

Undergraduate surgical education during COVID-19: could augmented reality provide a solution?

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Dear Editor

The COVID-19 pandemic has significantly disrupted undergraduate medical education¹. As medical students were withdrawn from clinical placements, we became increasingly concerned that they would miss out on important surgical learning opportunities. Positive surgical experiences during undergraduate placements have been shown to meaningfully impact on future career choice²; however, social distancing guidelines prevented delivery of our usual in-person teaching programme. Encouraged by the use of augmented reality (AR) telesurgery technologies in patients with COVID-19³, we developed a series of AR-enhanced virtual ward rounds using the Microsoft HoloLens device (Microsoft, Redmond, Washington, USA).

AR provides a live representation of a real-world environment into which additional computer-generated elements are integrated. To maximize student learning opportunities, the mixed reality optical display capabilities of the HoloLens headset were used to supplement a ‘surgeon’s-eye’ live feed with additional imaging, clinical videos, and anatomical diagrams.

In collaboration with the St George’s Advanced Patient Simulation & Skills (GAPS) Centre, we developed a series of remotely-delivered simulated ward rounds. Each of the three

sessions varied slightly, depending on the case mix available. The untethered HoloLens headset allowed the consultant educator to move freely between ward, theatre and hand trauma clinic environments. In total, 60 penultimate-year medical students participated in one of these virtual plastic surgery sessions, with a further workshop on suturing techniques provided separately. The surgical consultant delivering the sessions was supported by a member of the GAPS team, who proctored various AR elements into the live feed while managing student questions and connectivity issues.

Students were asked to complete an online Likert-scale questionnaire (SurveyMonkey, San Mateo, California, USA) following completion of the session. In total, responses were collated from 47 participants (response rate 78 per cent). Student feedback is summarized in Fig. 1.

Our experience has demonstrated that remote, AR-enhanced teaching sessions can be delivered successfully despite COVID-19 pressures. Learner feedback was overwhelmingly positive at a time when the provision of surgical education is particularly challenging. In line with the latest Joint Committee on Surgical Training statement on maximizing training⁴ - which encouraged trainers to ‘develop remote access possibilities such as HoloLens’ - we would encourage fellow surgical tutors to explore the role of

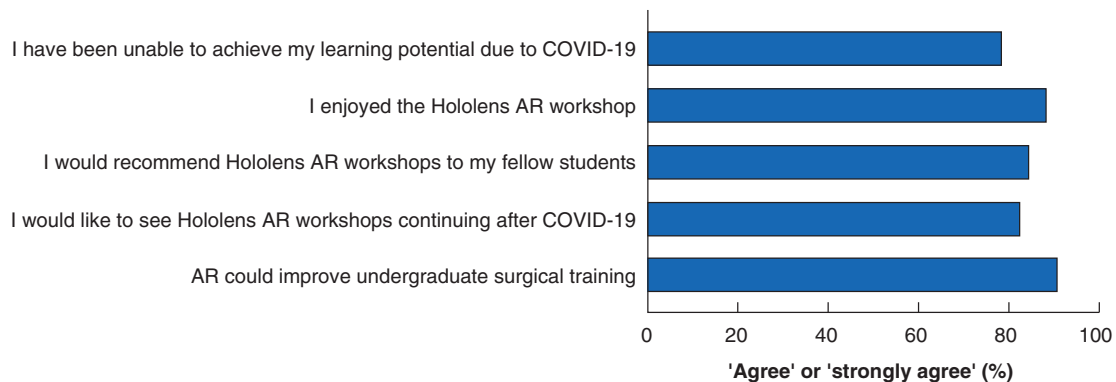


Fig. 1 Percentage of ‘agree’ or ‘strongly agree’ student responses

emerging AR technologies in their own teaching practice, both during the COVID-19 pandemic and beyond.

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