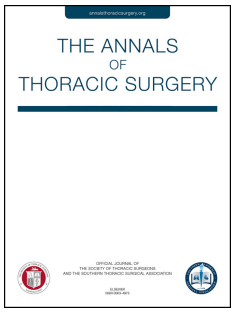
Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Journal Pre-proof



Hand On/Hands Off

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Hand On/Hands Off

Invited Commentary:

Video-based education as a component of surgical training has been studied in various capacities over the past decade [1]. However, the COVID-19 pandemic threw into sharp focus the absolute necessity of effective online programs for learning and the importance of adapting education delivery to a virtual platform [2]. The shift to virtual education happened overnight, and Zoom remains a routine part of our lives more than two years later.

In this issue of *The Annals of Thoracic Surgery*, Bajaj and colleagues assessed student satisfaction with a virtual version of the Cardiothoracic Surgical Skills Summer Internship (CSSSI), a cardiothoracic surgery education and skills program for high school students run by the Department of Cardiothoracic Surgery at Stanford University [3]. The program was administered virtually during 2020 and 2021, with students attending lectures and skills sessions via Zoom to approximate the in-person experience. Bajaj and colleagues used this new format as an opportunity to assess student experience and the effectiveness of virtual surgical skills training.

Students rated the program favorably and found the format reliable and valuable for learning surgical skills. Most students were satisfied with the experience and the simulation materials provided. However, they noted that more refined motor skills, such as coronary vessel suturing, were challenging to learn via Zoom. The authors note that refining the program for more one-on-one instruction or incorporating additional elements such as augmented reality may address these issues. The virtual nature of the course allowed for the instruction of 100 students in each cohort (as opposed to 30 students per cohort in prior years) and permitted students from outside the United States to participate.

As global internet usership continues to increase, virtual education could become a means to offer interactive surgical skills training to individuals who otherwise may not have the opportunity [4]. A low-cost simulation focusing on skill building rather than fidelity, coupled with virtual education, presents itself as a conceivable way to share information and expertise across borders[5]. As augmented and virtual reality technology improves, so too do our opportunities to train future generations of surgeons at home and abroad. The work by Bajaj and colleagues is an interesting descriptive analysis of the changing educational landscape.

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References:

[1] Jayakumar N, Brunckhorst O, Dasgupta P, et al. e-Learning in Surgical Education: A Systematic Review. *J Surg Educ*. Nov-Dec 2015;72(6):1145-57. doi:10.1016/j.jsurg.2015.05.008;

[2] Fuller S, Vaporciyan A, Dearani JA, et al. COVID-19 Disruption in Cardiothoracic Surgical Training: An Opportunity to Enhance Education. *Ann Thorac Surg*. 2020;110(5):1443-1446. doi:10.1016/j.athoracsur.2020.05.015;

[3] Bajaj SS, Patel HH, Fann JI, et al. Virtual Surgical Skills Training in a High School Summer Program. *Ann Thorac Sur*. 2022; in press;

[4] ITU Statistics. International Telecommunication Union. Accessed 8/9/2022, 2022. https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

[5] Bolton WS, Aruparayil N, Quyn A, et al. Disseminating technology in global surgery. *Br J Sur*. 2019;106(2):e34-e43. doi:10.1002/bjs.11036.