

Author	Institution	Country	Innovation / program	Short description	Technical means/ applications
Alkhowailed et al. ¹²	Qassim University & Cairo University	Saudi Arabia	Organized digitalization plan during COVID-19 lockdown	Composition of digitalization committee that designed new sessions for problem-based and team-based learning & survey on students' feedback	Blackboard learning management system, Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA), WhatsApp application
Bhaskar et al. ¹³	Faculty of Medicine, Macau University of Science and Technology	China	Online spirometry practical demonstration	Online spirometry practical demonstration with students' involvement in analysis of graphs by remote control	Vernier Go Direct wireless spirometer, laboratory technician, Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA)
Chandra et al. ¹⁴	Sidney Kimmel Medical College, Thomas Jefferson University	USA	Virtual emergency medicine clerkship	Review of electronic health records & subsequent video calls to patients previously evaluated in the ED	Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA)
Darnton et al. ¹⁵	School of Clinical Medicine, University of Cambridge	UK	Remote patient consultation	Remotely supervised medical students who undertook remote patient consultations & assessment of this educational intervention	Microsoft Teams, AccuRx (a clinical video consultation tool) or telephone
De Ponti et al. ¹⁶	School of Medicine, University of Insubria	Italy	Medical training including virtual reality	Online training sessions using an online virtual reality platform with simulated clinical scenarios of patient-based cases	Body Interact™ Clinical Education, TakeTheWind, Coimbra, Portugal
Durfee et al. ¹⁷	Brigham & Women's hospital, Harvard Medical School	USA	Virtual Radiology Core Clerkship	Large didactic lectures, online flipped modules, small-group homework activities, standardized online exams & survey on students' feedback	Aquifer, Inc modules, Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA), moderator for control of the chat room
Finn et al. ¹⁸	Hull York Medical School, University of York	UK	The #pandemicpedagogy social media initiative for knowledge exchange	Live Twitter chats to engage the wider academic community in an exchange of ideas around adaptation of teaching methods during the COVID-19 pandemic by using the hashtag #pandemicpedagogy	Twitter (Twitter Inc., San Francisco, CA, USA)

Flotte et al. ¹⁹	University of Massachusetts Medical School, University of Massachusetts Memorial Medical Center	USA	Accelerated graduation and system of early deployment of new physicians	Composition of a review board that determined whether 4 th year medical students fulfilled criteria for 2-month earlier graduation – new physicians were deployed as limited-licensed physicians, called “surge contractors”	NR
Hall et al. ²⁰	Faculty of Medicine, University of Southampton	UK	Online Neuroanatomy education	Implementation of the already developed SotonBrainHub website with online educational content & recorded lectures on neuroanatomy, head & neck anatomy & cranial nerve examination	SotonBrainHub website, Youtube channel & Instagram account
Huddart et al. ²¹	The “Becoming A Doctor” UK-based national organization supporting medical students, representatives from General Medical Council, Health Education England, National Health Service England & the World Health Organization	UK	The #MedStudentCovid social media initiative	A 1-hour Twitter discussion addressing medical students’ uncertainty over pandemic-related disjointed information & promoting student initiatives dealing with COVID-19 – responses by the invited representatives from various organizations contained the hashtag #MedStudentCovid so that they are easily accessible by all participants	Twitter (Twitter Inc., San Francisco, CA, USA)
Iqbal et al. ²²	College of Medicine, Imam Abdulrahman Bin Faisal University	Saudi Arabia	Use of the Telegram application for supplementary medical education	Access to educational resources – addition of unlimited members & uploading of multiple files in all formats and size to facilitate online learning – qualitative survey on students’ feedback	Telegram application
Jeong et al. ²³	University of Washington School of Medicine	USA	Virtual peer teaching	Online clinician teacher elective & virtual peer teaching	NR

Joseph et al. ²⁴	Brighton, Sussex & Bristol Medical Schools, Medical Schools Council, Health Education England	UK	Collaborative effort for sharing of online content	Sharing of online resources between different medical schools by developing the online platforms “Capsule” (developed by Brighton and Sussex Medical School) and “Speaking Clinically” (Bristol Medical School); sharing also available by “Health Education England” (e-Learning for Healthcare Hub) & supported by the national academic mailing list service, “JiscMail”	Online platforms, “Capsule”, “Speaking Clinically” & national academic mailing list, “JiscMail”
Kochis et al. ²⁵	Harvard Medical School	USA	Student-led development of a COVID-19 curriculum (educational for the students who designed it & all its users)	Faculty reviewed, available online & constantly updated learning resource that summarizes the most valuable educational material about the pandemic, all designed by medical students	NR
Lieberman et al. ²⁶	University of Washington	USA	Development of MedSci 585C, an online-only clinical pathology clerkship program	Remote clinical pathology clerkship program with mixed-formatted lectures, student presentations & participation in clinical conferences, rounds & discussions (also on pandemic-related subjects)	Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA), Zoom “breakout room” feature for small groups, cloud-based Canvas Learning Management System (Canvas GFX) for distribution of course material and submission of assignments
Mehta et al. ²⁷	Faculty of Medicine, University of Toronto	Canada	Student-faculty partnership as an enabler of curricular adaptation to the standards of the pandemic; establishment of the weekly “MD EducationMatters” educational newsletter	Contribution of students in decision making with regard to curricular modifications (minimization of students’ anxiety in front of changes); establishment of a weekly educational newsletter covering topics requested by students & perspectives of faculty members from the frontline	NR

Parker et al. ²⁸	University of Washington	USA	Remote anatomic pathology program	Lectures, discussions, virtual slides, case-based activities (“Detective Case”, “Good Will Hunting Case” – program comprising of 10 big topics with both morning and afternoon sessions)	Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA), Microsoft PowerPoint, the PathPresenter online digital platform, Canvas Learning Management System (Canvas GFX), Microsoft Teams (Microsoft)
Roberts et al. ²⁹	University of Bristol	UK	Peer-led teaching sessions	Re-adjustment of peer-led teaching sessions by a university medical students’ society: re-training of tutors on how to deliver & designing of 2 teaching branches; 4 th year teaching 3 rd year students symptom-based medicine & surgery topics, and 3 rd year teaching 2 nd year students systems-based pathology	Online meeting platform, PowerPoint
Roskvist et al. ³⁰	University of Auckland	New Zealand	Online programs for replacing clinical general practice attachments	E-learning program composing of 3 domains: asynchronous discussion; a symposium for social interactions and contact with faculty; and a portfolio for personal goal aspects	Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA), Goodfellow Unit continuing professional development website, BMJ Learning modules
Sam et al. ³¹	Imperial College London	UK	Digital clinical placement	Weekly set of interactive cases for students (including history, physical examination findings, investigation and management plan) on an online platform – discussion of cases in webinars – supplementary video cases	Online platform for patient data, cloud-based tool for interaction during webinars

Singh et al. ³²	All India Institute of Medical Sciences	India	Online classroom	Implementation of an online classroom environment by adopting “G Suite for Education”	“G Suite for Education” – “Google Classroom” for the online classroom environment & “Google Meet” for video-conferencing
Tabari et al. ³³	Clinical Education Research Center, Shiraz University of Medical Sciences	Iran	Online peer- and faculty-led educational and psychological support for medical students	Recruitment of faculty members, academic coaches & senior medical students to support junior peers with psychological & educational issues through virtual peer mentoring & online conversations	NR
Tan et al. ³⁴	National University of Singapore	Singapore	Simulated patient-based exams	Assessment of history-taking skills and ability for detection of abnormal signs using models of body parts and Harvey mannequins	Body part models, Harvey mannequins
Torres et al. ³⁵	Medical University of Lublin	Poland	Simulation-based teaching	Electronic simulated patient data system – students’ remote ordering of laboratory and imaging tests – instructor receives orders and returns the results to update the patient scenario	SimMan 3G (Laerdal, Stavanger, Norway); a technician (substituting for 'students' hands'); patient's monitor; instructor; Zoom™ (Zoom Video Communications Inc., San Jose, CA, USA)
Wickemeyer et al. ³⁶	University of Illinois at Chicago	USA	Adoption of the “R4 teaching model” for remote medical student education in Otolaryngology	Adoption of the R4 model which consists of “Read” (background information), “Respond” (to questions developed by faculty), “Review” (online with faculty) & “Realize” (application of knowledge & decision-making) – model includes real patient cases, journal clubs, interactive quizzes, flipped classroom, and attending-lead discussions on social justice & bioethics	NR

Supplementary table 1. Educational innovations and adaptations during the COVID-19 pandemic. Abbreviations: USA, United States of America; UK, United Kingdom; COVID-19, Coronavirus Disease 19; BMJ, British Medical Journal; NR, Not Reported.