Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Progress in Pediatric Cardiology 60 (2021) 101320

Contents lists available at ScienceDirect

Progress in Pediatric Cardiology

journal homepage: www.elsevier.com/locate/ppedcard

Review

Online education in a hurry: Delivering pediatric graduate medical education during COVID-19☆

Sarah A. Teele [a,b,*], Anthony Sindelar [b], David Brown [a], David A. Kane [a], Nikhil Thatte [a], Ryan J. Williams [a], Joy Gueverra [a], Traci A. Wolbrink [c]

[a] Department of Cardiology, Boston Children's Hospital, Harvard Medical School, Boston, MA, United States of America
[b] Massachusetts General Hospital Institute of Health Professions, Boston, MA, United States of America
[c] Department of Anesthesiology, Critical Care, and Pain Medicine, Boston Children's Hospital, Department of Anaesthesia, Harvard Medical School, United States of America

ARTICLE INFO

Keywords:
Graduate medical education
Online learning
Pediatric cardiology fellowship

ABSTRACT

In the setting of the coronavirus disease 2019 (COVID-19) pandemic, an emergency hospital-wide eWork policy was enacted at Boston Children's Hospital on March 16, 2020. The number of clinicians on campus was restricted to only essential personnel, guidelines limited clinical care delivery to solely non-elective patients, and strict maximums were placed on the numbers of people allowed to congregate in the same physical space. With this abrupt transition to social distancing and electronic communication, the established approach to educating graduate medical trainees became obsolete overnight. Anticipating significant impact on trainee and faculty professional and personal lives, the importance of adaptive teaching strategies was evident. This document details one approach to redesigning the clinical learning system including a description of the learners and environment, the pedagogical principles that guided the approach, and technological tools used in implementation. Additionally, available literature pertinent to this topic is explored, assessment of the work to date is presented, and suggestions are provided regarding future directions related to online graduate medical education.

1. Introduction

Prior to March 2020, the Boston Children's Hospital (BCH) Pediatric Cardiology Fellowship Program consisted of on-the-job clinical training in large interprofessional teams, scheduled in-person teaching conferences, and academic research. A total of thirty-seven trainees and more than seventy faculty were involved in the Department of Cardiology's day-to-day care of patients and graduate medical education. At the start of the coronavirus disease (COVID-19) pandemic in the United States, many dedicated pediatric centers, including BCH, minimized elective appointments and procedures in order to mitigate spread of disease. As a consequence, our trainees and faculty were isolated with reduced clinical exposure and limited social connections.

Medical educators worldwide quickly recognized the potential for considerable impact on trainee and faculty learning, mental health, and professional relationships. Multiple months of limited clinical experience constitute a substantial component of the one to three years of sub-specialty education in pediatric cardiology. Online communication, learning, and collaboration became the primary way to maintain professional and personal connections with trainees, faculty, and larger medical communities. Under these unusual and dramatic circumstances, the BCH Fellowship Program sought to leverage technology to transform the established educational model. Our objectives were to implement a multi-faceted solution that would accommodate learners' contexts and needs, meet the wide range of digital fluency present in faculty and trainees, create initiatives that could be deployed rapidly and fluidly, and adhere to established pedagogical principles and concepts.

2. Technological interventions and established support for these tools

Identifying learning and engagement goals early in the initiative

☆ **Table of contents summary**: An approach to delivering quality online graduate medical education and maintaining a professional community during the COVID-19 pandemic.

* Corresponding author at: Department of Cardiology, Boston Children's Hospital, 300 Longwood Avenue, Boston, MA 02115, United States of America.
E-mail address: sarah.teele@cardio.chboston.org (S.A. Teele).

https://doi.org/10.1016/j.ppedcard.2020.101320
Received 12 June 2020; Received in revised form 27 October 2020; Accepted 30 October 2020
Available online 4 November 2020
1058-9813/© 2020 Elsevier B.V. All rights reserved.

helped us focus on the use of technology as a solution to the challenges, as opposed to a gimmick or distractor. This approach is known to be important for learner and faculty buy-in, especially for those not already familiar with the tools [[1],[2]]. We, therefore, created learning goals and desired results as the first step in the process:

a. Provide high-yield synchronous and asynchronous learning opportunities that engage trainees and faculty using remote technology.
b. Create an online community that provides social support for one another by solidifying personal and professional relationships despite physical isolation.
c. Utilize and curate high-quality resources readily available to us (faculty and trainee expertise, pre-existing online resources, unstructured time) under extraordinary circumstances to create a learning tool that will be useful today and in the future.
d. Centralize currently available learning tools/resources from across the Cardiovascular Program.
e. Elicit real-time informal and formal feedback in order to modify and adjust the intervention to best meet the needs of our learners and educators.

2.1. Platform selection

Our fellowship program did not have an established Learning Management System. We needed an immediately functional platform with attributes of a successful educational technology tool including credible resources, easy access without temporal limitations, and a user-friendly interface [3]. BCH faculty and trainees were familiar with OPENPediatrics (https://www.openpediatrics.org), a free, global, open-access, medical e-learning platform available to healthcare professionals and developed at the institution. In March 2020, OPENPediatrics already contained established peer-reviewed educational resources relevant for pediatric cardiology fellows including video, PDF documents, interactive screen-based simulators, and a multi-media congenital heart disease library [4]. Taking into consideration our

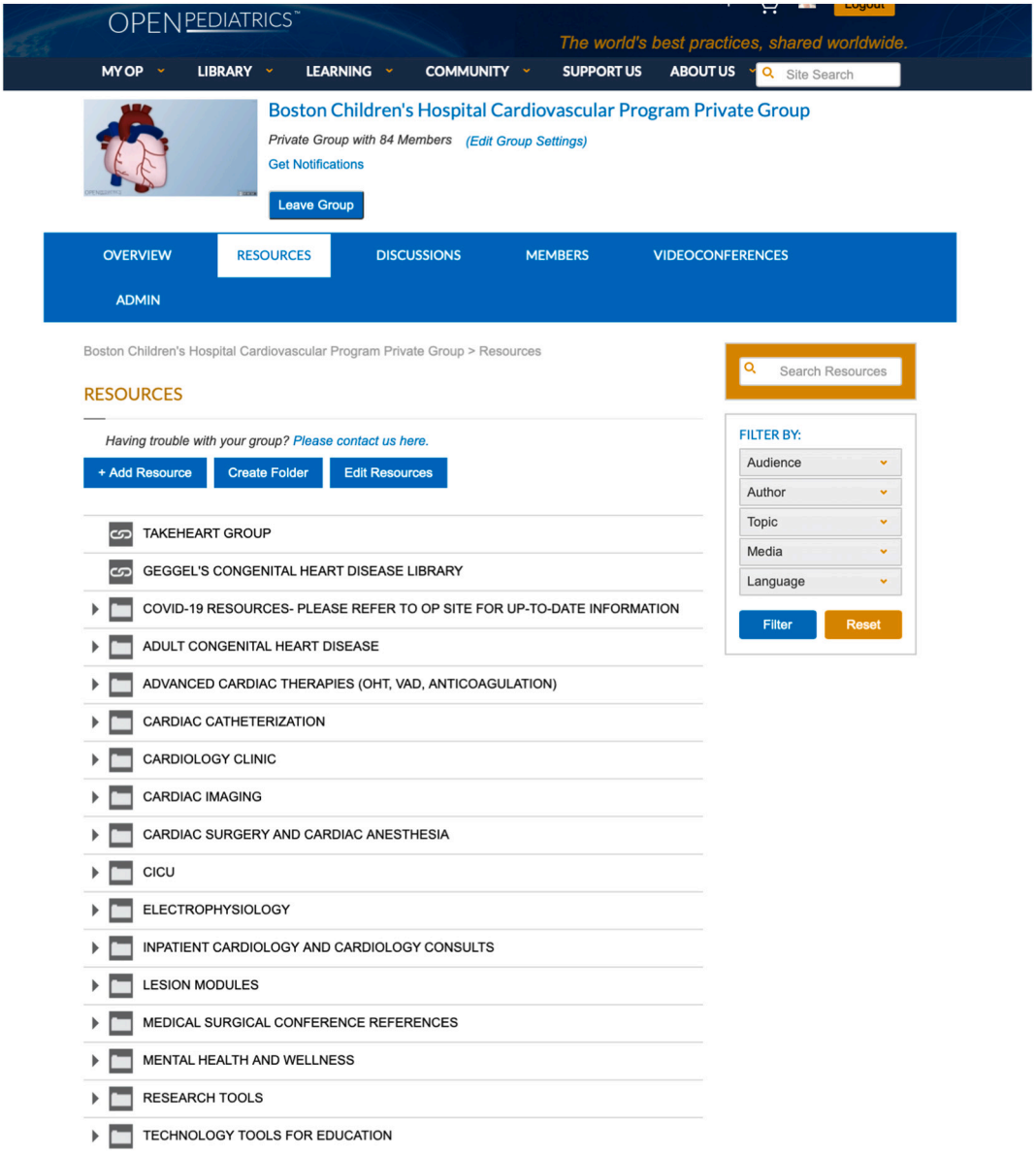

Fig. 1. Home resource page for CVP private group, administrative view. Note embedded links to pre-existing transition to practice resources (TAKEHEART GROUP) and congenital heart disease library. Folders were created and labeled by the author, ST, to address the needs and resources of the department's trainees and faculty.

pressing educational goals and the strengths inherent in OPENPediatrics, we created a private group site dedicated to the BCH Cardiovascular Program on March 14th, 2020. It was released to the trainees and faculty on March 16th, 2020. By March 24, 2020, ninety-three faculty and trainee members had joined the group.

2.2. Curation of existing resources

In order to rapidly deploy the initiative, we used a combination of pre-existing content and real time content creation. Anticipating rapid expansion in educational resources, we created clearly labeled folders assigned to topics such as "Electrophysiology" and "Cardiac Imaging" (Fig. 1), each with its own set of sub-folders for organization and ease of use. Task Force reports coordinated by the Society of Pediatric Cardiology Training Program Directors (SPCTPD) were included in each of the relevant sub-specialty folders to provide structure [5]. We identified Divisional educational champions across the Department of Cardiology to help populate folders in the sub-specialty topics with vetted, high quality content related to their area(s) of expertise (e.g. electrophysiology). Standards and guidelines for the care of patients with congenital or acquired heart disease were included. As the group site developed, it became increasingly easier to link resources which now number in the hundreds. For example, faculty teaching an imaging session on cardiac tumors could refer to the relevant pathology lecture and the surgical technique references already available on the BCH Cardiovascular Program group site.

2.3. Synchronous learning opportunities

Synchronous learning is defined as the education of a group of people that occurs simultaneously in real time. At the start of the pandemic, online conferences were immediately identified by global educators as an important solution for synchronous learning when learners could not be face-to-face. BCH had an established relationship with Zoom (https://zoom.us), however, many members of the Department were not familiar with its features. One of the Chief Fellows was tasked with creating a user-friendly document on how to host a Zoom meeting. This was circulated to the faculty and trainees on March 17, 2020.

Prior to the eWork policies, our Department hosted in-person teaching sessions one to two hours daily, Monday through Friday. The approach to these teaching sessions varied but included traditional lecture format and case-based learning. After a brief pause of a week, our core conference schedule was redeployed online, March 23, 2020. We added additional sessions at the request of the learners and interested faculty with a focus on important threshold concepts in the field of pediatric cardiology. Within several weeks, trainees had the option to attend two to three one-hour sessions per day and could choose amongst a variety of topics in the field of pediatric cardiology. Synchronous educational opportunities continued to increase in number throughout April and May, further complemented by national and international initiatives. Two to four hours of online pediatric cardiology content per day continues to be standard even though the Department has resumed much of its pre-COVID-19 activity. If local sessions do not contain patient health information, they are recorded and uploaded to the private OPENPediatrics group site for future viewing. Lecture references are linked with the recorded material for learners interested in additional content or reviewing sentinel literature.

2.4. Asynchronous learning opportunities

Asynchronous educational opportunities occur independently of a specific place or time and therefore offer increased flexibility. Learners may work independently or collaborate with others. This approach presents tremendous potential for active learning where the learner is compelled to engage with the subject material. Additionally, it allows the trainee control over when the learning will take place. With these pedagogical goals in mind, we created a voluntary team-based project that complemented the OPENPediatrics private group site and the Department's expanded conference schedule. The design strategy of this project utilized active educational strategies to promote and reinforce learning. Acknowledging the online format, we also emphasized transparency of expectations and purpose, clear instructions, small groups of three to five trainees, monitoring and support of the initiative, and guidelines for online etiquette [6].

Each team consisted of individuals from a range of years in training. Mixing the years of experience presented opportunities for vertical learning and mentorship. Additionally, each team was assigned a faculty coach who had volunteered their time and expertise in support of the endeavor. Project components were as follows: 1. Complete the flow chart for a lesion chosen by the team (Fig. 2), 2. Identify three key references as "must read" articles for a learner interested in the designated lesion, and 3. Create three Accreditation Council for Graduate Medical Education-type board questions based on the lesion with answers and explanations. Four teams were created. All components of the project were completed for the following lesions chosen by respective team members: isolated atrial septal defects, pulmonary atresia with intact ventricular septum, total anomalous pulmonary venous connection, and tetralogy of Fallot with absent pulmonary valve. An example of a complete project can be found in Appendix 1. Faculty coaches reviewed all of the content for accuracy and provided feedback to the learners.

The first step of the project was to address the components of the lesion flow chart. In essence, this provided the scaffolding for a concept map of a specific congenital heart lesion over a patient's lifespan. Each trainee was likely to have prior experience with some aspects of the map. The key component of the exercise was to elaborate on one's own pre-existing mental model of the lesion by connecting new information in a more sophisticated web. Ideally, combining the varied components of the lesion map (e.g. pathophysiology, management strategies, outcomes) into a complete clinical picture using their own words helped trainees consolidate and solidify knowledge.

The second component of the project was to curate educational resources for the learners and their peers. Although original research and innovative work remain a substantial component of medical education, there is growing recognition of content curation as an important skill. "As curators of content, educators must be skilled in selecting content materials from existing educational materials, and building alliances across stakeholders, including faculty, specialties, professions, accrediting bodies, and professional and interprofessional societies [7]." Asking trainees to choose a limited number of essential references forced them to critically review the scope of the literature and identify references with the highest value for a stated purpose. This skill is an important tool in clinical practice as real-time electronic resources increasingly impact informed decision-making by clinicians and patients.

The third component of the project was to write three mock board exam questions complete with explanations for the answers. Questions were then used to populate Qstream (https://qstream.com), an online spaced learning platform. Although the learning theory supporting writing practice test questions appears valid, data from studies are mixed [8]. Using these mock questions in an online spaced learning game, however, employs the well-documented testing effect, or benefit of retrieval as a powerful learning tool [9,10]. Repeated recall over time strengthens memory and consolidates concepts. In addition to populating Qstream, we uploaded the learners' questions into our private group on OPENPediatrics so that they may be used for additional independent learning in the future.

Information about the educational reasoning and pedagogical approach, available resources, and goal due dates were communicated to the trainees throughout the course of the project. Faculty coaches mentored content creation, guided the choice of key references, and reviewed the multiple-choice questions before submission. Our Department's Chief Fellows ensured project completion and provided

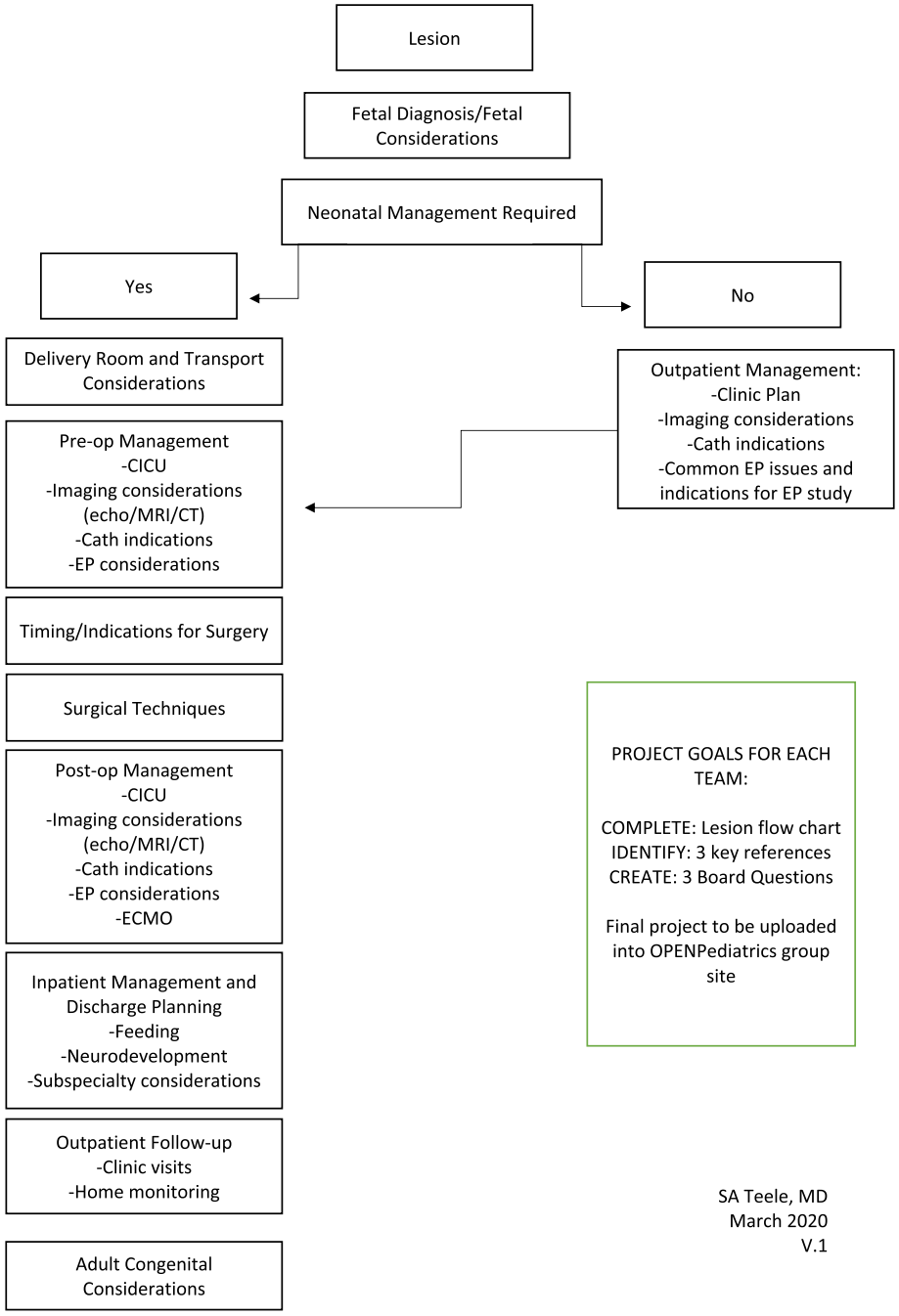

Fig. 2. Flow chart used in team-based asynchronous learning activity to create a concept map of a specific congenital heart lesion.

ongoing community support and monitoring of etiquette. Project deadlines were kept somewhat flexible as hospital staffing models and the nationwide implications of the pandemic changed frequently.

3. Assessment

Five weeks into the initiative, a survey was sent to the trainees via SurveyMonkey (SurveyMonkey Inc., San Mateo, California, United States of America), a commonly utilized online survey platform familiar to the learners. The Instructional Design Evaluation Survey for Post-graduate Medical *E*-Learning was modified and used to assess learners' experience of this online initiative [11]. Although the context was unusual and unique, assessing this initiative from a framework of quality student learning remained the priority. The survey attempted to measure student engagement, determine if the content delivery provided lasting significant learning, and whether the content and experience added value to the learners' lives [12]. Survey participation was optional. Responses were anonymized and no survey responder identifying data were collected.

Our survey response rate was 70% (26/37). Respondents reported a high level of motivation for participating in online learning. The top three motivating factors were: "I feel continuing my education through online learning is important", "I feel it is my professional responsibility to do this online learning", and "Online learning provides a way to stay professionally connected to my peers and faculty mentors". The most common barriers to participating in online learning were reported to be limitations on time due to clinical obligations, too many options for online learning, and distractions attributable to the COVID-19

pandemic. Eighty-nine percent (23/26) of respondents agreed that the online learning in this intervention was translatable to daily real-world work. Sixty-two percent (16/26) of our learners agreed that they felt more comfortable using technology tools at the time of completing the survey than they had before the online learning initiative.

Unfortunately, because our group on OPENPediatrics is designated as private, we were unable to obtain statistics on platform utilization. Data that would have been helpful and complementary to the survey included click counts, log-in time of day, time spent on the site by a user, and consistency of engagement by faculty and learners over time.

4. Summary

As the COVID-19 pandemic rapidly swept the globe, the international medical education community quickly mobilized to support collaborative real-time solutions to the challenge. Previously accepted approaches for many aspects of our existence were reimagined, including the delivery of graduate medical education. The BCH Department of Cardiology initiative embraced the video conference format for synchronous learning while simultaneously developing an innovative asynchronous educational opportunity. Although asynchronous activities are not a new concept, they were not part of the BCH Cardiology Fellowship curriculum prior to the pandemic. The extraordinary circumstances offered our trainees unstructured time not typically available to them and therefore an opportunity for inventive approaches to our training program.

Our local approach prioritized quality of content creation through engagement of our learners and faculty. This required a substantial time commitment across the Department. Rapid access to globally shared high-quality education and medical content resources was an important facet of our initiative. In a remarkably prescient document from 2010, a global commission dedicated to health professional education cited global threats, including infectious disease, as motivation to harness the potential power of technology for distance learning and collaborative connectivity [13]. Throughout the COVID-19 pandemic, journals have expedited articles for online publication to disseminate high-quality, innovative solutions to educational challenges [14–17]. Alternative dissemination sources such as blogs, Twitter (San Francisco, California), and crowd-sourced collaborative documents continue to be rich resources for educators [18–22]. Sharing medical content was part of the inspiration for the Free Open Access Medical (FOAM) educational movement which started in 2012. It focuses on the practice of emergency medicine, but its ethos is expanding to other specialties, especially in light of the pandemic [23–25]. We linked outside initiatives such as Heart University [26], the Congenital Heart Academy [27], and SPCTPD's Pediatric Cardiology National Educational Series [28] to our OPENPediatrics site as additional resources for our learners and faculty. Including flexibility in the design of online learning materials such that unanticipated collaboration could be supported, was critical.

Pediatric trainees were a unique group given their limited role on the frontline during this pandemic. Leveraging online learning to support the educational and psychosocial needs of these physically isolated learners was a priority. This experience may expand opportunities for approaching graduate medical education in the future. As our medical communities navigate a path back to a "new normal", the blended classroom model may continue to be a public health necessity. The experience of the pandemic has demonstrated the potential power of online learning to meet and sustain other educational challenges such as low attendance at teaching sessions. High quality online learning could be one way to mitigate the educational impact of work hour restrictions by allowing learners to participate from home. Perhaps most convincingly, the COVID-19 crisis profoundly demonstrated our interconnectedness on this planet. Broad online sharing of expertise fostered previously unimaginable collaboration within and between institutions worldwide.

5. Limitations and challenges

This approach to transitioning graduate medical education from an entirely face-to-face experience to completely online learning environment had challenges. Thankfully, all of our learners had reliable access to the internet, and therefore digital equity was not a factor. Additionally, none of our learners required assistive technologies to provide access, but it is an important consideration for educators attempting to design a similar kind of intervention.

Technological literacy and the generation gap between the learners and the faculty was our biggest hurdle. In general, the age of current trainees in graduate medicine qualifies them as "digital natives" and generally fluent in technology. In 2020, a large number of educators in academic medicine are "digital immigrants" with an enormous range of technological literacy [29]. Many of the faculty participating in the learning initiatives required substantial remote support from more technologically fluent faculty and learners. In hindsight, a survey of our faculty to assess technological literacy at the start of the initiative would have been helpful.

Even for those comfortable with the technology tools, online teaching and learning presents challenges to those not familiar with the format. Teaching on a computer screen is a very different experience than working with an overflowing lecture hall or intimate small group session. Physical separation and limited face-to-face contact can lead to feeling of disconnection and isolation by either the learner or the educator or both. There is a risk of disengagement and the promotion of superficial learning. Despite the need for rapid deployment of educational interventions, adherence to established concepts in adult learning was prioritized. Important considerations included ensuring that educational materials were relevant and meaningful to the learners' professional work, information was applicable to everyday problems, and learners were engaged with and feel connected to faculty and peers. High levels of connectivity and collaboration in synchronous and asynchronous activities were encouraged.

Online learning was a dynamic and expanding field prior to the pandemic with virtual reality, augmented reality, and gaming viewed as meaningful learning experiences which may engage our learners [30]. These approaches, however, require more established resources than were available at the time of this intervention. Additional exploration of these themes warrants further investigation and will be important to better understand and improve future educational interventions.

Perhaps most importantly, our educational goals, no matter how noble or grounded in theories of adult learning, were situated in the context of a devastating and historic international crisis. This was an incredibly challenging time for clinicians, professionally, and personally. Openly acknowledging that all members of the department were navigating multiple stressors was critical during this initiative.

6. Conclusion

Innovative, resourceful, and dynamic initiatives were required to manage the challenges highlighted by the COVID-19 pandemic and will be necessary to navigate the uncertainties of the future. Online learning cannot replace the physical examination of patients and the power of human touch. It is, however, an opportunity to deliver high quality learner-centered education in non-traditional settings while simultaneously cultivating intrinsic motivation in our trainees and faculty. It is clear that healthcare professionals yearn for lifelong learning, practice development, and connection to their local and global communities. Additional reflection and ongoing formal evaluation of new initiatives will be essential to understand the implications of these types of innovations.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ppedcard.2020.101320.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Financial disclosure

The authors have no financial relationships relevant to this article to disclose.

Declaration of competing interest

Traci A. Wolbrink is one of the co-founders and co-directors of OPENPediatrics, but she has no personal financial disclosures to report. The other authors have no conflicts of interest to disclose.

Acknowledgements

Thank you to the Boston Children's Hospital Department of Cardiology fellows for their patience, support, dedication, and enthusiasm for learning during an especially challenging and difficult time. Thank you to John Leary for his rapid responses and continuing support of our OPENPediatrics requests.

References

[1] 2019 Horizon Report. 2019 Horizon Report. https://library.educause.edu/resources/2019/4/2019-horizon-report. Published April 23, 2019. Accessed April 25, 2020.
[2] Clark RC, Mayer RE. E-Learning and the science of instruction: proven guidelines for consumers and designers of multimedia learning. San Francisco: Pfeiffer; 2016. p. 369–90.
[3] Casebeer L, Bennett N, Kristofco R, Carillo A, Centor R. Physician internet medical information seeking and on-line continuing education use patterns. Journal of Continuing Education in the Health Professions 2002;22(1):33–42. https://doi.org/10.1002/chp.1340220105.
[4] Daniel D, Wolbrink T. Comparison of healthcare professionals' motivations for using different online learning materials. Pediatric Investigation 2019;3(2):96–101. https://doi.org/10.1002/ped4.12131.
[5] Ross RD, Brook M, Koenig P, et al. 2015 SPCTPD/ACC/AAP/AHA training guidelines for pediatric cardiology fellowship programs (revision of the 2005 training guidelines for pediatric cardiology fellowship programs): introduction [published correction appears in circulation. 2016 mar 29;133(13):e465]. Circulation. 2015;132(6):e43–7. https://doi.org/10.1161/CIR.0000000000000191.
[6] A Guide to Quality in Online Learning - Academic Partnerships. https://www.academicpartnerships.com/Resource/documents/A-Guide-to-Quality-in-Online-Learning.pdf. Accessed April 26, 2020.
[7] Simpson D, Marcdante K, Souza KH, Anderson A, Holmboe E. Job roles of the 2025 medical educator. J Grad Med Educ 2018;10(3):243–6. https://doi.org/10.4300/jgme-d-18-00253.1.
[8] Jobs A, Twesten C, Göbel A, Bonnemeier H, Lehnert H, Weitz G. Question-writing as a learning tool for students – outcomes from curricular exams. *BMC Medical Education*. 2013;13(1). doi:https://doi.org/10.1186/1472-6920-13-89.
[9] Brown PC, Roediger HL, McDaniel MA. Make it stick: The science of successful learning. Cambridge, MA: The Belknap Press of Harvard University Press; 2014.
[10] Larsen DP, Butler AC, Roediger HL. Repeated testing improves long-term retention relative to repeated study: a randomised controlled trial. Med Educ 2009;43(12):1174–81. https://doi.org/10.1111/j.1365-2923.2009.03518.x.
[11] Leeuw RAD, Westerman M, Walsh K, Scheele F. Development of an Instructional Design Evaluation Survey for Postgraduate Medical E-Learning: Content Validation Study. *Journal of Medical Internet Research*. 2019;21(8). doi:https://doi.org/10.2196/13921.
[12] Fink LD. 1: evaluating teaching: a new approach to an old problem. To Improve the Academy 2008;26(1):3–21. https://doi.org/10.1002/j.2334-4822.2008.tb00497.x.
[13] Frenk J, Chen L, Bhutta ZA, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. The Lancet 2010;376(9756):1923–58. https://doi.org/10.1016/s0140-6736(10)61854-5.
[14] Ahmed H, Allaf M, Elghazaly H. COVID-19 and medical education. Lancet Infect Dis 2020. https://doi.org/10.1016/s1473-3099(20)30226-7.
[15] Defilippis EM, Schmidt ACS, Reza N. Adapting the educational environment for cardiovascular fellows-in-training during the COVID-19 pandemic. J Am Coll Cardiol 2020. https://doi.org/10.1016/j.jacc.2020.04.013.
[16] Dineen EH, Hsu JJ, Saeed A. Reinforcing cardiology training during a pandemic: an open letter to our leaders. Circulation. 2020. https://doi.org/10.1161/circulationaha.120.047593.
[17] Rose S. Medical student education in the time of COVID-19. Jama. 2020. https://doi.org/10.1001/jama.2020.5227.
[18] #HMICommunity Resources 04.20.20.xlsx. Google Sheets. https://docs.google.com/spreadsheets/d/1axEjhwL_VF8EutJcAL1Ds8DP4uyUyYSD/edit#gid=122126530. Accessed June 10, 2020.
[19] #MedEdPearls: Mastering Adaptive Teaching in the Midst of COVID-19. HMI. https://harvardmacy.org/index.php/hmi/april-2020-mededpearls. Published April 6, 2020. Accessed April 23, 2020.
[20] Johnson S. Developing Online Assessments of Student Learning in a Hurry. Vanderbilt University. https://www.vanderbilt.edu/brightspace/2020/03/25/developing-online-assessments-of-student-learning-in-a-hurry-we-have-resources-for-you/. Published March 25, 2020. Accessed April 23, 2020.
[21] Teaching Effectively During Times of Disruption. Google Docs. https://docs.google.com/document/d/1ccsudB2vwZ_GJYoKlFzGbtnmftGcXwCIwxzf-jkkoCU/edit. Accessed April 26, 2020.
[22] Eight Steps for a Smoother Transition to Online Teaching: Faculty Focus. Faculty Focus | Higher Ed Teaching & Learning. https://www.facultyfocus.com/articles/online-education/eight-steps-for-a-smoother-transition-to-online-teaching/. Published March 19, 2020. Accessed May 6, 2020.
[23] Nickson CP, Cadogan MD. Free open access medical education (FOAM) for the emergency physician. Emerg Med Australas 2014;26(1):76–83. https://doi.org/10.1111/1742-6723.12191.
[24] Wolbrink TA, Rubin L, Burns JP, Markovitz B. The top ten websites in critical care medicine education today. J Intensive Care Med 2018;34(1):3–16. https://doi.org/10.1177/0885066618759287.
[25] Thoma B, Mohindra R, Artz JD, Chan TM. CJEM and the changing landscape of medical education and knowledge translation. Cjem. 2015;17(2):184–7. https://doi.org/10.1017/cem.2015.16.
[26] Tretter JT, Windram J, Faulkner T, et al. Heart university: a new online educational forum in paediatric and adult congenital cardiac care. The future of virtual learning in a post-pandemic world? Cardiol Young 2020;30(4):560–7. https://doi.org/10.1017/s1047951120000852.
[27] Congenital Heart Academy. (n.d.). https://www.youtube.com/channel/UCBP2vvBMciapCG3BL4RTH7w. Accessed October 27, 2020.
[28] Educational Resources for Fellows. (n.d.). https://spctpd.org/Educational-Resources-for-Fellows. Accessed October 27, 2020.
[29] Prensky M. Digital natives, digital immigrants part 1. On the Horizon 2001;9(5):1–6. https://doi.org/10.1108/10748120110424816.
[30] Clark RC, Mayer RE. E-Learning and the science of instruction: proven guidelines for consumers and designers of multimedia learning. San Francisco: Pfeiffer; 2016. p. 369–90.