

# Education, Scholarship, Academic, and Public Services during and after Corona Crisis

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## ABSTRACT

We report on the response to the Coronavirus disease-2019 (COVID-19) crisis by clinical educators, scholars, and researchers in academic medicine. Our review article presents the challenges, advantages, and impact of this long-lasting pandemic emergency on the transition to eLearning, online publishing, and teleconferencing. Advances in educational technology and digital tools allow us to transform our outdated practices by reshaping medical education, scholarship, academic and public services. Educators of the future are not traditional large-group lecturers, small-group proctors, and clinical trainers. They are all of the above, and much more. They are facilitators of the learning processes which occur locally, globally, and virtually. Modern educators and scholars are adaptable to change and are productive and resilient in difficult and uncertain times. They are creators of the learning material that may be used both for online and face-to-face activities. They are effective team players and flexible research collaborators, and are able to see and do things differently. They are open to innovative ideas and willing to share knowledge, experience, and expertise with their peers and learners through different types of academic and public services. Step-by-step instructions for organization of teleconferences provided in our article may serve as a model for academic health science institutions and organizations for rapid transition to online academic services.

**Keywords:** Academic service, Corona virus crisis, COVID-19, Education, eLearning, Online education, Scholarship.

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Currently, all of us are working hard on the creation of the contingency plans for our centers, departments, and institutions, while carefully monitoring the spread of the coronavirus (COVID-19) in our countries, regions, and communities. Similarly, the leaderships of the Donald School of Ultrasound in Obstetrics and Gynecology (Obs and Gyn) and its sister organizations the Fetus as a Patient, World Association of Perinatal Medicine, and World Academy of Perinatal Medicine contemplate how to efficiently reshape their educational activities, workshops, conferences, and congresses.

Many of us lived through a war or natural disasters such as earthquake and hurricane; some of us witnessed terrorist attacks and suffered the loss of loving persons, but never in our lifetime, we had experienced a slow spread of an invisible enemy, similarly affecting patients and providers both in the developed and developing countries. Never in our lifetime, we had experienced being so distant, and at the same time, so interconnected. While being focused on the short-term goals to best serve our patients with acute symptoms and immediate needs, and provide extraordinary online and offline education for our learners, we continue to silently wash our hands, keep social distancing, and practice self-isolation. Classes are canceled, and we switched to eLearning. Patients with chronic problems stopped coming to our clinics, and we transitioned to telemedicine. Yet, we do not know what is around the corner, and how the life of an academician, clinician, educator, and researcher will look like in the post-COVID-19 world.

We hope that our professional family will find a way to stay united, while each of us will continue fighting this battle in the best possible way. Unfortunately, travel restrictions will prevent us from a meeting, but we should not be prevented from interacting, sharing knowledge, and talking about our clinical and educational experiences. We should find a way to keep connected and informed about the impact this global and long-lasting emergency has on our professional life in different parts of the world.

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## RESHAPING THE FUTURE OF EDUCATION IN HEALTH SCIENCES PROFESSIONS

Numerous papers have addressed the advantages of eLearning in health sciences education, emphasizing a positive shift toward the application of adult, individualized, and collaborative learning.<sup>1</sup> Recently published systematic review and meta-analysis assessing five databases and four key journals of medical education during 2000–2017 found that compared with offline learning, eLearning improves learning outcomes of undergraduate medical students.<sup>2</sup>

We believe that the rapid transition to eLearning during the COVID-19 crisis has already reshaped our educational experience. The silent enemy spreading around the globe has pushed us toward replacing our face-to-face lectures and small-group sessions into eLearning packages consisting of narrated PowerPoints, links to YouTube videos of procedural skills, creation of authentic case studies, and online reading assignments. Interactive virtual clerkships and residents' rotations replaced their traditional clinical learning experience. Learners left "home alone" were quick in adopting the efficient strategies of online learning, from raising their virtual hands to engage in small- and large-group sessions during WebEx and Zoom teleconferences to participating in discussion forums and online chats.<sup>3</sup>

Massive open online courses (MOOC) have been available for some time and increased in popularity since 2012.<sup>4</sup> If MOOC can accomplish the delivery of lessons to hundreds or thousands of learners at once, then lesson delivery for those who were in a physical class should be an accomplishable task due to the foundation created by MOOCs, the availability of educators, resources, and an established curriculum. This assumption could not be more incorrect. Many educators have never imparted online education, and many learners have not been exposed to online courses. Additionally, just like with MOOC, online courses for in-class learners were destined to have the same educational barriers: administrative/instructor issues, social interactions, academic skills, technical skills, learner motivation, time and support for studies, cost, and access to the internet, and technical problems.<sup>5</sup> Overcoming these barriers has proven to be a challenging task, especially in medical and nursing education.

Currently, in the United States, there are 152 MD (Doctor of Medicine) programs fully accredited by the Liaison Committee on Medical Education (LCME) and 33 DO (Doctor of Osteopathic Medicine) programs accredited by the American Osteopathic Association.<sup>6</sup> Contrary to the uniform, standardized three-step examination for medical licensure, the United States Medical Licensing Examination® (USMLE®) focusing on the assessment of a student's/physician's ability to apply knowledge, concepts, and principles necessary for safe and effective patient care and medical schools' curricula vary significantly.<sup>7</sup> The American medical education model consists of a preclerkship portion (2 years of basic science education), followed by 2 years of clinical clerkships. Classroom and laboratory-based experience, participation in clinical skills and simulation sessions, and supervised clinical practice provide students with the necessary knowledge and skills needed to become practicing physicians.<sup>8</sup>

During the era of rapid and massive replacement of face-to-face to an online learning experience, educators were equally challenged with the application of the pedagogy of online learning and implementation of the advanced technology.<sup>9</sup> Despite the availability of eLearning, for many years, under- and postgraduate medical and nursing education continued to follow a traditional path where physical presence was a key to the efficient training of these health science professionals. Nowadays, new technologies such as the implementation of the personalized augmented reality systems could support autonomous learning by reducing the time needed for laboratory and/or clinical training.<sup>9</sup>

Successful implementation of eLearning is based on its meaningful integration into the curriculum, availability of content experts, professional course designers, technology support, learning management system (LMS), authoring tools and software,

availability of reviewers of the copyrighted material, and course-teaching assistance. The ability to teach online comes with multiple options, which can include an online video, blog, and reading material on a web site. Still, it is without a doubt that an LMS is the preferred option to deliver a professional online course. LMSs, course management systems, or "virtual learning environments" are software systems designed to assist in the management of educational courses for students, especially by helping teachers and learners with course administration.<sup>10</sup> Currently, there are several options of LMSs that it has become a challenge for an institution, organization, or individual educator to decide what is the most appropriate LMS for their courses. The purpose of an LMS is to supplement and organize a conventional course experience.<sup>11</sup> With this idea in mind, the role of an LMS is to assist the instructors, administrators, and students in course organization and administration, provide a wide assortment of communication opportunities, and facilitate educational content creation and delivery.<sup>12</sup> Table 1 depicts these tools and specific questions that need to be asked before deciding on an LMS. Furthermore, it is equally important to consider (a) if the system is customizable, (b) if it is open source or proprietary, (c) if the project development team has the necessary expertise and experience on the system, (d) if there is a possibility of future expansion of the system, and (e) if it can connect and work effectively with other systems.<sup>12</sup> Being able to determine if these concerns are relevant to your long-term goals in the production of online courses will allow you to decide which LMS is most suitable for your institution, organization, or yourself.

As previously mentioned, there are several LMSs on the market, but we will only mention the two LMSs that our institution has experience with, Canvas and Blackboard. Canvas's selling points for instructors are that it is easy to import, build, manage, and grade courses, as well as to communicate with their students. For students, the advantages are its highly customizable notification system, integration with their favorite devices and social platforms, interactivity, and ease of use. For course administrators, the advantages are control, monitoring, and reporting over things they could not accomplish before.<sup>13</sup> The selling points for Blackboard are seamless evolution of a design and architecture, easy customization, and demonstration of the improvement of learning outcomes.<sup>14</sup> Both Canvas and Blackboard offer services or solutions for K-12 education, higher education, businesses, and government, which can be for credit or noncredit.<sup>13,14</sup> Currently, Canvas is the most preferred LMS, and it might have an advantage over Blackboard due to its "intuitive capabilities to improve classroom navigation, classroom set-up, course management, faculty-student engagement, and self-direct learning".<sup>15</sup> As previously mentioned, there are many LMSs on the market, so take the time to investigate the advantages and disadvantages of each and learn how it will integrate into your system or network. Consider the needs of your institution and learners, the ease of use, and ask yourself whether this tool will allow you to offer the best educational experience to your learners.

Nowadays, videoconferencing solutions (VCS) such as WebEx, Zoom, and Microsoft Teams are widely used for teleconferencing and distance education purposes. While their technical performance is based on an evaluation of their scalability, data protection, security, support, accessibility, etc., their educational impact may be assessed by their opportunities to ensure and facilitate educational interaction. Table 2 summarizes general criteria for the assessment of the VCS educational interaction, which is divided into

**Table 1:** Selecting a learning management system

<i>Tool</i>	<i>Questions to consider about the service</i>
Communication tools	<p>Are there discussion forums that allow for the interaction of students and the instructor?</p> <p>Can you assign a moderator to manage discussions? Do you receive notifications?</p> <p>Can students and instructors share files?</p> <p>Can emails be sent within the LMS?</p> <p>Do students have a space to write their course notes or an educational journal for reflection?</p> <p>Do students have a space to share and save their course notes or an educational journal?</p> <p>Are students able to communicate in real time?</p> <p>Is there a place where students can collaborate and express their ideas?</p> <p>Is it possible to have online conferences with the instructor and the team?</p>
Assistance tools	<p>Can the students mark the last place they visited in the course?</p> <p>Can you search for educational content within the course?</p> <p>Is there a calendar to keep track of deadlines and activities?</p> <p>Is there a help menu to obtain assistance for students?</p> <p>Is there a help menu to obtain assistance for tutors?</p> <p>Can you assign group spaces?</p> <p>Are there tools to self-evaluate the progress?</p> <p>Can the instructor or student create a group of students for collaboration and assignments?</p> <p>Is there a place where the student or instructor can display or discuss experiences?</p>
Administration tools	<p>Is there a compatible institution or organization authentication system?</p> <p>Can you customize roles and grant permissions in a given course and the LMS?</p> <p>Can students enroll in more than one course?</p> <p>Is the Shareable Content Object Reference Model available?</p> <p>Are external apps (LTI tools) available like Kaltura, Office 360, etc.?</p>
Course tools	<p>Can the student or instructor schedule activities?</p> <p>Is there a grading tool to assist you in evaluating student work?</p> <p>Is there a tracking tool to analyze and review the student progress?</p> <p>Can you create and customize a test?</p> <p>Can you assign roles to manage the course such as designer, administrator, teacher, etc.?</p>
Educational content creation tools	<p>Does the LMS offer course templates, or can you import templates from other courses?</p> <p>Can you customize the graphical user interface to make the course more appealing?</p> <p>Does the LMS offer options to organize the course and content, etc.?</p> <p>Does the LMS offer instructional design tools to meet pedagogical needs?</p>
Case-based learning tools	<p>Is there support for case-based learning instruction?</p> <p>Is there support for case-based learning examinations?</p> <p>Does the LMS allow for case-based learning applications in different fields?</p> <p>Are there support tools to assist in the learning process?</p> <p>Can you customize the course for case-based learning?</p> <p>Can the LMS be installed locally on your computer?</p>

LMS, learning management system

three categories: learner–content interaction, learner–educator interaction, and learner–learner interaction.<sup>16</sup>

Hopefully, improvement of learner-to-learner and learner-to-educator interactivity and active engagement of eLearning participants through discussion forums and chat functions will motivate more leading discipline experts to engage in the creation of the robust peer-reviewed online resources to be selflessly shared across the nation, or even globally.<sup>4</sup>

Are we ready for the initiation of such a cost-beneficial project which may reshape education of the post-COVID-19 world? Strategic interuniversity collaboration at the national and international levels may result in the creation of a wide spectrum of topic subjects for different types of curricula, including

problem-based learning, case study, or clinical presentation-based curriculum. Application of modern and mobile medical education technology for the new generation of learners may facilitate self-paced eLearning based on the premises of learning “anytime and anywhere”.<sup>17</sup> The creation of a rich repository of the eLearning material coordinated by recognized national and international institutions and associations during the time of unpredictable closures may give enough time to medical and nursing school educators and clinical departments of the respective universities, regional and local educational and academic institutions to refocus on the creation of the interactive online, and, if and when possible, face-to-face sessions in clinical simulation, clinics, teaching hospitals, and learning communities.

**Table 2:** Assessment of educational interaction categories of the videoconferencing tools

<i>Interaction category</i>	<i>Criteria</i>
Learner–content delivery	Provides educational assets before/during/after the educational conference Records conference (audio, video, files) and makes them accessible for future use Allows learners to save educational assets Measure performance (testing) before/during/after conference Enables access to specialized software/systems (hands-on labs) before/during/after sessions
Learner–educator	Allows moderation of participants; can mute/unmute audio; participants' attention indicator (raise hand) Rich means of interactivity: Chat, Poll, Video, Audio, Q&A, Whiteboard, File Sharing, Desktop/App Sharing, Q&A, Feedback, hands-on labs A learner has the means to schedule one-on-one learner–educator interaction (office hours) Enables learners and educators to interact in small groups (breakout sessions)
Learner–learner	Enables to interact in small groups (breakout sessions), generated randomly or preconfigured Allows the creation of environments/teams/virtual rooms, enables the creation of <i>ad hoc</i> video, audios, chat recordings, etc. (rich means of interactivity) Enables learners' event/meeting scheduling Dedicated learner environments/teams/virtual rooms retain shared educational assets, which are searchable, and categorized for later use

A critical aspect of online education that needs to be considered is the learner. Every learner is different, and a useful online course can be influenced by their demographic characteristics and previous experiences, such as gender, learning style, attitude, satisfaction, and level of engagement. A key to the delivery of a successful online course leading to knowledge retention is learner engagement, as it differentiates a dull online course consisting of the reading material and a quiz, vs an interactive, dynamic, self-exploratory, well-designed online course. Similarly, poor course oversight and poor pedagogy negatively affect the enthusiasm of the learners and, in turn, result in poor learning outcomes.<sup>18</sup> Instructors of eLearning need to invest time in the course design to construct a learning attitude and satisfy the learning needs of their students. Learners prefer engagement and connection, whether it be in an asynchronous or synchronous course.<sup>19</sup> Therefore, keeping in mind the learners' characteristics when designing an online course will help in the production of worth taking e-courses.

Finally, how can we, experts in Obs and Gyn ultrasound, best support ongoing eLearning projects in our institutions? What can we do to complement the educational material, clinical vignettes, podcasts, and quizzes for undergraduate and postgraduate learners? Should we just focus on providing high-resolution images and instructional videos, or should we proactively reshape the way we teach in our courses, workshops, conferences, and congresses?

## RESHAPING THE FUTURE OF SCIENTIFIC PUBLISHING AND SCHOLARSHIP

Most scientific journals are highly specialized in publishing articles from the specific scientific discipline and/or research field. The rules and guidelines for writing and submitting an article vary on the type of journal, type of article, and the publisher. Furthermore, to ensure the quality and validity of the manuscripts, the articles go through editorial screening and a peer-review process. Citation indices are thought to measure the impact of published work in an objective and computable way and represent the basics of bibliometrics.

According to the World Economic Forum, in 2018, more than 2.5 million scientific and engineering articles were published across the world, with over 700,000 open-access articles.<sup>20</sup> China published 20.7%, the United States 16.5%, and India 5.3% articles. According

to the Philadelphia-based Institute for Scientific Information (ISI), 55% of the papers published in the journals indexed by the Institute received no citations at all in the 5 years after they were published.<sup>21,22</sup> Interestingly, there are no more recent studies focusing on this topic, but it looks that many papers are read-only by the authors, editors, and peer reviewers, and more than 90% of the papers are never cited.<sup>23</sup> An illustrative example is one online paper from 2010 published in Nature that has never been cited but has been viewed 1,500 times and downloaded 500 times.<sup>24</sup>

Despite a significant number of subscriptions and online journals, most of the world's scientific knowledge is still unavailable behind the expensive paywalls. It is estimated that only approximately 15–30% of journals worldwide are open access.<sup>25</sup> The Bill and Melinda Gates Foundation, currently funding about \$4.6 billion worth of science every year, mandated that any publications coming from their grants must be open access.<sup>26</sup> A similar step was taken by a group of EU science funding agencies from 11 European countries who stipulated that by 2020, recipients of their grants must publish their results in an open-access journal (OAJ).<sup>27</sup> Open-access journal is free for the public, but the authors are being charged a fee between 2,000 and 5,000 USD, typically paid from the funds of their research grant. The current OAJ system is very profitable for the journals because the preparation for publishing is done by the author; the papers are peer-reviewed by discipline experts dedicated to the public and academic services. So, what does this mean for the scientific impact of OAJs? A recent study confirmed that biomedical articles published in OAJs indexed in Scopus and Web of Science, established during the last 10 years, receive about as many citations and have a similar scientific impact as subscription journals with a similar history.<sup>28</sup>

Many researchers, advocacy groups, and the general public believe that such an expensive system for publishing in both subscription and OAJs is slowing dissemination of the scientific knowledge, which contradicts the Article 27 of the Universal Declaration of Human Rights that (1) everyone has the right to freely participate in the cultural life of the community, to enjoy the arts and to share the scientific advancement and its benefits and that (2) everyone has the right to the protection of the moral and material interests resulting from any scientific, literary, or artistic production of which he is the author.<sup>29</sup>

However, OAJs need to be distinguished from the pirating platforms, such as the Sci-Hub, a website hosting more than 60 million papers, free to view and download, created by a neuroscientist, Alexandra Elbakyan of Kazakhstan.<sup>30</sup> Often, scientists want to increase the visibility of their research, and many of them participate in a questionable practice of uploading and sharing their preprints in academic-networking sites, such as ResearchGate or Academia.com.

More recently, Stern and Shea proposed the model of progressive open publishing based on the publication of the author-posted articles.<sup>31</sup> To ensure that the scientific standards are satisfied, the author(s) should ensure data integrity and availability, originality of the information and images, and compliance with publishing ethics, such as performing self-check for plagiarism, etc. Not only that, less time and resources would be spent on getting the work published, but such a process would empower authors to submit high-quality work, accelerate a discovery process, and promote networking and collaboration. At the same time, peer-reviewers would be more motivated to provide public service if it is appropriately recognized as a scholarship contribution. By providing constructive feedback, and participating in a creative and transparent discussion, the reviewers may further be recognized as contributors and facilitators of the scientific process. Indeed, shifting publication toward cheaper publishing platforms may liberate funds libraries currently pay for traditional subscription and OAJs.

We believe that the described approach may increase partnerships among scientific societies, publishers, libraries, funding agencies, and academic institutions. This approach can potentially lead to more effective and efficient publication practices, increased transparency, meaningful peer evaluation, fast dissemination of new knowledge, collaboration, and effective networking.

Clearly, digital tools allow us to transform an outdated and costly publishing process, but are we ready and mature for a cultural shift involving transition to publishing platforms and postpublishing curation?

## RESHAPING THE FUTURE OF TELECONFERENCING

There is no branch of economy that is not affected by the COVID-19 pandemic. As we are assessing the situation in our community and region, simultaneously and instantaneously, we are reformulating and updating our practice and business plans. Hospitals and medical centers stopped performing unnecessary diagnostic procedures and elective surgeries, and providers became more reliant upon technology and, when possible, started performing telehealth visits. While our clinics and schools remain closed, our minds had to stay open to create strategies, plans, and material for the upcoming uncertainty. Although it is not possible to predict how this crisis will play out, we know that digitalization in healthcare and education has the potential to assist us in staying on the right path to a structured future.

At the time of COVID-19 breakout, numerous academic institutions, companies, small and large businesses have already achieved a certain level of digitalization. However, the process of shifting to eLearning was quite tricky for some of them. Many educators and tutors were unprepared for what was coming, could not decide which solutions to choose, and were unaware of how to create high-quality materials to maintain an uninterrupted learning experience for their students, residents, and faculty. During the time

of emergent transition to online services, expertise in particular academic domain had to be accompanied by a reliable and robust IT support for the creation and delivery of the eLearning material.

When observing institutions by their level of preparedness, we can divide them into the two groups: those with available technology, and already familiarized with processes and benefits of eLearning, and those who still did not start shifting toward it. Institutions with implemented authoring tools and LMSs and dedicated technology support were efficient during this transition. Their primary task was the creation of a novel eLearning material or digitalization and adjustment of the existing face-to-face sessions. On the other hand, academic institutions and organizations which were postponing their transition to a digital pathway and those with little or no experience in online education found themselves in an unfortunate situation, negatively impacting their learners and building up their stress level. Those who were not ready had to find quick solutions for the continuation of their activities, facing a lot of challenges, and resulting in an enormous cost.

## RISE OF EdTECH COMPANIES SUPPORTING ACADEMIC HEALTHCARE INSTITUTIONS AND ORGANIZATIONS

Many Education technology (EdTech) companies acted quickly by providing free materials or by unlocking their premium features for a certain period to help not only students but the overall population to overcome this unprecedented pandemic crisis. These actions of EdTech companies were truly praise-worthy, as they were not there only to sell or share their courses but also to help professionals in creating customized, tailor-made solutions, and eLearning materials. Furthermore, the EdTech companies were assisting healthcare providers, scientists, industry, and the public to address health education-related challenges and free up their time so that they can fully devote to their patients, learners, and customers.

Technology support may be offered in different ways: should an institution not have their own LMS or would like to upgrade the existing one to a better solution, enabling smooth operations for an increased number of users. Numerous companies assist with the production or transformation of the existing PPTs, articles, and other types of learning material into highly sophisticated eLearning courses that motivate learners and increase their knowledge retention. These online materials could be regularly updated and maintained, leading to a long-lasting collaboration and partnership.

When talking about learners or students, we are not limiting ourselves only to undergraduate and postgraduate university students. Just anyone can become engaged in lifelong eLearning. Similar strategies could be efficiently used for patient education, during which patients are familiarized with preventative, diagnostic, and surgical procedures. Knowledgeable and well-informed patients are better prepared, leading to shorter patient encounters and increased satisfaction and improved overall experience. During the COVID-19 era, many governmental and nongovernmental organizations created informative eLearning material, mobile apps, questionnaires, and animations aiming to public education about COVID-19 symptoms, preventative measures, treatment options, and travel advisory.

Often, we say that after this pandemic, the world will never be the same. Congresses and conferences with thousands of participants and numerous parallel sessions will not occur in the

post-COVID academic world. Likely, they will be replaced with the posting of the enduring educational material, videos, and podcasts on powerful platforms, live-streamed sessions, and other types of synchronous activities via WebEx, Zoom, discussion forums, social media, and chat functions. Virtual programs and book of abstracts with searching engines will allow participants to select the topics of their interest. The three “Cs” of the old model of medical conferences: Content, Commerce, and Community will be replaced with three “Is”: Intimacy, Intentionality, and Insight.<sup>32</sup> Participants from all over the world will interact with experts, and among themselves, enhancing dialog and improving collaboration and networking. Gigantic conference venues and exhibition halls will be replaced with intimate, meaningful interaction, leading to improved outcomes and decreased cost. Participation through social media is another vital component of this shift, allowing discussions and interactivity to remain timeless.

Implementation of Augmented Reality (AR) and Virtual Reality (VR) has the potential to improve understanding of new concepts through enhanced 360 videos, enabling visualization of various physical examination techniques, imaging studies, and procedures from different perspectives. In the future, eLearning workshops implementing deep-learning experience will allow novices to compare their biometry and pattern-recognition diagnostic skills with automatic measurements and best images of the representative planes obtained by sophisticated Artificial Intelligence (AI) equipment.<sup>33-36</sup> Exchange of compressed volumes of illustrative Obs and Gyn cases for three-dimensional (3D) reconstruction and training in 3D ultrasound may significantly improve training experience and practice of the residents and novices.

In this respect, EdTech providers should serve as a link between teleconference organizers and national and international associations. This type of service focuses on the technical and educational support for a teleconference, through assistance with the creation of interactive eLearning material, quizzes to assess knowledge acquisition, improvement, and retention, and organization of synchronous events, such as teleconferencing and online panel discussions.

Many of us are familiar with the benefits and steps of organizing traditional conferences, professional meetings, and congresses. Most of us participated in the organization of the congresses and conferences in different roles, from being members of the Organizing or Scientific Committees to being regular participants or invited speakers. Some of the steps are similar or even the same to those used for the creation of a teleconference. Although the process is somehow related to transferring a standard face-to-face teaching activity into an eLearning session, due to the complexity and different expectations of the participants, the organization process has to be readjusted and fine-tuned.

Many of the conventional congress organizer’s roles are replaced with assignments to EdTech provider, whose role is introducing information technology (IT) tools into the production and publishing of the engaging eLearning material to create an inclusive yet individualized learning and scholarship experience. If done right, teleconference participation will result in improved communication and collaboration between and among event participants, presenters, and organizers. Figure 1 illustrates a step-by-step, month-by-month process outlining the teleconference organizer’s roles, while Figure 2 demonstrates the corresponding process for EdTech provider. As indicated in these images, EdTech

support assists the teleconference organizer to streamline, organize, and analyze the progress, delivery, and outcomes of the teleconference. Additionally, EdTech provider facilitates and improves the interaction between the organizer, presenters, participants, and sponsors, ensuring that the educational and research material is transformed into high-quality eLearning content and that the scientific impact of the teleconference is placed at the center, leading to impactful outcomes of the event.

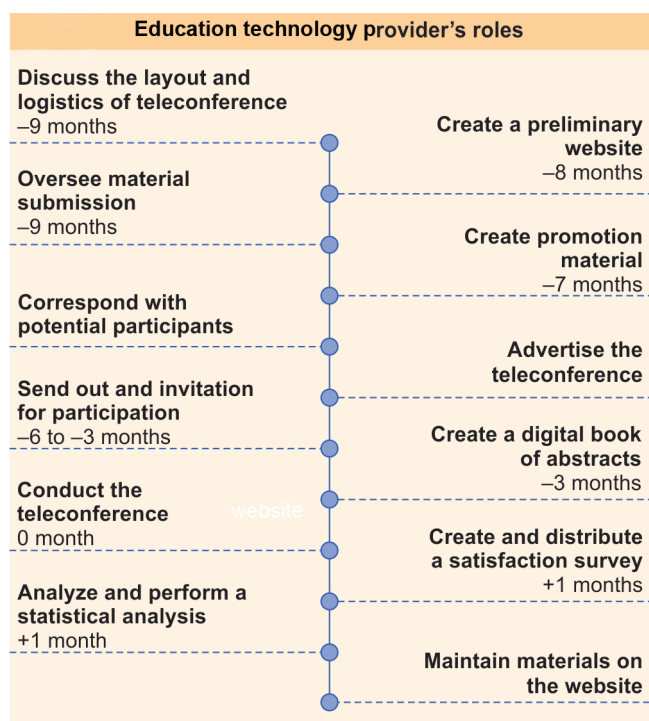
As obstetricians, we commonly use the terms “conception,” “trimester,” and “delivery.” The first step is pretty straight forward; a teleconference organizer needs to choose and define the right topic and determine the dates. To remain on the same track, from an idea about the organization of a teleconference to its delivery, it will take about 9 months or 3 trimesters. Step one also involves the nomination of the members and presidents of the Organizing and Scientific Committees, budget determination, and conversation with stakeholders, including potential teleconference sponsors, academic institutions, as well as national and international associations by the level and type of support they can offer.

Early in the teleconference planning process, the organizer should choose and contact the EdTech provider to discuss the layout and logistics of the event, and better understand its objectives and goals. By exchanging thoughts, expertise, and ideas, the two entities become the partners who collaborate on the creation, customization, scaling and delivery of the eLearning and scholarly content, monitoring the process of organization, pointing to the weaknesses, and utilizing each other’s strengths.

The second step involves defining and contacting potential keynote/plenary presenters and asking them to propose the topic(s) of their presentation. The invitation letter should be specific, outlining the title, objectives, and dates of the teleconference, listing the organizers, collaborators, layout, and expected outcomes of the event. After defining the submission deadlines and briefly explaining the logistics of the teleconference, the organizer should



Fig. 1: Step-by-step explanations of the teleconference organizer’s roles



**Fig. 2:** Step-by-step explanations of the education technology provider's roles in organizing teleconferences

ensure presenters that they will receive EdTech support, necessary for the delivery of attractive and impactful digital presentations.

Simultaneously, EdTech provider will engage in the creation and launching of the preliminary website including visual identity, a teleconference title, dates, objectives, and goals; information about the organizer, photos, and brief biographies of the members and presidents of the Organizing and Scientific Committees and, if applicable, society/association and its/their leadership names, mission, and vision. A preliminary program with a tentative list of session/module topics, invited presenters, and the titles of their presentation(s), names, and information about the sponsors, their videos, graphics, and links. At the same time, in communication with the organizer, the EdTech company will create promotional material, a newsletter, and advertise the teleconference via social networks and multimedia.

About 6 months before the teleconference, the organizer is responsible for submission and review of the invited presentations. Once presentations are approved, and the letters of acceptance are sent out, the EdTech provider begins with the creation of the digital material, part of which will be used for the official website, social media, as well as newsletters. The presenters, organizer, and EdTech experts extensively collaborate on the creation of the eLearning material based on the best practices of online learning. This intense 2-month partnership results in the development of the preliminary program and structured plenary sessions. Note that teleconference does not allow last-minute changes; instead, its success depends on months of intense multidisciplinary teamwork and preparation. Once the website is enriched with attractive names of presenters, teleconference topics, and original illustrations, the organizer will send out an invitation for abstract submission to potential participants.

About 3 months before the event, the peer review of the abstracts is completed, and the participants are invited to submit their e-presentations to be posted on the teleconference website. The EdTech provider will focus on the creation of the participants' accepted e-presentations, production, and publication of the final program and creation of a Digital Book of Abstracts. While the final program is disseminated and promoted to a targeted public, the Digital Book of Abstracts will be available to those who will register for the event.

When all the materials are ready and digitalized, it is time for the grand finale—the teleconference delivery. During the last weeks, the EdTech provider is running multiple dry runs to ensure that invited presenters and participants are familiar with the specific rules of eLearning and teleconferencing. They are taking into consideration that different participants will be connecting from different parts of the world, from various devices and different time zones, and will experience different technical and connectivity problems.

During the teleconference, the EdTech provider will ensure its permanent presence, monitoring, assistance, and troubleshooting. Support should be offered to all the participants, and communication between the organizer and EdTech provider should remain uninterrupted during the duration of the teleconference. The website is updated as needed, and all important data and information are shared through designated channels.

Once the teleconference is over, the EdTech provider creates and distributes a satisfaction survey, analyzes teleconference outcomes, and creates the final report for the organizer. That way, both parties can detect and discuss areas of quality improvement, focusing on participants' feedback, eLearning content, production, presentation, and delivery. Depending on the agreement, the EdTech provider may continue with the maintenance of the eLearning material on the teleconference website and contact with the stakeholders. This is the time when the organizer can decide whether the digital material may be shared with third parties (e.g., professionals associations in developing countries).

More accessible material and easy knowledge sharing are not the only advantages in comparison with formerly known in-person conferences and congresses. Benefits of teleconferencing are multiple, from cost and time-saving, through increased convenience, flexibility, and productivity of presenters and participants, to long-lasting impact of the enduring online material. All the meetings and communication prior to the teleconference are held through various channels over the internet. There is no need for travel, and both the organizers and participants can use their time more productively. When organizing a conference, the organizer is challenged with covering the travel and accommodation-related costs for the event leadership and invited speakers, printing costs, arranging refreshments and food, organizing social events, and preparing exhibit area, booths, and stands. All of these can be avoided by conducting a teleconference.

The real impact of the EdTech companies is not only helping the organizers, sponsors, and participants to enjoy the benefits of teleconferencing but even more. It is everything from avoiding the pollution created by planes, cars, and buses used by the participants for traveling to the meeting site to protecting the trees by avoiding printing of the conference material and programs to transitioning to online.

## CONCLUSION

For many of us, it was hard to learn how to interact with our learners using screens instead of face-to-face encounters. Still, we realized that meaningful transition to online, allowed for a greater amount of flexibility, lessened the impact of staffing shortages, increased academic productivity, and improved consistency of educational content delivery. Innovations in educational technology will further facilitate the implementation of eLearning and teleconferencing initiatives, even after COVID-19 will no longer shape our day-to-day life and educational practice.

## REFERENCES

- Ruiz J, Mintzer M, Leipzig R. The impact of E-learning in medical education. *Acad Med* 2006;81(3):207–212. DOI: 10.1097/00001888-200603000-00002.
- Pei L, Wu H. Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. *Med Educ Online* 2019;24(1):1. DOI: 10.1080/10872981.2019.1666538.
- Weiner S, No classrooms, no clinics: Medical education during a pandemic. 2020; <https://www.aamc.org/news-insights/no-classrooms-no-clinics-medical-education-during-pandemic>.
- Popenici S, Deceptive promises: The meaning of MOOCs-hype for higher education; 2015, ch. 9.
- Muilenburg LY, Berge ZL. Student barriers to online learning: a factor analytic study. *Distance Education* 2005;26(1):29–48. DOI: 10.1080/01587910500081269.
- US News and World Report 2019 <https://www.usnews.com/best-graduate-schools/top-medical-schools>.
- The United States Medical Licensing Examination® (USMLE®); <https://www.usmle.org/>.
- Subramanian A, Timberlake M, Mittakanti H, et al. Novel educational approach for medical students: improved retention rates using interactive medical software compared with traditional lecture-based format. *J Surg Educ* 2012;69(4):449–452. DOI: 10.1016/j.jsurg.2012.05.013.
- Han ER, Yeo S, Kim MJ, et al. Medical education trends for future physicians in the era of advanced technology and artificial intelligence: an integrative review. *BMC Med Educ* 2019;19(1):460. DOI: 10.1186/s12909-019-1891-5.
- Simonson M. Course management systems. *Quarterly Review of Distance Education* 2007;8(1):7–9.
- Ullman C, Rabinowitz M, Course management systems and the reinvention of instruction. *THE Journal*, 2004. <http://www.thejournal.com/magazine/vault/A5070.cfm>.
- Konstantinidis AaPPaTTaDS. Selecting and evaluating a learning management system: a Moodle evaluation based on instructors and students. *Int J Distance Educ Technol* 2011;9:13–30.
- Instructure. 2020; <https://www.instructure.com/>. Accessed May 20, 2020.
- Blackboard. 2020; <https://www.blackboard.com/>. Accessed May 20, 2020.
- Reid L. Learning management systems: the game changer for traditional teaching and learning at adult and higher education institutions. *Global J Hum Soc Sci* 2019;19(6). DOI: 10.34257/GJHSSGVOL19IS6PG1.
- Moore M. Three types of interaction. *Am J Dist Educ* 1989;3:1–7. DOI: 10.1080/08923648909526659. [https://www.researchgate.net/publication/237404371\\_Three\\_Types\\_of\\_Interaction](https://www.researchgate.net/publication/237404371_Three_Types_of_Interaction).
- Smith L. New medical schools in the United States forces of change past and Present. *Trans Am Clin Climatol Assoc* 2009;120:227–238. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2744513/>.
- Choe RC, Scuric Z, Eshkol E, et al. Student satisfaction and learning outcomes in asynchronous online lecture videos. *CBE Life Sci Educ* 2019;18(4):ar55. DOI: 10.1187/cbe.18-08-0171.
- Kim KJ, Kim G. Development of e-learning in medical education: 10 years' experience of Korean medical schools. *Korean J Med Educ* 2019;31(3):205–214. DOI: 10.3946/kjme.2019.131. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6715898/>.
- McCarty N, The countries leading the world in scientific research. Statista <https://www.weforum.org/agenda/2020/01/top-ten-countries-leading-scientific-publications-in-the-world/>.
- Hamilton DP. Research papers: who's uncited now? *Science* 1991;251(4989):25. DOI: 10.1126/science.1986409.
- Pendlebury DA. Science, citation, and funding (letter to the editor). *Science* 1991;251(5000):1410–1411. DOI: 10.1126/science.251.5000.1410-b.
- Van Noorden R. The science that's never been cited. *Nature* 2018; 162–164. <https://www.nature.com/articles/d41586-017-08404-0>.
- Egger JR, Konty KJ, Jessica M, et al. Monitoring temporal changes in the specificity of an oral HIV test: a novel application for use in postmarketing surveillance. *Nature* 2010:e12231. DOI: <https://doi.org/10.1371/journal.pone.0012231>.
- Directory of Open Access Journals (DOAJ); <https://doaj.org/about>.
- Bill and Melinda Gates Foundation Open Access Policy. <https://www.gatesfoundation.org/how-we-work/general-information/open-access-policy>.
- European Commission. Open Access. <https://ec.europa.eu/research/openscience/index.cfm?pg=openaccess>.
- Björk BC, Solomon D. Open access versus subscription journals: a comparison of scientific impact. *BMC Med* 2012;10(73):73. DOI: 10.1186/1741-7015-10-73.
- United Nations Universal Declaration of Human Rights. <https://www.un.org/en/universal-declaration-human-rights/>.
- Milova H, Elbakyan A. Science Should Be Open to All, Not Behind Paywalls. <https://www.lifespan.io/news/alexandra-elbakyan/>.
- Stern BM, Shea EK. A proposal for the future of scientific publishing in the life sciences. *PLoS Biol* 2019;17(2):e3000116. DOI: 10.1371/journal.pbio.3000116.
- Palmer B, The Future (of Medical Meetings) Will See You Now. January 2, 2018. <https://www.pcma.org/medical-meetings-disruptors/>.
- Yeo L, Luewan S, Romero R. Fetal intelligent navigation echocardiography (fine) detects 98% of congenital heart disease. *J Ultrasound Med* 2018;37(11):2577. DOI: 10.1002/jum.14616.
- Bahado-Singh RO, Sonek J, McKenna D, et al. Artificial intelligence and amniotic fluid multiomics analysis: the prediction of perinatal outcome in asymptomatic short cervix. *Ultrasound Obstet Gynecol* 2019;54(1):110–118. DOI: 10.1002/uog.20168.
- DeVore GR, Polanco B, Satou G, et al. Two-dimensional speckle tracking of the fetal heart: a practical step-by-step approach for the fetal sonologist. *J Ultrasound Med* 2016;35(8):1765–1781. DOI: 10.7863/ultra.15.08060.
- Rizzo G, Capponi A, Persico N, et al. 5D CNS+ software for automatically imaging axial, sagittal, and coronal planes of normal and abnormal second-trimester fetal brains. *J Ultrasound Med* 2016;35(10):2263–2272. DOI: 10.7863/ultra.15.11013.