and social media. The structure of the seminars was divided into two parts: a theoretical part, with a traditional presentation on the topic of the speaker's domain, and an "interview" style part, to debate more personal/human issues. To stimulate discussion and interaction between the audience and the speaker, the questions were open to everyone and preferably carried out through audio/video (in addition to chat also available). The duration of the seminars oscillates between 100 and 120 min. All the seminars were transmitted via Google Meeting platform and the recordings were uploaded on YouTube.

2.1.1 | Theoretical with traditional presentation

The theoretical presentation consisted of a classical seminar, with 1 h of key concepts to introduce the subject and presentation of results of the investigative research project chosen by the researcher.

2.1.2 | Interview (debate more personal issues)

At the end of each seminar, we proposed some questions on the personal level for each researcher. The guests received questions about their careers and training in science, about hobbies and personal projects, about a general world view (politics, society, diversity, among others), and also about opportunities in their laboratories. Both moderators and students were allowed to ask questions, with the aim of reducing the distance between student and researcher.

2.2 | Topics and the participants from disciplines

Our online seminars were mainly offered to postgraduate students in the areas of chronic and infectious diseases, but participation was not restricted to these criteria. During the seminars, we included different themes and approaches. For this, researchers (moderators) from different institutions invited prominent researchers from different places and scientific backgrounds to present their results. Each seminar was conducted by a different researcher/moderator and responsible for introducing the guest researcher and mediating the discussions during the presentation/seminar. The approach to the topics can be seen in Table S1.

TABLE 1 Examples of questionnaires applied to participants after each seminar, consisting of a question related to scientific content and a question of a personal/motivational nature.

Sample question about the scientific content of the seminar	Sample question of personal/motivational aspects
Define biofilm and explain what are the treatment alternatives and complications when it comes to <i>Candida</i> biofilm.	During the seminar, the speaker discussed social inequality and diversity in Mexican science. How do you see social and/or ethnic integration in Brazilian universities?
What was the experimental model used by the researcher to design more effective antibiotics?	The speaker commented on the importance of his time living abroad. What is your opinion about the experiences gained outside the country for a scientific career?
Explain the association found by the researcher between Covid-19 HDL and APO-M.	How have you taken advantage of opportunities within science and how do you see changes in work themes during your career?
What is the mechanism of CD200 induction in <i>Leishmania</i> -infected macrophages? Is there a difference between <i>L. major</i> and <i>L. amazonensis</i> ?	How do you see the differences in attitudes towards the control of the COVID-19 pandemic in China, the USA and Brazil? What lesson or comparison would you take from the speaker's words to reflect the pandemic situation in Brazil?
Explain the strategy used by the researcher to obtain nanobodies (nanobodies) against the Spike protein.	During the seminar, comparisons were made between the German science system and that of Brazil. Comment on the differences and suggest what lessons we could learn from the German model.

2.3 | Questionnaire and feedback

To assess the students' perception of the topics proposed in the discussions, questionnaire was sent to participants after each seminar. The questionnaires contained (i) an open theoretical question about the theme presented and (ii) a question-comment about the humanized themes discussed with the researchers. The examples of questions applied to participants after each seminar can be seen in Table 1. At the end of the seminars, the students received forms containing multiple-choice questions to evaluate general aspects of the seminar, such as quality,

understanding, structure, among others. Data analysis is described in the results.

3 | RESULTS AND DISCUSSIONS

3.1 | Multidisciplinary from various angles and perspectives

The extraordinary growth of science in the last decades made it possible to expand the scope of hypotheses in the most diverse areas, such as, biology, biochemistry, physiology, microbiology, immunology, medicine, mathematics, physics, informatics are joining in multidisciplinary efforts to understand mechanisms and phenomena in the field of human health.

Different rationales and strategies can come from professionals with different backgrounds. In that sense, our strategy was to bring together international researchers from different disciplines answering questions in chronic and infectious diseases. During the seminar cycles, 14 moderators presented researchers from eight different countries, including: Brazil, Germany, France, Argentina, Mexico, Portugal, England, and the United States, represented in Figure 1.

During a pandemic, PhD and master's students who were normally in the laboratory doing research,⁷ at this time the careers of young scientists are slowing down, and it was necessary to find other ways to improve scientific knowledge. Most of the student participants in seminars belong to PhD (44.8%, $N = 58$) and masters courses (41.4%) and the vast majority of these were currently involved in research activities. The educational background of students was quite heterogeneous since seminars were offered as subjects for several graduate programs in health and biology areas. The rich diversity of students was also shown in their research models: most participants work on infectious diseases (protozoa—29.3%; fungi—12.1%; bacteria—8.6%; and viruses—8.6%), and 20.7% of them work on chronic diseases. The main areas of knowledge involved in the participants' research were molecular and cellular biology (50% and 39.7%, respectively), immunology (20.7%), omics (17.2%), biochemistry and pathophysiology (13.8%).

3.2 | Virtual conferences: A platform to shorten distances, reduce differences, and integrate around science

One of the great advantages of remote learning and virtual conferences is the ability to bring people from different locations together through online meetings. Thus,



FIGURE 1 Researchers and moderators. Distribution of speakers in the world (dark gray) and seminar chairman (light gray).

the invitation to the seminars was extended to institutions throughout Brazil and we have students from different Brazilian regions. There was also the participation of foreign students, such as from Argentina, Chile, Venezuela, and Bolivia, leading to an integration of different languages, cultures and experiences. Through the seminars, students and researchers had the opportunity to meet and share experiences. We believe that integration at this time of pandemic was able to encourage and motivate students to continue to improve their skills, which are based on communication, exchange of experiences and networking. In this way, we stimulate and provide students with this experience in our seminars.

One of the most important ways to validate scientific progress is scientific conferences or meetings, where scientists and researchers discuss developments and progress in areas of activity. Even more, collaborations and employment opportunities may appear in these activities. With the advance of the COVID-19 pandemic, this approach currently used in most scientific conferences has changed drastically from virtual conferences/meetings.⁸

Virtual conferences broke barriers and brought the scientific community together through computers, smartphones, among others. Although the scientific community has been forced to explore online alternatives to hold the annual conferences, scientists have shown interest in maintaining this new form of communication. A survey by the journal *Nature* and *Science* showed that scientists would like to continue with the conferences and virtual meetings, even with the end of the pandemic. There are several reasons cited for continuing this model remotely, including: (i) Greater public reach and presence, as

researchers are able to participate in meetings without compromising their teaching workloads or private responsibilities. (ii) Improve diversity and equity. (iii) Different and varied audiences. (iv) Carbon dioxide reduction, among others.^{9,10}

The seminars on chronic and infectious diseases brought up diverse themes and enabled students to refresh their knowledge and, most importantly, remain highly motivated in this challenging pandemic.

Highlight several points of our' seminars

- i. Access to diverse and better-quality science (integrating isolated and economically disadvantaged regions).
- ii. Placing students and researchers with different backgrounds and from different regions in contact, showing the human side of both students and researchers.
- iii. Stimulating collaborations between different groups, making known researchers, lines of work, groups, institutions.

Our seminars are an example of an online meeting that has had a wide reach and has been successful, with the participation of speakers and students from eight countries. We believe that moving from face-to-face meetings, conferences and seminars to online meetings will improve science and spread around the world. Other initiatives of dissemination of science in time social isolation emerged, such as, Immunology society seminars, ISEV webinars, Argentina Protozoology Society seminars, Global ImmunoTalks, Immunometabolism Mini-Symposia series, the scientific organizers of the

Transforming Vaccinology Keystone and EcoSeminars at the University of California and others worldwide.^{5,11,12}

To strengthen our proposal and the experience of scientific communication more integrative and open to discussion between researchers and students in pandemic, we organized the host pathogen interaction meeting (October, 2021), an online event that brought together scientists and students from Brazil and Latin America Interaction (broadcast on YouTube, supplementary link). A free event with roundtables, conferences, oral presentations, and e-posters with more than 250 participants from various regions of the country and Latin America. Our interest is that the meeting be an annual event, opening up to more institutions, countries, researchers, and students, reinforcing the interaction proposal. Being able to promote an open science and high level of collective discussion in the area of host–pathogen interaction.

3.3 | Building a humanized seminar format to reduce distances between students and researchers

In order to provide an environment of approximation in times of social isolation due to the COVID-19 pandemic, a session of short presentations by students called “My minute” was created. In this session, five students per day were available to introduce themselves, their affiliation, and their line of research (Video). This moment was widely accepted by the students, who showed interest in sharing their line of research and their experiences in the laboratory, and also took advantage of this moment to emphasize the importance of interactive seminars and a space for exchange between students.

To strengthen a more humanized seminar format, we also decided to use the final third of the presentation to measure and understand the life of the researchers in other aspects. The human side of the scientist has a long and experienced run to have a vision of society and science.

In difficult times of the pandemic and with social isolation, we tried to listen about life experiences and the trajectory of the researchers. We paid special attention to the mobility experience of the researchers with time in countries with other cultures and with many of them living in countries other than where they were born. At a time of low support in science in underdeveloped countries and with uncertainties of the pandemic, a message of hope and resilience was given by following the lives of scientists, who gave advice to students to continue with their work in science, waiting for better times and taking advantage of the opportunities that arise.

3.4 | Student feedback allows us to believe in the construction of high-level seminars

A course evaluation form was applied to capture students' feelings about the quality and understanding of the seminars. The global seminar considered a variety of strategies and subjects taught by high-level researchers. 79.3% of the students rated the importance of the contents taught in the seminars with a grade of 5, with 1 being equivalent to “unimportant” and 5 to “very important” (based on the Likert Scale) (Figure 2a). Students considered that the level of depth of the seminars was between high (60.3%) and very high (36.2%) (Figure 2b). In addition, most students (69%) absorbed about 60%–80% of the content, stating that they understood a lot, losing only some reasoning or concepts (Figure 2c) and considered that the subject had a great contribution to their academic training (67.2% with grade 5 and 24.1% with grade 4) (Figure 2d).

Our interest was also to understand if the used seminar model was able to provide gains in soft skills for the students, as already shown by Nelson and Crow (2014).¹³ Students stated that the seminars contributed with their understanding of knowledge production processes and execution of strategies to answer biological questions. The students' sense of acquiring research skills and their motivation to continue developing research also increased with the seminars. Among the main characteristics/skills that the students developed, it is cited: knowing new lines of research (74.1%), understanding scientific rationales of great researchers (51.7%) and getting to know a more human side of researchers (46.6%). This reinforces the importance of a more intimate moment with researchers to recognize an ordinary person in them. Feedback revealed that students have rarely participated in seminars that go beyond the traditional mold, in which there is only theoretical-scientific content. Our proposal for a mixed model of theoretical seminar together with intimate talks was well received by the participants, with 93.1% of the students claiming that the session with more personal questions to the speakers was very interesting. The examples of questions applied to participants after each seminar can be seen in Table 1. This reinforces the need for a change in the higher education model to strengthen a humanized side in the training of future scientists.

Most students reacted positively to the experience of interactive seminars, in which they had the opportunity to share their ideas and meet students and researchers in different lines of research. In times of pandemic, the integration and participation of students in seminars helped in motivating them to continue developing research.

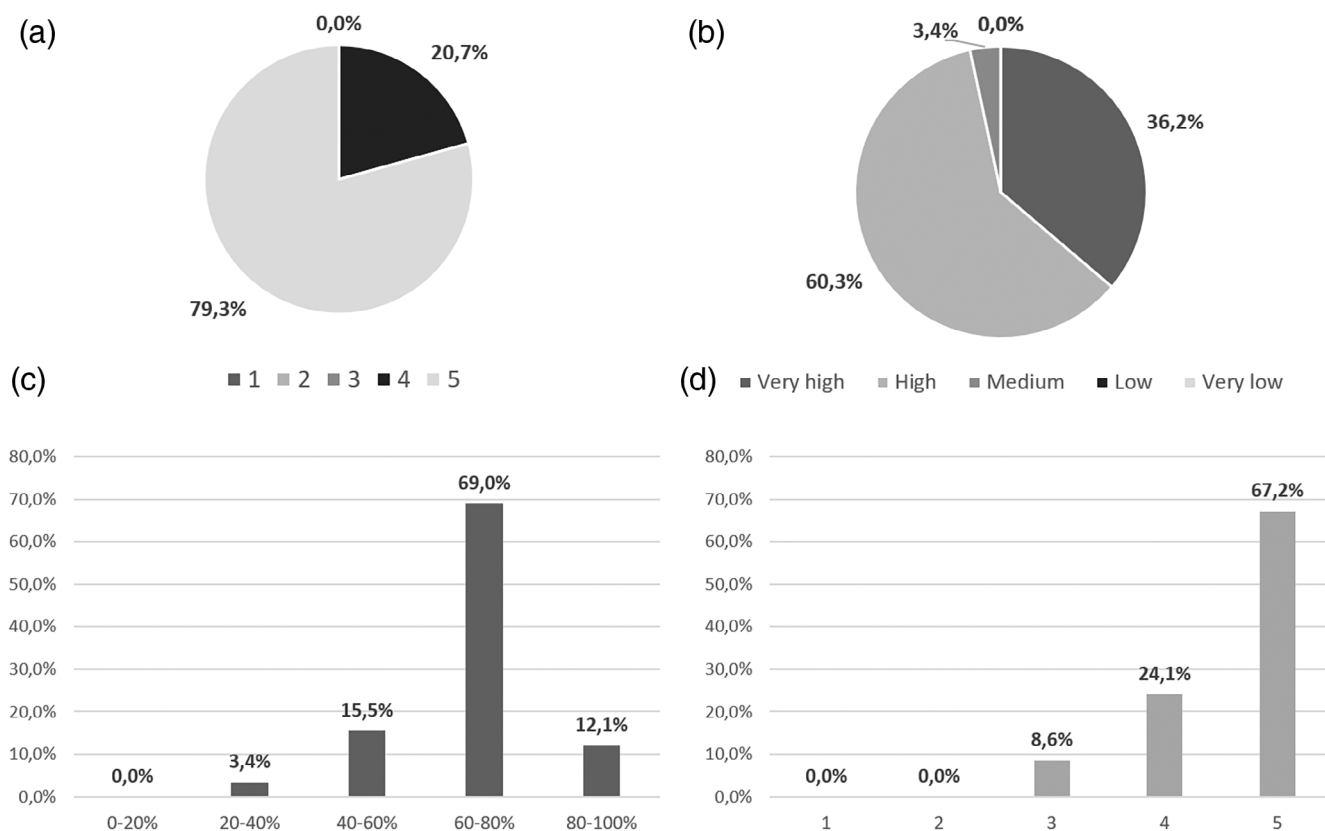


FIGURE 2 Feedback responses. Students were asked to evaluate: (a) the importance of the contents presented in the seminars (from 1 to 5, with 1 being equivalent to “unimportant” and 5 to “very important”); (b) the level of depth of the seminars (between very high, high, medium, low, very low); (c) absorption of the knowledge presented in the seminars (in ranges expressed in percentage of absorption); (d) contribution of the seminars to their academic training (from 1 to 5, with 1 being equivalent to “unimportant” and 5 to “very important”). Data are shown in percentage of students ($N = 58$).

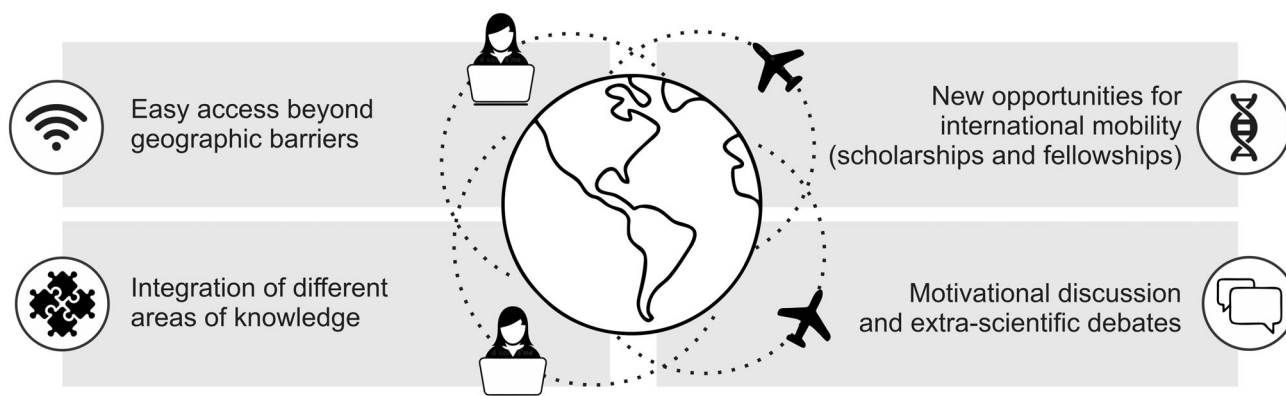


FIGURE 3 Highlights of virtual scientific seminars. Virtual scientific seminars facilitating communication between researchers and students, promoting motivational discussion, integration between different groups and new opportunities.

The online format has the most advantage of high quality accessible to everyone (without the need to be present on site), immediacy, new interactions and contacts, membership of societies or institutions.⁵ The benefits of having accessible quality science will be added to a greater mobility of students and researchers from

different regions, new collaborations, and more opportunities in science. As well as our results, Rossi et al. (2021) demonstrated during the pandemic that encouraging students can increase independence, improve critical thinking and motivation, communication, and self-development of students.⁶

4 | CONCLUSIONS

Many changes occurred due to the pandemic, we had to adapt and find new ways to maintain everyday habits. Online learning has become part of our daily lives, so adopting and incorporating these already introduced methodologies means reducing the distance between developed and developing countries. Our proposal to carry out more interactive and humanized seminars ensured great acceptance by students and researchers. In this way, we support the continuation of this teaching modality for scientific diffusion, generating more accessibility and opportunities for young researchers and for regions with more difficulties in accessing science from high-level centers (Figure 3).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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