eLearning in Health Bibliography 2019-2021*
v1.5

Introduction

This bibliography, prepared in part as an initial step towards a proposed research project *Impact Evaluation of eLearning in Science and Health Literacies,* has revealed that much of the research presently available concerns using elearning in professional education, be it at undergraduate, postgraduate or professional level. Very little is concerned with health education and literacy at school level.

Moreover, there is little about educating the public in health literacies and in countering **Fake News and Disinformation** - given the fake news infodemic generated during COVID, the professional community needs urgently take a much more proactive and combative line in countering misinformation (see also the introduction to our '*Climate Change*' bibliography).

Useful tools to assist already exist:

- Literacy Online, from the US Office of Disease Prevention and Health Promotion https://health.gov/healthliteracyonline/
- Health LiteracyUK https://www.healthliteracy.org.uk/ has tips and links to other sites on clear and concise communication techniques
- Centers for Disease Control and Prevention (US) website has similar links https://www.cdc.gov/healthliteracy/

whilst various health libraries have produced pointers on how to evaluate and identify reliable information online e.g.:

- Georgia Sate University Library https://research.library.gsu.edu/c.php?g=115557&p=753713
- St George's University of London (including the CRAAP test) https://libguides.sgul.ac.uk/medicine/evaluating
- US National Library of Medicinehttps://medlineplus.gov/webeval/webeval.html

We suggest there is now a need urgently to pool experience and synthesise "what works" in eLearning for health – both in public awareness, in the school curriculum, and in delivering effective professional education.

A general section of references is followed by a number of subdivisions:

- Continuing Education and Training
- Fake News, Disinformation, and Digital Literacies
- Nursing
- Patients and Service Delivery
- Peer Learning
- School & Child Health
- Social Media Applications and Mobile Learning
- Specific Morbidities and Conditions Applications
- Concluding observations

General

Abbasi, Maria S., Naseer Ahmed, Batool Sajjad, Abdullah Alshahrani, Sumera Saeed, Shaur Sarfaraz, Rana S. Alhamdan, Fahim Vohra, and Tariq Abduljabbar. 'E-Learning Perception and Satisfaction among Health Sciences Students amid the COVID-19 Pandemic'. *Work* 67, no. 3 (1 December 2020): 549–56. https://doi.org/10.3233/WOR-203308.
E-learning satisfaction levels were better among developed countries (7.34) compared to developing countries (5.82). E-learning was satisfactory in acquiring knowledge, however not effective in acquiring clinical and technical skills

Al-Balas, Mahmoud, Hasan Ibrahim Al-Balas, Hatim M. Jaber, Khaled Obeidat, Hamzeh Al-Balas, Emad A. Aborajooh, Raed Al-Taher, and Bayan Al-Balas. 'Distance Learning in Clinical Medical Education amid COVID-19 Pandemic in Jordan: Current Situation, Challenges, and Perspectives'. *BMC Medical Education* 20, no. 1 (December 2020): 341. https://doi.org/10.1186/s12909-020-02257-4.
explores distance E-learning among medical students during their clinical years and identifies possible challenges, limitations, satisfaction

Alabdulkarim, Lamya. 'University Health Sciences Students Rating for a Blended Learning Course Framework'. *Saudi Journal of Biological Sciences* 28, no. 9 (September 2021): 5379–85. https://doi.org/10.1016/j.sjbs.2021.05.059.
attitude and satisfaction of students seemed to play a vital role in teaching and learning outcomes. e-learning tools provided flexible learning environment, regardless of location and time zone.

Anwar, Aiza, Hajra Mansoor, Danyal Faisal, and Huma Saeed Khan. 'E-Learning amid the COVID-19 Lockdown: Standpoint of Medical and Dental Undergraduates'. *Pakistan Journal of Medical Sciences* 37, no. 1 (9 December 2020). https://doi.org/10.12669/pjms.37.1.3124.
Students agreed online study material provides flexibility in the learning process but also saves time. Female participants showed more positive readiness response. Students have easier access to teaching resources. Online lectures were more organized and stimulated interest Frequent participation in the learning process is important for success in online education .

Arora, Anish K., Charo Rodriguez, Tamara Carver, Matthew Hacker Teper, Laura Rojas-Rozo, and Tibor Schuster. 'Evaluating Usability in Blended Learning Programs Within Health Professions Education: A Scoping Review'. *Medical Science Educator* 31, no. 3 (June 2021): 1213–46. https://doi.org/10.1007/s40670-021-01295-x.
Study sought to map current knowledge about and understanding of how usability has been conceptualized and evaluated in the context of Blended Learning Programs within Health Professions Education.

Back, David A., Florian Behringer, Nicole Haberstroh, Jan P. Ehlers, Kai Sostmann, and Harm Peters. 'Learning Management System and E-Learning Tools: An Experience of Medical Students' Usage and Expectations'. *International Journal of Medical Education* 7 (20 August 2016): 267–73. https://doi.org/10.5116/ijme.57a5.f0f5.
Study from Berlin of student experiences and wishes from a Learning Management System

Bączek, Michał, Michalina Zagańczyk-Bączek, Monika Szpringer, Andrzej Jaroszyński, and Beata Wożakowska-Kapłon. 'Students' Perception of Online Learning during the COVID-19 Pandemic: A Survey Study of Polish Medical Students'. *Medicine* 100, no. 7 (19 February 2021): e24821. https://doi.org/10.1097/MD.0000000000024821.
"successful implementation of online learning into the curriculum requires a well thought-out strategy and a more active approach."

Barteit, Sandra, Dorota Guzek, Albrecht Jahn, Till Bärnighausen, Margarida Mendes Jorge, and Florian Neuhann. 'Evaluation of E-Learning for Medical Education in Low- and Middle-Income Countries: A Systematic Review'. *Computers & Education* 145 (February 2020): 103726. https://doi.org/10.1016/j.compedu.2019.103726.
Concludes full potential has not been reached because of piecemeal approaches

Blakemore, Louise M, Sarah E M Meek, and Leah K Marks. 'Equipping Learners to Evaluate Online Health Care Resources: Longitudinal Study of Learning Design Strategies in a Health Care Massive Open Online Course'. *Journal of Medical Internet Research* 22, no. 2 (26 February 2020): e15177. https://doi.org/10.2196/15177.
Carefully designing a range of digital literacy–related activities that would be beneficial to this heterogenous group of learners enabled learners to become more effective at evaluating and citing appropriate online resources within their written assignments

Bringman-Rodenbarger, Lauren, and Michael Hortsch. 'How Students Choose E-learning Resources: The Importance of Ease, Familiarity, and Convenience'. *FASEB BioAdvances* 2, no. 5 (May 2020): 286–95. https://doi.org/10.1096/fba.2019-00094.
SecondLook TM histology self-review tool was offered in three different interfaces to students participating in two histology courses These interfaces included PowerPoint files, an online website, and a mobile application (app). Evaluation suggested preference for the familiar rather than the high-tech

Browne, Cherylea J. 'Assessing the Engagement Rates and Satisfaction Levels of Various Clinical Health Science Student Sub-Groups Using Supplementary ELearning Resources in an Introductory Anatomy and Physiology Unit'. *Health Education* 119, no. 1 (1 January 2019): 2–17. https://doi.org/10.1108/HE-04-2018-0020.
The resources were utilized primarily as an exam preparation tool rather than consistently throughout semester. Out of the various courses, the Paramedicine, Physiotherapy and Podiatry students were the most engaged. Course-specific resources may be the way forward.
PAYWALL

Car, Josip, Jan Carlstedt-Duke, Lorainne Tudor Car, Pawel Posadzki, Penny Whiting, Nabil Zary, Rifat Atun, Azeem Majeed, James Campbell, and Digital Health Education Collaboration. 'Digital Education in Health Professions: The Need for Overarching Evidence Synthesis'. *Journal of Medical Internet Research* 21, no. 2 (14 February 2019): e12913. https://doi.org/10.2196/12913.
Digital Health Education Collaboration has been established as an international initiative for effective digital education ...in response to a growing shortage of health professionals worldwide [6] and aims at providing robust evidence to support the transformation of education through use of digital technology.

Carter-Roberts, Helen, Richard Antbring, Manuela Angioi, and Gemma Pugh. 'Usability Testing of an E-Learning Resource Designed to Improve Medical Students' Physical Activity Prescription Skills: A Qualitative Think-Aloud Study'. *BMJ Open* 11, no. 7 (July 2021): e042983. https://doi.org/10.1136/bmjopen-2020-042983.
students noted e-learning should not replace face-to-face teaching and suggested physical activity education best delivered through a blended learning approach; motivation to engage with the MEGA e-learning resource was positively impacted by aesthetically appealing design and interactive gamification elements such as self-assessment quizzes and visual progress tracking.

Chu, Andrew, Dea Biancarelli, Mari-Lynn Drainoni, James Liu, Jeffrey Schneider, Ryan Sullivan, and Alexander Sheng. 'Usability of Learning Moment: Features of an E-Learning Tool That Maximize Adoption by Students'. *Western Journal of Emergency Medicine* 21, no. 1 (9 December 2019): 78–84. https://doi.org/10.5811/westjem.2019.6.42657.
To maximize potential of E-learning tools, every effort should be made to encourage adoption by optimizing usability. We created Learning Moment (LM), a web-based application that integrates principles of asynchronous learning and learning portfolios into a platform on which students can document and share learning experiences in clinical work.

Dadaczynski, K., Okan, O., Messer, M., Leung, A. Y. M., Rosário, R., Darlington, E., & Rathmann, K. (2021). Digital Health Literacy and Web-Based Information-Seeking Behaviors of University Students in Germany During the COVID-19 Pandemic: Cross-sectional Survey Study. *Journal of Medical Internet Research*, *23*(1), e24097. https://doi.org/10.2196/24097

Deepika, Velusami, Krishnamurthy Soundariya, Kaliaperumal Karthikeyan, and Ganapathy Kalaiselvan. '"Learning from Home": Role of e-Learning Methodologies and Tools during Novel Coronavirus Pandemic Outbreak'. *Postgraduate Medical Journal*, 5 November 2020, postgradmedj-2020-137989. https://doi.org/10.1136/postgradmedj-2020-137989.
review emphasises on the various e-learning methods that can be used in the current scenario.
45 full-text articles were reviewed - discusses the methods and tools in e-learning that can modify the traditional ways of content delivery, record maintenance, assessment and feedback.
PAYWALL

Donkin, Rebecca, Elizabeth Askew, and Hollie Stevenson. 'Video Feedback and E-Learning Enhances Laboratory Skills and Engagement in Medical Laboratory Science Students'. *BMC Medical Education* 19, no. 1 (December 2019): 310. https://doi.org/10.1186/s12909-019-1745-1.

students are engaged and motivated when being taught in a blended learning format and respond positively to the use of video recordings with expert feedback for the initial learning of hands-on techniques

Donkin, Rebecca, and Rosemary Rasmussen. 'Student Perception and the Effectiveness of Kahoot!: A Scoping Review in Histology, Anatomy, and Medical Education'. *Anatomical Sciences Education* 14, no. 5 (September 2021): 572–85. https://doi.org/10.1002/ase.2094.
majority of articles supported positive student outcomes including improved collaborative learning, improved knowledge of content, attendance, and participation
PAYWALL

Duckwitz, Veronica, Lena Vogt, Claudia Hautzinger, Alexander Bartel, Sebastian Haase, Mechthild Wiegard, and Marcus G. Doherr. 'Students' Acceptance of Case-based Blended Learning in Mandatory Interdisciplinary Lectures for Clinical Medicine and Veterinary Public Health'. *Veterinary Record Open* 8, no. 1 (December 2021). https://doi.org/10.1002/vro2.14.
evaluation showed a significant improvement of learning motivation and acceptance when compared to the traditional teaching

Ertl, Sebastian, Dagmar Steinmair, and Henriette Löffler-Stastka. 'Encouraging Communication and Cooperation in E-Learning: Solving and Creating New Interdisciplinary Case Histories'. Text/html. *GMS Journal for Medical Education; 38(3):Doc62*, 15 March 2021. https://doi.org/10.3205/ZMA001458.
Case-based elearning can be a promising approach to teach students how to investigate and ask for important information. This Medical University of Vienna paper focuses on undergraduate education and provides an outlook on possible concepts that can be used in different health care sectors.

Fontaine, Guillaume, Sylvie Cossette, Marc-André Maheu-Cadotte, Tanya Mailhot, Marie-France Deschênes, Gabrielle Mathieu-Dupuis, José Côté, Marie-Pierre Gagnon, and Veronique Dubé. 'Efficacy of Adaptive E-Learning for Health Professionals and Students: A Systematic Review and Meta-Analysis'. *BMJ Open* 9, no. 8 (August 2019): e025252. https://doi.org/10.1136/bmjopen-2018-025252.
AEEs appear particularly effective in improving skills in health professionals and students. The adaptivity process within AEEs may be more beneficial for learning skills rather than factual knowledge

Franklin, Gillian, Clare Martin, Marc Ruszaj, Maliyat Matin, Akaash Kataria, Jinwei Hu, Arlen Brickman, and Peter L. Elkin. 'How the COVID-19 Pandemic Impacted Medical Education during the Last Year of Medical School: A Class Survey'. *Life* 11, no. 4 (30 March 2021): 294. https://doi.org/10.3390/life11040294.
rapid adaptation of online e-learning using various learning modalities such as Aquifer, from "face-to-face" in person, didactic learning, was useful to the fourth-year medical students at Buffalo University USA

Gismalla, Mohamed Daffalla-Awadalla, Mohamed Soud Mohamed, Omaima Salah O Ibrahim, Moawia Mohammed Ali Elhassan, and Mohamed NaserEldeen Mohamed. 'Medical Students' Perception towards E-Learning during COVID 19 Pandemic in a High Burden Developing Country'. *BMC Medical Education* 21, no. 1 (December 2021): 377. https://doi.org/10.1186/s12909-021-02811-8.
Draws attention to weaknesses in e-Learning delivery in Sudan and how this might be addressed

Hart, Elizabeth Paige, Jennifer Brueckner-Collins, and Jessica S Bergden. 'A Qualitative Examination Detailing Medical Student Experiences of a Novel Competency-Based Neuroanatomy ELearning Intervention Designed to Bridge a Gap Within an Integrated Medical Curriculum'. *Journal of Medical Education and Curricular Development* 8 (January 2021): 238212052110352. https://doi.org/10.1177/23821205211035231.
competency-based neuroanatomy eLearning intervention shows promising initial results... students described this educational tool as helpful and outlined ways in which to improve this resource.

Hendriks, Renée A, Peter G M de Jong, Wilfried F Admiraal, and Marlies E J Reinders. 'Uncovering Motivation and Self-Regulated Learning Skills in Integrated Medical MOOC Learning: A Mixed Methods Research Protocol'. *BMJ Open* 10, no. 10 (October 2020): e038235. https://doi.org/10.1136/bmjopen-2020-038235.
Report of a study being undertaken at Leiden, Netherlands

Hilburg, Rachel, Niralee Patel, Sophia Ambruso, Mollie A. Biewald, and Samira S. Farouk. 'Medical Education During the Coronavirus Disease-2019 Pandemic: Learning From a Distance'. *Advances in Chronic Kidney Disease* 27, no. 5 (September 2020): 412–17. https://doi.org/10.1053/j.ackd.2020.05.017.
Examines already available technologies in medical education, including video conferencing softwares and social media platforms. Efficient and effective use of these technologies requires an understanding not only of these platforms and their features but also of their inherent limitations

Ibrahim, Nahla Khamis, Rajaa Al Raddadi, Moroj AlDarmasi, Abdullah Al Ghamdi, Mahmoud Gaddoury, Hussain M. AlBar, and Iman Kamal Ramadan. 'Medical Students' Acceptance and Perceptions of e-Learning during the Covid-19 Closure Time in King Abdulaziz University, Jeddah'. *Journal of Infection and Public Health* 14, no. 1 (January 2021): 17–23. https://doi.org/10.1016/j.jiph.2020.11.007.
Students accepted e-learning during Covid-19. More training of students and tutors, better designing e-courses, more interaction, motivation, and blended learning are recommended.

Jaam, Myriam, Zachariah Nazar, Daniel C. Rainkie, Diana Alsayed Hassan, Farhat Naz Hussain, Salah Eldin Kassab, and Abdelali Agouni. 'Using Assessment Design Decision Framework in Understanding the Impact of Rapid Transition to Remote Education on Student Assessment in Health-Related Colleges: A Qualitative Study'. Edited by Tareq Mukattash. *PLOS ONE* 16, no. 7 (9 July 2021): e0254444. https://doi.org/10.1371/journal.pone.0254444.
This Qatari study employed the Assessment Design Decision Framework (ADDF), a theoretical model that considers key aspects of assessment design, to retrospectively investigate from a multi-stakeholder perspective the assessments implemented following the rapid transition to remote learning during COVID-19

Jiang, Zhehan, Hongbin Wu, Huaqin Cheng, Weimin Wang, A'Na Xie, and Sarah Rose Fitzgerald. 'Twelve Tips for Teaching Medical Students Online under COVID-19'. *Medical Education Online* 26, no. 1 (1 January 2021): 1854066. https://doi.org/10.1080/10872981.2020.1854066.
"Best practice" synthesis frrom 40 medical schools, offering specific strategies to optimize teaching online, highlighting tech-based pedagogy, counselling, motivation, and ethics, as well as the assessment and modification

Kyaw, Bhone Myint, Nakul Saxena, Pawel Posadzki, Jitka Vseteckova, Charoula Konstantia Nikolaou, Pradeep Paul George, Ushashree Divakar, et al. 'Virtual Reality for Health Professions Education: Systematic Review and Meta-Analysis by the Digital Health Education Collaboration'. *Journal of Medical Internet Research* 21, no. 1 (22 January 2019): e12959.
 https://doi.org/10.2196/12959.
VR improves post-intervention knowledge and skills outcomes of health professionals compared with traditional education or other types of digital education such as online or offline digital education. Future research should evaluate the effectiveness of immersive and interactive forms of VR and evaluate outcomes such as attitude, satisfaction, cost-effectiveness, and clinical practice or behavior change.

Kyaw, Bhone Myint, Pawel Posadzki, Sophie Paddock, Josip Car, James Campbell, and Lorainne Tudor Car. 'Effectiveness of Digital Education on Communication Skills Among Medical Students: Systematic Review and Meta-Analysis by the Digital Health Education Collaboration'. *Journal of Medical Internet Research* 21, no. 8 (27 August 2019): e12967. https://doi.org/10.2196/12967.
Blended digital education seems to be at least as effective as and potentially more effective than traditional learning for communication skills

Lee, Su-Jin, Jayoung Park, Yoon Jung Lee, Sira Lee, Woong-Han Kim, and Hyun Bae Yoon. 'The Feasibility and Satisfaction of an Online Global Health Education Course at a Single Medical School: A Retrospective Study'. *Korean Journal of Medical Education* 32, no. 4 (1 December 2020): 307–15. https://doi.org/10.3946/kjme.2020.178.
Online course was comparable to traditional course except for drawback of lack of interaction between peer-learners.

Leung, Billy C, Matthew Williams, Christopher Horton, and Thomas DA Cosker. 'Modernising Anatomy Teaching: Which Resources Do Students Rely On?' *Journal of Medical Education and Curricular Development* 7 (January 2020): 238212052095515. https://doi.org/10.1177/2382120520955156.
Our results provided a snapshot of students' preferences in studying anatomy, and highlighted the importance of digital platforms and the need for evaluating our own learning resources. .. there is an increasing tendency for students to rely on the Internet for information, which may expose them to unfiltered and unreliable content.

Lim, Hooi Min, Chirk Jenn Ng, Chin Hai Teo, Ping Yein Lee, Puteri Shanaz Jahn Kassim, Nurul Amelina Nasharuddin, Phelim Voon Chen Yong, et al. 'Prioritising Topics for Developing E-Learning Resources in Healthcare Curricula: A Comparison between Students and Educators Using a Modified Delphi Survey'. Edited by Jenny Wilkinson. *PLOS ONE* 16, no. 6 (24 June 2021): e0253471. https://doi.org/10.1371/journal.pone.0253471.
The mismatch in prioritised topics between students and educators uncovered factors that might influence the prioritisation process. This study highlighted the importance of conducting needs assessment at the beginning of eLearning resources development.

Liu, Qinlai, Wenping Sun, Changqing Du, Leiying Yang, Na Yuan, Haiqing Cui, Wengang Song, and Li Ge. 'Medical Morphology Training Using the Xuexi Tong Platform During the COVID-19 Pandemic: Development and Validation of a Web-Based Teaching Approach'.

JMIR Medical Informatics 9, no. 3 (15 March 2021): e24497.
https://doi.org/10.2196/24497.
study showed that the web-based teaching mode was not inferior to the traditional offline teaching mode for medical morphology courses

Meinert, Edward, Jessie Eerens, Christina Banks, Stephen Maloney, George Rivers, Dragan Ilic, Kieran Walsh, Azeem Majeed, and Josip Car. 'Exploring the Cost of ELearning in Health Professions Education: Scoping Review'. *JMIR Medical Education* 7, no. 1 (11 March 2021): e13681. https://doi.org/10.2196/13681.
cost is a recognized factor in studies detailing eLearning design and implementation; the way cost is captured is inconsistent. Despite a perception that eLearning is more cost-effective than face-to-face instruction, there is not yet sufficient evidence to assert this conclusively. A rigorous, repeatable data capture method is needed

Miao, Julia H. 'Adapting Medical Education Initiatives Through Team-Based e-Learning, Telemedicine Objective Structured Clinical Exams, and Student-Led Community Outreach During the COVID-19 Pandemic'. *JMIR Medical Education* 7, no. 2 (14 June 2021): e26797. https://doi.org/10.2196/26797.
Through the perspective of medical students, we share how the COVID-19 pandemic has impacted and transformed small team-based learning in medical education; changed objective structured clinical exam evaluations and the practice of clinical skills through telemedicine; and nurtured nationwide, web-based, student-led initiatives for community outreach, telehealth, and medical services.

Molina-Arrebola, Maria-Angustias, Elena Fernández-Guerrero, Francisco-Javier Aguirre-Ortega, and Cristóbal Avivar-Oyonarte. 'Digital Resources for Transfusion Education'. *Journal of Education and Health Promotion* 9, no. 1 (2020): 173. https://doi.org/10.4103/jehp.jehp_81_20.
E-learning has demonstrated itself as an affordable solution [for] training of all staff involved in the transfusion process at our hospital, with the advantage that it includes general knowledge and particular skills in local transfusion medical practice.

Muflih, Suhaib, Sawsan Abuhammad, Reema Karasneh, Sayer Al-Azzam, Karem H Alzoubi, and Mohammad Muflih. 'Online Education for Undergraduate Health Professional Education during the COVID-19 Pandemic: Attitudes, Barriers, and Ethical Issues'. Preprint. In Review, 16 July 2020. https://doi.org/10.21203/rs.3.rs-42336/v1.
further research is needed to assess whether learners are ready and willing to make greater use of online education to obtain high quality teaching and learning opportunities

Müller, Andre Matthias, Charlene Goh, Li Zhen Lim, and Xiaoli Gao. 'COVID-19 Emergency ELearning and Beyond: Experiences and Perspectives of University Educators'. *Education Sciences* 11, no. 1 (5 January 2021): 19. https://doi.org/10.3390/educsci11010019.
Experience of HE in Singapore, the issues raised are of general interest and suggest blended learning is the way forward

Munabi, Ian G., Erisa S. Mwaka, Gonzaga G. Kirum, Haruna Kirwowa, Aloysius Gonzaga Mubuuke, Sarah Kiguli, and William Buwembo. 'Effect of an ELearning Intervention on Undergraduate Health Professional Student's General Histology and Embryology

Summative Examination Scores'. *OALib* 07, no. 06 (2020): 1–13.
https://doi.org/10.4236/oalib.1106230.
Overall the students in the course with the online eLearning intervention had significantly better examination scores. The student's nationality, sponsorship and program significantly affect their examination scores.

Naeem, Noor-i-Kiran, and Rehan Ahmed Khan. 'Stuck in the Blend: Challenges Faced by Students Enrolled in Blended Programs of Masters in Health Professions Education'. *Pakistan Journal of Medical Sciences* 35, no. 4 (29 June 2019).
https://doi.org/10.12669/pjms.35.4.12.
Students of MHPE are challenged with variety of issues in blended learning program relating to self-regulation, heavy cognitive load with engagement, social interaction especially with facilitators and managing group dynamics. Addressing these issues can improve the experience of these students in blended programs.Study from Pakistan

Okan, Orkan, Ullrich Bauer, Diane Levin-Zamir, Paulo Pinheiro, and Kristine Sørensen, eds. *International Handbook of Health Literacy: Research, Practice and Policy across the Lifespan*. Bristol: Policy Press, 2019.
https://library.oapen.org/handle/20.500.12657/24879
Includes coverage of measuring instruments, but relatively little attention to the use of eLearning

Olum, Ronald, Linda Atulinda, Edwin Kigozi, Dianah Rhoda Nassozi, Alzan Mulekwa, Felix Bongomin, and Sarah Kiguli. 'Medical Education and E-Learning During COVID-19 Pandemic: Awareness, Attitudes, Preferences, and Barriers Among Undergraduate Medicine and Nursing Students at Makerere University, Uganda'. *Journal of Medical Education and Curricular Development* 7 (January 2020): 238212052097321.
https://doi.org/10.1177/2382120520973212.

Otaki, Farah, Shroque Zaher, Stefan Du Plessis, Ritu Lakhtakia, Nabil Zary, and Ibrahim M. Inuwa. 'Introducing the 4Ps Model [People processes platforms policies] of Transitioning to Distance Learning: A Convergent Mixed Methods Study Conducted during the COVID-19 Pandemic'. Edited by Haoran Xie. *PLOS ONE* 16, no. 7 (15 July 2021): e0253662. https://doi.org/10.1371/journal.pone.0253662.
how was the rapid transition to distance learning, due to COVID-19, perceived by undergraduate medical students and instructors, and how do those perceptions relate to one another? Which variables converged to maintain the embeddedness and active participation of the students throughout the transition

Pham, Do-Quyen, Sarah A. Golub, Cora Collette Breuner, and Yolanda N. Evans. 'The Impact of Telehealth on Clinical Education in Adolescent Medicine During the COVID-19 Pandemic: Positive Preliminary Findings'. *Frontiers in Pediatrics* 9 (19 March 2021): 642279. https://doi.org/10.3389/fped.2021.642279.
aim of our study was to assess the educational experience of Pediatric and Adolescent Medicine trainees participating in clinical encounters via telehealth in a specialty Adolescent Medicine Clinic.

Prasetyo, Yogi Tri, Ralph Andre C. Roque, Thanatorn Chuenyindee, Michael Nayat Young, John Francis T. Diaz, Satria Fadil Persada, Bobby Ardiansyah Miraja, and Anak Agung Ngurah Perwira Redi. 'Determining Factors Affecting the Acceptance of Medical Education ELearning Platforms during the COVID-19 Pandemic in the Philippines: UTAUT2 Approach'. *Healthcare* 9, no. 7 (22 June 2021): 780.
https://doi.org/10.3390/healthcare9070780.

performance expectancy was found to have the highest effect on behavioral intention, which was followed by learning value and instructor characteristics

Prosser, Mia, Thomas Stephenson, Jai Mathur, Hanieh Enayati, Abdirasak Kadie, Manal Mohamed Abdi, Jibril I. M. Handuleh, and Roxanne C. Keynejad. 'Reflective Practice and Transcultural Psychiatry Peer E-Learning between Somaliland and the UK: A Qualitative Evaluation'. *BMC Medical Education* 21, no. 1 (December 2021): 58. https://doi.org/10.1186/s12909-020-02465-y.
E-learning programmes have the potential to develop reflective practice in remote settings and low- and middle-income countries (LMICs), where access to in-person reflective groups may be reduced. 'Aqoon' is a global mental health peer-to-peer e-learning programme

Puljak, Livia, Marta Čivljak, Ana Haramina, Snježana Mališa, Dalibor Čavić, Dinko Klinec, Diana Aranza, et al. 'Attitudes and Concerns of Undergraduate University Health Sciences Students in Croatia Regarding Complete Switch to E-Learning during COVID-19 Pandemic: A Survey'. *BMC Medical Education* 20, no. 1 (December 2020): 416. https://doi.org/10.1186/s12909-020-02343-7.
Most health sciences students were satisfied with the exclusive e-learning, as well as their personal and institutional adjustment to it. Students' feedback can help institutions to improve the exclusive e-learning experience

Rajeh, Mona T., Fahad H. Abduljabbar, Saad M. Alqahtani, Feras J. Waly, Ibrahim Alnaami, Abdulaziz Aljurayyan, and Naweed Alzaman. 'Students' Satisfaction and Continued Intention toward e-Learning: A Theory-Based Study'. *Medical Education Online* 26, no. 1 (1 January 2021): 1961348. https://doi.org/10.1080/10872981.2021.1961348.
Saudi study suggesting need for easy and useful e-learning platforms. In addition, training and motivating students to continue e-learning and increasing their confidence to ensure the effective and efficient use of such teaching modalities.

Regmi, Krishna, and Linda Jones. 'A Systematic Review of the Factors – Enablers and Barriers – Affecting e-Learning in Health Sciences Education'. *BMC Medical Education* 20, no. 1 (December 2020): 91. https://doi.org/10.1186/s12909-020-02007-6.
need to put learners at the centre of learning – considering the pedagogic design, learning styles and their expectations, integrating e-learning into health science education curriculum and practice.

Reinhart, Anika, Bastian Malzkorn, Carsten Döing, Ines Beyer, Jana Jünger, and Hans Martin Bosse. 'Undergraduate Medical Education amid COVID-19: A Qualitative Analysis of Enablers and Barriers to Acquiring Competencies in Distant Learning Using Focus Groups'. *Medical Education Online* 26, no. 1 (1 January 2021): 1940765. https://doi.org/10.1080/10872981.2021.1940765.
results may offer guidance on the thoughtful design of future (medical) curricula for a competency-based medical education integrating distant learning – and at the same time alleviate its potentially adverse effects on learning and mental wellbeing. Our model may support a thoughtful, necessary transition to future e-learning and hybrid programs to advance medical education beyond the COVID-19 pandemic

Rhim, Hye Chang, and Heeyoung Han. 'Teaching Online: Foundational Concepts of Online Learning and Practical Guidelines'. *Korean Journal of Medical Education* 32, no. 3 (1 September 2020): 175–83. https://doi.org/10.3946/kjme.2020.171.
Includes discussion of "practical guidelines for designing an effective online curriculum."

Rossettini, Giacomo, Tommaso Geri, Andrea Turolla, Antonello Viceconti, Cristina Scumà, Mattia Mirandola, Andrea Dell'Isola, Silvia Gianola, Filippo Maselli, and Alvisa Palese. 'Online Teaching in Physiotherapy Education during COVID-19 Pandemic in Italy: A Retrospective Case-Control Study on Students' Satisfaction and Performance'. *BMC Medical Education* 21, no. 1 (December 2021): 456. https://doi.org/10.1186/s12909-021-02896-1.
retrospective case-control study aims to compare students' satisfaction and performances shown in an online course to a control group of students who underwent the same course delivered face-to-face in the previous five years.

Sebbani, Majda, Latifa Adarmouch, Adil Mansouri, Ouassim Mansoury, Sarah Michaud, Ahmed Rhassane ElAdib, Mohamed Bouskraoui, and Mohamed Amine. 'Implementation of Online Teaching in Medical Education: Lessons Learned from Students' Perspectives during the Health Crisis in Marrakesh, Morocco'. Edited by Harco Leslie Hendric Spits Warnars. *Education Research International* 2021 (16 April 2021): 5547821. https://doi.org/10.1155/2021/5547821.
institutionalization of virtual learning with more interaction in addition to the in-person courses is the main recommendation of this study

Sepp, Kristiina, and Daisy Volmer. 'Use of Face-to-Face Assessment Methods in E-Learning—An Example of an Objective Structured Clinical Examination (OSCE) Test'. *Pharmacy* 9, no. 3 (20 August 2021): 144. https://doi.org/10.3390/pharmacy9030144.
results demonstrated the feasibility and effectiveness of and students' satisfaction with OSCE tests in the Zoom environment

Soundy, Andy, Laura Hemmings, Lucy Gardiner, Sheeba Rosewilliam, Nicola R. Heneghan, Katie Cronin, and Kate Reid. 'E-Learning Communication Skills Training for Physiotherapy Students: A Two Phased Sequential Mixed Methods Study'. *Patient Education and Counseling* 104, no. 8 (August 2021): 2045–53. https://doi.org/10.1016/j.pec.2021.01.022.
e-learning groups identified an increase in the perceived ability to handle distressing communication. Elearning may have an important role in Curriculum Development
PAYWALL

Suppan, Mélanie, Loric Stuby, Emmanuel Carrera, Philippe Cottet, Avinash Koka, Frédéric Assal, Georges Louis Savoldelli, and Laurent Suppan. 'Asynchronous Distance Learning of the National Institutes of Health Stroke Scale During the COVID-19 Pandemic (E-Learning vs Video): Randomized Controlled Trial'. *Journal of Medical Internet Research* 23, no. 1 (15 January 2021): e23594. https://doi.org/10.2196/23594.
Compared to traditional didactic video, a highly interactive e-learning module enhances asynchronous distance learning and NIHSS knowledge in senior medical students.

Sweileh, Waleed M. 'Global Research Activity on E-Learning in Health Sciences Education: A Bibliometric Analysis'. *Medical Science Educator* 31, no. 2 (April 2021): 765–75. https://doi.org/10.1007/s40670-021-01254-6.
Notes inadequate international research cooperation and a dearth of articles from the Global South

Tan, Jun Wen, and Nabil Zary. 'Diagnostic Markers of User Experience, Play, and Learning for Digital Serious Games: A Conceptual Framework Study'. *JMIR Serious Games* 7, no. 3 (16 July 2019): e14620. https://doi.org/10.2196/14620.
there remains little consensus in medical education on core components that afford a serious game its seriousness whilst retaining the fun and entertaining elements that characterize recreational games ...such games are often the result of attempts to gamify an existing teaching method, but suffer from poor instructional or game design so perform poorly compared to methods they were meant to replace / support

Thom, Mitchell L., Blair A. Kimble, Kelli Qua, and Susanne Wish-Baratz. 'Is Remote Near-peer Anatomy Teaching an Effective Teaching Strategy? Lessons Learned from the Transition to Online Learning during the Covid-19 Pandemic'. *Anatomical Sciences Education*, 8 September 2021, ase.2122. https://doi.org/10.1002/ase.2122.
University of Malta study reviewing how near-peer learning can successfully be transferred as an online activity.

Tuma, Faiz, Aussama K. Nassar, Mohamed K. Kamel, Lisa M. Knowlton, and Naseer Kadhim Jawad. 'Students and Faculty Perception of Distance Medical Education Outcomes in Resource-Constrained System during COVID-19 Pandemic. A Cross-Sectional Study'. *Annals of Medicine and Surgery* 62 (February 2021): 377–82. https://doi.org/10.1016/j.amsu.2021.01.073.
Iraqi study: concludes requirements are adequate preparation, good quality audio-visuals and Internet, and student engagement activities

Ulrich, Frank, Niels Henrik Helms, Uffe Poulsgaard Frandsen, and Anne Vollen Rafn. 'Learning Effectiveness of 360° Video: Experiences from a Controlled Experiment in Healthcare Education'. *Interactive Learning Environments* 29, no. 1 (2 January 2021): 98–111. https://doi.org/10.1080/10494820.2019.1579234.
Eighty-one physiotherapy students participated in the experiment. Results show 360° video to be just as effective to enhance academic performance as regular video and traditional teaching. However, 360° video and regular video were less effective than traditional teaching in students' learning satisfaction
PAYWALL

Vallée, Alexandre, Jacques Blacher, Alain Cariou, and Emmanuel Sorbets. 'Blended Learning Compared to Traditional Learning in Medical Education: Systematic Review and Meta-Analysis'. *Journal of Medical Internet Research* 22, no. 8 (10 August 2020): e16504. https://doi.org/10.2196/16504.
From this review, blended learning demonstrated consistently better effects on knowledge outcomes when compared with traditional learning

Vedi, Neeraj, and Puja Dulloo. 'Students' Perception and Learning on Case Based Teaching in Anatomy and Physiology: An e-Learning Approach'. *Journal of Advances in Medical Education & Professionalism* 9, no. 1 (January 2021). https://doi.org/10.30476/jamp.2020.87332.1304
Case based teaching (CBT) has been accepted as an effective interactive learning strategy. Digital portals allow the students to learn the content at their own pace, explore various resources and finally enable them to discuss within group and build team work approach, which is a prime focus in the health care professional field

Viljoen, Charle André, Rob Scott Millar, Kathryn Manning, and Vanessa Celeste Burch. 'Effectiveness of Blended Learning versus Lectures Alone on ECG Analysis and Interpretation by Medical Students'. *BMC Medical Education* 20, no. 1 (December 2020): 488. https://doi.org/10.1186/s12909-020-02403-y.
Blended learning achieved significantly better levels of ECG competence and confidence amongst medical students than conventional ECG teaching

Wang, Cixiao, A'na Xie, Weimin Wang, and Hongbin Wu. 'Association between Medical Students' Prior Experiences and Perceptions of Formal Online Education Developed in Response to COVID-19: A Cross-Sectional Study in China'. *BMJ Open* 10, no. 10 (1 October 2020): e041886. https://doi.org/10.1136/bmjopen-2020-041886.
"online learning is perceived less favourably by male students and students from rural areas; students in higher learning phases in which clinical practices are important, and high selfevaluation students."

Yaqinuddin, Ahmed, Junaid Kashir, Wael AlKattan, and Khaled AlKattan. 'Applying Integrated Video Assisted Learning Approaches for Medical Clerkship – Potential Adaptations in the Post-COVID-19 Era'. *Journal of Medical Education and Curricular Development* 7 (January 2020): 238212052096304. https://doi.org/10.1177/2382120520963043.
discusses number of options that could be deployed to aid acquisition of requisite skills during the clerkship years, with a focus on wearable technologies and video recording/broadcasting.

Yildiz, Suleyman, İhsan Selçuk Yurttaş, Ayfer Gözü Pirinççioğlu, İrem Aktar, Emine Senkal, Abdullah Yıldız, İlker Kelle, and İsmail Yıldız. 'European Medical Students' Attitudes on Distance Learning during COVID-19 Pandemic'. *MedEdPublish* 10, no. 1 (2021). https://doi.org/10.15694/mep.2021.000172.1.
short report of survey study on "Attitudes of Medical Students to Distance Learning during COVID-19 Pandemic" through European Medical Students' Association's member faculties, with some suggestions for effective use of e-learning

Zalat, Marwa Mohamed, Mona Sami Hamed, and Sarah Abdelhalim Bolbol. 'The Experiences, Challenges, and Acceptance of e-Learning as a Tool for Teaching during the COVID-19 Pandemic among University Medical Staff'. Edited by Gwo-Jen Hwang. *PLOS ONE* 16, no. 3 (26 March 2021): e0248758. https://doi.org/10.1371/journal.pone.0248758.
Study from Zagazig University, Egypt

Zamberg, Ido, Eduardo Schiffer, and Catherine Stoermann-Chopard. 'Novice and Advanced Learners' Satisfaction and Perceptions of an e-Learning Renal Semiology Module During the COVID-19 Pandemic: Mixed Methods Study'. *JMIR Medical Education* 7, no. 2 (28 June 2021): e29216. https://doi.org/10.2196/29216.
Case-based e-learning activities might be better suited for advanced learners and could increase learners' satisfaction within a blended teaching instructional design.

Zhang, Qian, Yu Shi, Youqing Xin, Shutian Zhang, Na Zeng, Mo Liu, Shanshan Wu, et al. 'A Multimodal International Collaborative Clinical Research Training Program in China'. *Medical Education Online* 24, no. 1 (1 January 2019): 1679944. https://doi.org/10.1080/10872981.2019.1679944.

Zupanic, Michaela, Patrick Rebacz, and Jan P Ehlers. 'Media Use Among Students From Different Health Curricula: Survey Study'. *JMIR Medical Education* 5, no. 2 (19 August 2019): e12809. https://doi.org/10.2196/12809.
The results show that almost all students use electronic learning (e-learning) tools. At the same time, different profiles for different degree programs become apparent, which are to be attributed to not only the varying curricula and courses but also to the life circumstances of different age groups. Universities should, therefore, pay attention to the diverse user patterns and media literacy levels of students when planning courses to enable successful use of e-learning methods.

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Continuing Education and Training

Aalaa, Maryam, Mahnaz Sanjari, Mohammad Reza Amini, Ghobad Ramezani, Neda Mehrdad, Mohammad Reza Mohajeri Tehrani, Shoaleh Bigdeli, Hosein Adibi, Bagher Larijani, and Zohreh Sohrabi. 'Diabetic Foot Care Course: A Quasi-Experimental Study on E-Learning versus Interactive Workshop'. *Journal of Diabetes & Metabolic Disorders* 20, no. 1 (June 2021): 15–20. https://doi.org/10.1007/s40200-020-00630-0.
findings suggest that the e-learning course of DF could be as effective as conventional educational methods. However, considering the time, cost savings and providing an opportunity to learn anytime and anywhere, of the e-learning course, it is recommend for the future and required that more health care providers be trained to use of distance learning
PAYWALL

Annan, Reginald Adjetey, Linda Nana Esi Aduku, Samuel Kyei-Boateng, Ho Ming Yuen, Trevor Pickup, Andy Pulman, Michele Monroy-Valle, Ann Ashworth, Alan A. Jackson, and Sunhea Choi. 'Implementing Effective ELearning for Scaling up Global Capacity Building: Findings from the Malnutrition Elearning Course Evaluation in Ghana'. *Global Health Action* 13, no. 1 (31 December 2020): 1831794. https://doi.org/10.1080/16549716.2020.1831794.
Concludes eLearing can be an effective way of disseminating training

Bakibinga, Pauline, Eva Kamande, Lyagamula Kisia, Milka Omuya, Dennis J. Matanda, and Catherine Kyobutungi. 'Challenges and Prospects for Implementation of Community Health Volunteers' Digital Health Solutions in Kenya: A Qualitative Study'. *BMC Health Services Research* 20, no. 1 (December 2020): 888. https://doi.org/10.1186/s12913-020-05711-7.
Findings reveal the importance of considering the readiness of information and communication technologies (ICT) users before rollout of ICT solutions. The political and sociocultural environment in which the innovation is to be implemented and integration of new solutions into existing ones is critical for success.

Bannister, James, Mia Neve, and Celeste Kolanko. 'Increased Educational Reach through a [online] Microlearning Approach: Can Higher Participation Translate to Improved Outcomes?' *Journal of European CME* 9, no. 1 (1 January 2020): 1834761. https://doi.org/10.1080/21614083.2020.1834761.
case analysis of a combined microlearning and traditional eLearning approach, observing a movement towards increased learner participation through to evaluation completion compared with similar previous educational programmes

Bikker, Rolf, Kevin Meyer, Petra Domberg, Korbinian Brand, and Marianne Behrends. 'Development and Evaluation of Point-of-Care Testing Recertification with e-Learning'. *Scandinavian Journal of Clinical and Laboratory Investigation* 80, no. 2 (17 February 2020): 133–38. https://doi.org/10.1080/00365513.2019.1703212.
Considering a variety of users and time-independent learning, e-learning is preferred. However, in our experience, e-learning is not always accepted by employees. After using a commercial e-learning program with little success, we developed a specific e-learning offer to achieve a better acceptance of online-based training. Herein our goal was to identify the most relevant aspects for better acceptance. The new e-learning modules were implemented with the learning management system ILIAS and dealt with typical sources of error

Brusamento, Serena, Bhone Myint Kyaw, Penny Whiting, Li Li, and Lorainne Tudor Car. 'Digital Health Professions Education in the Field of Pediatrics: Systematic Review and Meta-Analysis by the Digital Health Education Collaboration'. *Journal of Medical Internet Research* 21, no. 9 (25 September 2019): e14231. https://doi.org/10.2196/14231.
Digital education for postregistration health professions education in pediatrics is at least as effective as traditional learning. High-fidelity mannequins were found to be more effective at improving skills than traditional learning with low-fidelity mannequins. Computer-based offline/online digital education was... as good as traditional face-to-face learning

Chaves, Juan, Antonio A. Lorca-Marín, and Emilio José Delgado-Algarra. 'Methodology of Specialist Physicians Training: From Traditional to e-Learning'. *International Journal of Environmental Research and Public Health* 17, no. 20 (21 October 2020): 7681. https://doi.org/10.3390/ijerph17207681.
Mixed methodology can be effective in medical training. However, there are no conclusive studies in specialist training on advanced life support (ALS). Intervention consisted of e-learning training plus face-to-face workshops versus standard. There were no significant differences in immediate or deferred performance. In satisfaction, a significant difference was obtained in favour of the face-to-face group.

Choi, Sunhea, Ho Ming Yuen, Reginald Annan, Michele Monroy-Valle, Trevor Pickup, Nana Esi Linda Aduku, Andy Pulman, Carmen Elisa Portillo Sermeño, Alan A Jackson, and Ann Ashworth. 'Improved Care and Survival in Severe Malnutrition through ELearning'. *Archives of Disease in Childhood* 105, no. 1 (January 2020): 32–39. https://doi.org/10.1136/archdischild-2018-316539.
eLearning course was successful in improving quality of care for children with SAM, leading to a reduction in mortality. We consider the eLearning course to be a scalable tool to train high volumes of in-service and pre-service health professionals with the potential to advance the Sustainable Development Goals.

Chong, Jun Hua, C. Anwar A. Chahal, Ajay Gupta, Fabrizio Ricci, Mark Westwood, Francesca Pugliese, Steffen E. Petersen, and Mohammed Y. Khanji. 'COVID-19 and the Digitalisation of Cardiovascular Training and Education—A Review of Guiding Themes for Equitable and Effective Post-Graduate Telelearning'. *Frontiers in Cardiovascular Medicine* 8 (2 July 2021): 666119. https://doi.org/10.3389/fcvm.2021.666119.
We highlight five foundational themes for building a successful e-learning model in cardiovascular and general post-graduate medical training: (1) digital solutions and associated infrastructure; (2) equity in access; (3) participant engagement; (4) diversity and inclusion; and (5) patient confidentiality

Colaceci, Sofia, Francesca Zambri, Carmen D'Amore, Alessia De Angelis, Francesco Rasi, Gianluca Pucciarelli, and Angela Giusti. 'Long-Term Effectiveness of an E-Learning Program in Improving Health Care Professionals' Attitudes and Practices on

Breastfeeding: A 1-Year Follow-Up Study'. *Breastfeeding Medicine* 15, no. 4 (1 April 2020): 254–60. https://doi.org/10.1089/bfm.2019.0203.
e-learning program was effective in improving Attitudes and Practices regarding the protection, promotion, and support of breastfeeding. The improvement, higher immediately after training, decreased over time. E-learning project managers should propose strategies to facilitate the retention of knowledge

Hegerius, Anna, Pia Caduff-Janosa, Ruth Savage, and Johan Ellenius. 'E-Learning in Pharmacovigilance: An Evaluation of Microlearning-Based Modules Developed by Uppsala Monitoring Centre'. *Drug Safety* 43, no. 11 (November 2020): 1171–80. https://doi.org/10.1007/s40264-020-00981-w.
Learners from 137 countries participated, predominantly from industry (36.6%), national pharmacovigilance centres (22.6%) and academia (16.3%). The overall satisfaction level was very high for all modules, with over 90% of the learners rating it as either 'excellent' or 'good'. The majority were satisfied with the learning platform, the course content and the lesson duration.

Helle, Segan, and Sarah Steele. 'Cutting Edge or Ignored Resource: Assessing the Uptake and Content of the NHS e-Learning for Healthcare on "Identifying and Supporting Survivors of Modern Slavery"'. *Journal of Public Health* 43, no. 2 (7 June 2021): 413–19. https://doi.org/10.1093/pubmed/fdz124.
e-Learning, while flexible, must be engaging and,accompanied by in-person sessions. Materials should be co-produced with survivors and healthcare workers around the world to improve interest and relevance. Updating content regularly is critical.
PAYWALL

Hoffmann, Tammy C, Chris Del Mar, Ramai Santhirapala, and Alexandra Freeman. 'Teaching Clinicians Shared Decision Making and Risk Communication Online: An Evaluation Study'. *BMJ Evidence-Based Medicine*, 22 September 2020, bmjebm-2020-111521. https://doi.org/10.1136/bmjebm-2020-111521.
This online, free e-learning course was successful in increasing participants' confidence in, and some aspects of knowledge about, shared decision making and risk communication. We suggest that the course is used in combination with practical face-to-face experience and more intensive numerical skills training

Ibáñez-Carrasco, Francisco, Catherine Worthington, Sean Rourke, and Colin Hastings. 'Universities without Walls: A Blended Delivery Approach to Training the Next Generation of HIV Researchers in Canada'. *International Journal of Environmental Research and Public Health* 17, no. 12 (15 June 2020): 4265. https://doi.org/10.3390/ijerph17124265.
curricular components such as interdisciplinarity, community-based research, intervention research, and applied ethics-can be learned through a blended delivery when combined with opportunities to apply the knowledge with eg field mentoring placement and a learning institute

Leeuw, Robert de, Anneloes de Soet, Sabine van der Horst, Kieran Walsh, Michiel Westerman, and Fedde Scheele. 'How We Evaluate Postgraduate Medical E-Learning: Systematic Review'. *JMIR Medical Education* 5, no. 1 (5 April 2019): e13128. https://doi.org/10.2196/13128.
need for an evaluation tool that is properly constructed, validated, and tested. This could be a more homogeneous way to compare the effects of e-learning and for authors of e-learning to continue to improve their product.

McCabe, Catherine, Kunal D Patel, Simon Fletcher, Niall Winters, Greg Sheaf, Jarlath Varley, and Margaret McCann. 'Online Interprofessional Education Related to Chronic Illness for Health Professionals: A Scoping Review'. *Journal of Interprofessional Care* 35, no. 3 (4 May 2021): 444–53. https://doi.org/10.1080/13561820.2020.1749575.
review found very limited research for online interprofessional education related to chronic disease
PAYWALL

May, Nicholas, Jeanne Young, and Lucia Gillman. 'Take 5: Designing and Evaluating 5-Minute ELearning for Busy Hospital Staff'. *Focus on Health Professional Education: A Multi-Professional Journal* 22, no. 2 (30 July 2021): 60–71. https://doi.org/10.11157/fohpe.v22i2.505.
Take 5 uptake has been strong and sustained. The concept was not designed to replace formal education but to act as an adjunct, providing key education to meet staff demands. It provided immediacy of information and quality evidence-based content

McMahon, Colin J., Justin T. Tretter, Theresa Faulkner, R. Krishna Kumar, Andrew N. Redington, and Jonathan D. Windram. 'Are E-Learning Webinars the Future of Medical Education? An Exploratory Study of a Disruptive Innovation in the COVID-19 Era'. *Cardiology in the Young* 31, no. 5 (May 2021): 734–43. https://doi.org/10.1017/S1047951120004503.
assesses impact of Webinars on deep learning of topical areas within the management of post-operative tetralogy of Fallot patients. Over 70% of participants reported they "agreed" or "strongly agreed" Webinar format promoted deep learning compared to other standard learning methods (textbook and journal learning). Two-thirds expressed preference for attending Webinar rather than an international conference
PAYWALL

Nguyen, Jonathan, and Natalie Ong. 'Evaluating a Pilot ELearning Program as an Educational Tool for Child Health and Developmental Surveillance in General Practice'. *MedEdPublish* 9, no. 1 (2020). https://doi.org/10.15694/mep.2020.000255.1.
Sydney [Australia] Local Health District Well Child Health eLearning program has the potential to be an effective medical education tool for general practitioners and can lead to an increase in knowledge of child health and developmental surveillance.

Otu, Akaninyene, Okey Okuzu, Emmanuel Effa, Bassey Ebenso, Soter Ameh, Nrip Nihalani, Obiageli Onwusaka, Tomisin Tawose, Adebola Olayinka, and John Walley. 'Training Health Workers at Scale in Nigeria to Fight COVID-19 Using the InStrat COVID-19 Tutorial App: An e-Health Interventional Study'. *Therapeutic Advances in Infectious Disease* 8 (January 2021): 204993612110407. https://doi.org/10.1177/20499361211040704.
Health worker training is an essential component of epidemic control; rapid delivery of such training is possible in low-middle income countries with digital platforms.

Rawlings, Deb, Jennifer Tieman, and Carly Moores. 'E-Learning: Who Uses It and What Difference Does It Make?' *International Journal of Palliative Nursing* 25, no. 10 (2 October 2019): 482–93. https://doi.org/10.12968/ijpn.2019.25.10.482.
Study concludes elearning can make possible provision of easily updatable content geared to various target groups

Rouleau, Geneviève, Marie-Pierre Gagnon, José Côté, Julie Payne-Gagnon, Emilie Hudson, Carl-Ardy Dubois, and Julien Bouix-Picasso. 'Effects of E-Learning in a Continuing Education Context on Nursing Care: Systematic Review of Systematic Qualitative, Quantitative, and Mixed-Studies Reviews'. *Journal of Medical Internet Research* 21, no. 10 (2 October 2019): e15118. https://doi.org/10.2196/15118.

Rudd, Kristina E., Nancy Puttkammer, Jennifer Antilla, Janise Richards, Matthew Heffron, Herman Tolentino, Daniel J. Jacobs, et al. 'Building Workforce Capacity for Effective Use of Health Information Systems: Evaluation of a Blended ELearning Course in Namibia and Tanzania'. *International Journal of Medical Informatics* 131 (November 2019): 103945. https://doi.org/10.1016/j.ijmedinf.2019.08.005.
blended eLearning course is an effective method with which to train healthcare workers in the basic features of HIS, and the cost is up to 3-4 times less expensive than for an in-person course with similar content.
PAYWALL

Sayıner, A. Arzu, and Esin Ergönül. 'E-Learning in Clinical Microbiology and Infectious Diseases'. *Clinical Microbiology and Infection*, May 2021, S1198743X21002317. https://doi.org/10.1016/j.cmi.2021.05.010.
techniques, tools and resources described in this article should be considered for the development and implementation of e-learning programmes in clinical microbiology and infectious disease training.

Shimasaki, Suzuho, Erin Bishop, Michelle Guthrie, and John F (Fred) Thomas. 'Strengthening the Health Workforce through the ECHO Stages of Participation: Participants' Perspectives on Key Facilitators and Barriers'. *Journal of Medical Education and Curricular Development* 6 (January 2019): 238212051882092. https://doi.org/10.1177/2382120518820922.
Study of a programme which made extensive use of Zoom

Wong, Katelyn H., Amanda Allen, and Timur S. Durrani. 'Evaluating Effectiveness of Online Learning Modules in Pediatric Environmental Health Education'. *Journal of Medical Toxicology* 16, no. 3 (July 2020): 269–75. https://doi.org/10.1007/s13181-019-00746-7.
Pediatric Environmental Health Specialty Unit (PEHSU) program offers free, interactive, web-based ("eLearning") modules on environmental health topics. The aim of this study is to determine the effectiveness of PEHSU eLearning modules in increasing knowledge about pediatric and reproductive environmental health
PAYWALL

Yo, Edward Christopher, Anissa Nindhyatriayu Witjaksono, Dewi Yunia Fitriani, Retno Asti Werdhani, and Dyandra Parikesit. 'Assessing Webinar Outcomes for Health Professionals: A Perspective from Indonesia during Coronavirus Disease 2019 Pandemic'. *Korean Journal of Medical Education* 33, no. 2 (1 June 2021): 87–96. https://doi.org/10.3946/kjme.2021.190.
use of webinar for health professionals training in Indonesia was well-received amid the ongoing pandemic. In the future, health institutions and teaching hospitals should optimize the implementation of webinar training as it is associated with low cost, high flexibility, and less time commuting.

Fake News, Disinformation, and Digital Literacies

Articles specifically on teaching these aspects of media literacy in Medical and Health Sciences seem elusive, and the scientific community might usefully take a much more proactive line in countering the fake news infodemic (see introduction to our 'Climate Change' bibliography).

Potentially valuable tools are:
- Health Literacy Online, from the US Office of Disease Prevention and Health Promotion https://health.gov/healthliteracyonline/
- Health LiteracyUK https://www.healthliteracy.org.uk/ has tips and links to other sites on clear and concise communication techniques
- Centers for Disease Control and Prevention (US) website has similar links https://www.cdc.gov/healthliteracy/

For a practical guide to evaluating health sites from Georgia State University Library see https://research.library.gsu.edu/c.php?g=115557&p=753713
similarly, from St George's University of London (including the CRAAP test) https://libguides.sgul.ac.uk/medicine/evaluating
a more in-depth tutorial is available form the US National Library of Medicine https://medlineplus.gov/webeval/webeval.html

and for research articles:

Ayre, Julie, Daniel S J Costa, Kirsten J McCaffery, Don Nutbeam, and Danielle Marie Muscat. 'Validation of an Australian Parenting Health Literacy Skills Instrument: The Parenting plus Skills Index'. *Patient Education and Counseling* 103, no. 6 (June 2020): 1245–51. https://doi.org/10.1016/j.pec.2020.01.012.
The PPSI instrument aimed to assess functional, communicative and critical health literacy skills. PAYWALL

Basol, Melisa, Jon Roozenbeek, and Sander Van der Linden. 'Good News about Bad News: Gamified Inoculation Boosts Confidence and Cognitive Immunity Against Fake News'. *Journal of Cognition* 3, no. 1 (10 January 2020): 2. https://doi.org/10.5334/joc.91.
The inoculation metaphor relies on a medical analogy: by pre-emptively exposing people to weakened doses of misinformation cognitive immunity can be conferred. A recent example is the *Bad News* game, an online fake news game in which players learn about six common misinformation techniques...

Bin Naeem, Salman, and Maged N. Kamel Boulos. 'COVID-19 Misinformation Online and Health Literacy: A Brief Overview'. *International Journal of Environmental Research and Public Health* 18, no. 15 (30 July 2021): 8091. https://doi.org/10.3390/ijerph18158091.
paper provides a quick overview of the magnitude of the problem of COVID-19 misinformation on social media, its devastating effects, and its intricate relation to digital health literacy...tools should ideally focus on evaluating both the message (information content) and the messenger (information author/source)

Blakemore, Louise M, Sarah E M Meek, and Leah K Marks. 'Equipping Learners to Evaluate Online Health Care Resources: Longitudinal Study of Learning Design Strategies

in a Health Care Massive Open Online Course'. *Journal of Medical Internet Research* 22, no. 2 (26 February 2020): e15177. https://doi.org/10.2196/15177.
Carefully designing a range of digital literacy–related activities that would be beneficial to this heterogenous group of learners enabled learners to become more effective at evaluating and citing appropriate online resources within their written assignments

Bonnevie, Erika, Sierra M Smith, Caitlin Kummeth, Jaclyn Goldbarg, and Joe Smyser. 'Social Media Influencers Can Be Used to Deliver Positive Information about the Flu Vaccine: Findings from a Multi-Year Study'. *Health Education Research* 36, no. 3 (12 July 2021): 286–94. https://doi.org/10.1093/her/cyab018.
PAYWALL

Dib, Fadia, Philippe Mayaud, Pierre Chauvin, and Odile Launay. 'Online Mis/Disinformation and Vaccine Hesitancy in the Era of COVID-19: Why We Need an EHealth Literacy Revolution'. *Human Vaccines & Immunotherapeutics*, 24 February 2021, 1–3. https://doi.org/10.1080/21645515.2021.1874218.

Dadaczynski, Kevin, Orkan Okan, Melanie Messer, Angela Y M Leung, Rafaela Rosário, Emily Darlington, and Katharina Rathmann. 'Digital Health Literacy and Web-Based Information-Seeking Behaviors of University Students in Germany During the COVID-19 Pandemic: Cross-Sectional Survey Study'. *Journal of Medical Internet Research* 23, no. 1 (15 January 2021): e24097. https://doi.org/10.2196/24097.
use of social media was associated with a low ability to critically evaluate information, while the opposite was observed for the use of public websites.

Fleming, Nic. 'Coronavirus Misinformation, and How Scientists Can Help to Fight It'. *Nature* 583, no. 7814 (2 July 2020): 155–56. https://doi.org/10.1038/d41586-020-01834-3.

Gaalen, A. E. J. van, J. Brouwer, J. Schönrock-Adema, T. Bouwkamp-Timmer, A. D. C. Jaarsma, and J. R. Georgiadis. 'Gamification of Health Professions Education: A Systematic Review'. *Advances in Health Sciences Education* 26, no. 2 (May 2021): 683–711. https://doi.org/10.1007/s10459-020-10000-3.
Findings suggest it is possible to improve learning outcomes using gamifcation, especially when employing game attributes that improve learning behaviours and attitudes towards learning. Most studies lack well-defned control groups and do not apply theory to understand underlying processes. Future research should clarify mechanisms underlying gamifed educational interventions and explore theories that could explain the effects of these interventions on learning outcomes, using well-defned control groups,

Germani, Federico, and Nikola Biller-Andorno. 'The Anti-Vaccination Infodemic on Social Media: A Behavioral Analysis'. Edited by Luigi Lavorgna. *PLOS ONE* 16, no. 3 (3 March 2021): e0247642. https://doi.org/10.1371/journal.pone.0247642.
we welcome policies that aim at halting the circulation of false information about vaccines by targeting the anti-vaccination community on Twitter. Based on our data, we also propose solutions to improve the communication strategy of health organizations and build a community of engaged influencers that support the dissemination of scientific insights

Great Britain. House of Commons. Digital, Culture, Media and and Sport Committee. 'Misinformation in the COVID-19 Infodemic Second Report of Session 2019–21 Report,

Together with Formal Minutes Relating to the Report', 2021.
https://committees.parliament.uk/publications/1954/documents/19089/default/.

Leung, Billy C, Matthew Williams, Christopher Horton, and Thomas DA Cosker.
'Modernising Anatomy Teaching: Which Resources Do Students Rely On?' *Journal of Medical Education and Curricular Development* 7 (January 2020): 238212052095515.
https://doi.org/10.1177/2382120520955156.
Our results provided a snapshot of students' preferences in studying anatomy, and highlighted the importance of digital platforms and the need for evaluating our own learning resources. .. there is an increasing tendency for students to rely on the Internet for information, which may expose them to unfiltered and unreliable content.

Lewandowsky, Stephan, and Sander van der Linden. 'Countering Misinformation and Fake News Through Inoculation and Prebunking'. *European Review of Social Psychology*, 22 February 2021, 1–38. https://doi.org/10.1080/10463283.2021.1876983.
Inoculation in a digital, not a medical sense: "we need to pursue multiple avenues—many of them political—to contain misinformation and redesign the information architecture that facilitates its dissemination"
PAYWALL

Matthews, Barry. 'Digital Literacy in UK Health Education: What Can Be Learnt from International Research?' *Contemporary Educational Technology* 13, no. 4 (13 July 2021): ep317. https://doi.org/10.30935/cedtech/11072.
This research identifies areas of good practice and areas that need to be considered in higher education programmes and by academics to ensure the digital literacy of the future healthcare workforce.

Melki, Jad, Hani Tamim, Dima Hadid, Maha Makki, Jana El Amine, and Eveline Hitti. 'Mitigating Infodemics: The Relationship between News Exposure and Trust and Belief in COVID-19 Fake News and Social Media Spreading'. Edited by Anat Gesser-Edelsburg. *PLOS ONE* 16, no. 6 (4 June 2021): e0252830.
https://doi.org/10.1371/journal.pone.0252830.
Higher education and trust in information from government contributed to decreasing belief in COVID-19 myths. Trust in news from social media, interpersonal communication and clerics contributed to increasing belief in COVID-19 myths contributing to less critical social media posting practices. Media literacy training contributed to increasing critical social media posting practices

Naeem, Salman Bin, and Rubina Bhatti. 'The Covid-19 "Infodemic": A New Front for Information Professionals'. *Health Information & Libraries Journal* 37, no. 3 (September 2020): 233–39. https://doi.org/10.1111/hir.12311.

Naeem, Salman Bin, Rubina Bhatti, and Aqsa Khan. 'An Exploration of How Fake News Is Taking over Social Media and Putting Public Health at Risk'. *Health Information & Libraries Journal* 38, no. 2 (June 2021): 143–49. https://doi.org/10.1111/hir.12320.
Article identifies problems and suggests some aspirational counter-approaches

Neely, Stephen, Christina Eldredge, and Ron Sanders. 'Health Information Seeking Behaviors on Social Media During the COVID-19 Pandemic Among American Social Networking Site Users: Survey Study'. *Journal of Medical Internet Research* 23, no. 6 (11 June 2021): e29802. https://doi.org/10.2196/29802.

Concludes health workers need to become more proactive and technically savvy to counteract mis- and disinformation

Nutbeam, Don, and Jane E. Lloyd. 'Understanding and Responding to Health Literacy as a Social Determinant of Health'. *Annual Review of Public Health* 42, no. 1 (1 April 2021): 159–73. https://doi.org/10.1146/annurev-publhealth-090419-102529.
Future health literacy intervention research should focus on (a) improving the quality of health communication that reaches a diversity of populations, especially by improving frontline skills; (b) enabling people to develop transferable skills in accessing, and understanding health information; and (c) ensuring that priority is proportionate to need by reaching groups disproportionately affected by low health literacy. UNPAYWALL ACCESS https://www.annualreviews.org/doi/pdf/10.1146/annurev-publhealth-090419-102529

Patil, Uday, Uliana Kostareva, Molly Hadley, Jennifer A. Manganello, Orkan Okan, Kevin Dadaczynski, Philip M. Massey, Joy Agner, and Tetine Sentell. 'Health Literacy, Digital Health Literacy, and COVID-19 Pandemic Attitudes and Behaviors in U.S. College Students: Implications for Interventions'. *International Journal of Environmental Research and Public Health* 18, no. 6 (23 March 2021): 3301. https://doi.org/10.3390/ijerph18063301.

Public Health Wales. 'Guidance for Countering False Information about Coronavirus or the Behaviours Which Prevent Its Transmission'. Accessed 28 September 2021. https://phw.nhs.wales/topics/latest-information-on-novel-coronavirus-covid-19/behaviourally-informed-communications/sup-030/.
Includes Appendix "Useful Resources" incluidng links to "Debunking Handbook", "Conspiracy Theory Handbook", UK Government "RESIST Counter disinformation toolkit" etc

Robinson, Laura, Jeremy Schulz, Øyvind N. Wiborg, and Elisha Johnston. 'The COVID Connection: Pandemic Anxiety, COVID-19 Comprehension, and Digital Confidence'. *American Behavioral Scientist*, 12 April 2021, 000276422110031. https://doi.org/10.1177/00027642211003155.
digitally confident have lower probability of experiencing physical manifestations of pandemic anxiety and higher probability of adequately comprehending critical information on COVID-19

U.S. Surgeon General's Advisory on Building a Healthy Information Environment. 'Confronting Health Misinformation'. Author, 2021. https://www.hhs.gov/sites/default/files/surgeon-general-misinformation-advisory.pdf.
Brief guidance for health professionals, journalists, social media, the public etc
Gaalen, A. E. J. van, J. Brouwer, J. Schönrock-Adema, T. Bouwkamp-Timmer, A. D. C. Jaarsma, and J. R. Georgiadis. 'Gamification of Health Professions Education: A Systematic Review'. *Advances in Health Sciences Education* 26, no. 2 (May 2021): 683–711. https://doi.org/10.1007/s10459-020-10000-3.

World Health Organization. 'Digital Channels: Reaching Digital Populations Everywhere with Trusted Information; Combatting Misinformation Online; Creating New Tools and Channels to Amplify Health Information'. Accessed 30 September 2021. https://www.who.int/teams/digital-health-and-innovation/digital-channels.

World Health Organization and UK Government. 'Tackling Covid-19 Misinformation: Social Media Toolkit for Healthcare Practitioners'. Accessed 30 September 2021.

https://2020yearofthenurse.org/resource/tackling-covid-19-misinformation-social-media-toolkit-for-healthcare-practitioners/.

Zhang, Shuai, Wenjing Pian, Feicheng Ma, Zhenni Ni, and Yunmei Liu. 'Characterizing the COVID-19 Infodemic on Chinese Social Media: Exploratory Study'. *JMIR Public Health and Surveillance* 7, no. 2 (5 February 2021): e26090. https://doi.org/10.2196/26090.
We have tracked the COVID-19 infodemic across Chinese social media, providing critical new insights into the characteristics of the infodemic and pointing out opportunities for preventing and controlling the COVID-19 infodemic.

Zielinski, Chris. 'Infodemics and Infodemiology: A Short History, a Long Future'. *Revista Panamericana de Salud Pública* 45 (12 May 2021): 1. https://doi.org/10.26633/RPSP.2021.40.
WHO has so far made two unsuccessful attempts to create a trusted top-level domain for health information, but it is suggested this could be attempted again, in the light of the COVID-19 infodemic experience. The vital role of reliable information in public health should be recognized in the Sustainable Development Goals, with explicit targets.

Nursing

Dahlke, Sherry, Kathleen F. Hunter, and Oluwakemi Amoudu. 'Innovation in Education With Acute Care Nurses'. *The Journal of Continuing Education in Nursing* 51, no. 9 (September 2020): 420–24. https://doi.org/10.3928/00220124-20200812-07.
innovative methods using an ePlatform have the potential to meet nurses' desires for continuing education that is flexible and applicable to their work, more research is needed to understand its effectiveness
PAYWALL

García-González, Jessica, Wei Ruqiong, Raquel Alarcon-Rodriguez, Mar Requena-Mullor, Can Ding, and Maria Isabel Ventura-Miranda. 'Analysis of Anxiety Levels of Nursing Students Because of E-Learning during the COVID-19 Pandemic'. *Healthcare* 9, no. 3 (1 March 2021): 252. https://doi.org/10.3390/healthcare9030252.
highest anxiety levels were associated with being female, being in the last year of the nursing degree, and living in a house without a garden

Glanville, David, Jane Kiddell, Rosalind Lau, Ana Hutchinson, and Mari Botti. 'Evaluation of the Effectiveness of an ELearning Program in the Nursing Observation and Assessment of Acute Surgical Patients: A Naturalistic Observational Study'. *Nurse Education in Practice* 55 (August 2021): 103152. https://doi.org/10.1016/j.nepr.2021.103152.
An online (eLearn) program highlighting the importance of clinical assessment provided nurses with an overview of the Airway,Breathing, Circulation, Disability, Exposures ('ABCDE') approach.Study provides some evidence that completion of an eLearn can change clinical practice, however the intensity of the intervention was insufficient to achieve optimal practice in the conduct of clinical assessments.
PAYWALL

O'Connor, Siobhan, Claire S. Daly, Juliet MacArthur, Gunilla Borglin, and Richard G. Booth. 'Podcasting in Nursing and Midwifery Education: An Integrative Review'. *Nurse Education in Practice* 47 (August 2020): 102827. https://doi.org/10.1016/j.nepr.2020.102827.

Podcasting is a positive learning tool but more robust research examining its efficacy in improving learning outcomes is needed.
PAYWALL

Rouleau, Geneviève, Marie-Pierre Gagnon, José Côté, Julie Payne-Gagnon, Emilie Hudson, Carl-Ardy Dubois, and Julien Bouix-Picasso. 'Effects of E-Learning in a Continuing Education Context on Nursing Care: Systematic Review of Systematic Qualitative, Quantitative, and Mixed-Studies Reviews'. *Journal of Medical Internet Research* 21, no. 10 (2 October 2019): e15118. https://doi.org/10.2196/15118.
effectiveness of e-learning interventions for nurses in a continuing education context remains unknown regarding how the learning can be transferred to change practice and affect patient outcomes. Further scientific, methodological, theoretical, and practice-based breakthroughs are needed

Saeki Yagi, Machiko, Reiko Murakami, Shigeki Tsuzuku, Mitsue Suzuki, Hiroshi Nakano, and Katsuaki Suzuki. 'Distance Learning for Nurses: Using Learning Analytics to Build a Learning Support Program'. *The Journal of Information and Systems in Education* 19, no. 1 (2020): 1–8. https://doi.org/10.12937/ejsise.19.1.
study applies learning analytics to distance learning logs and learner information to build a learning support program suitable for learners in nursing. Findings show login frequency was related to course completion, as was login frequency to an orientation course three months after the start of the program

Singh, Hemant Kumar, Arvind Joshi, Raghavi N. Malepati, Shaista Najeeb, Pavithra Balakrishna, Naresh Kumar Pannerselvam, Yashwant Kumar Singh, and Pratyusha Ganne. 'A Survey of E-Learning Methods in Nursing and Medical Education during COVID-19 Pandemic in India'. *Nurse Education Today* 99 (April 2021): 104796. https://doi.org/10.1016/j.nedt.2021.104796.
ICT infrastrucure improvements, guidance on effective use, and continuous feedback is required for effective deployment in countries such as India
PAYWALL

Soriano, Gil, and Ryan Michael Oducado. 'Shifting the Education Paradigm amid the COVID 19 Pandemic: Nursing Students' Attitude to E Learning'. *Africa Journal of Nursing and Midwifery* 23, no. 1 (7 May 2021). https://doi.org/10.25159/2520-5293/8090.
Filipino nursing students had negative (40.5%) and ambivalent attitudes (30.6%) towards e-learning... impersonal and to lack feeling (80.18%) … results in less student–teacher interaction (75.66%). Need is to improve VLEs

Uprichard, Kate. 'E-Learning in a New Era: Enablers and Barriers to Its Implementation in Nursing'. *British Journal of Community Nursing* 25, no. 6 (2 June 2020): 272–75. https://doi.org/10.12968/bjcn.2020.25.6.272.
Discusses benefits and barriers to e-learning, drawing upon the author's experience as a digital project nurse who aided with the implementation of e-learning for community nurses.
PAYWALL

Urstad, Kristin Hjorthaug, Esther Navarro-Illana, Bjørg Oftedal, Katharine Whittingham, Santiago Alamar, Richard Windle, Atle Løkken, et al. 'Usability and Value of a Digital Learning Resource in Nursing Education across European Countries: A Cross-Sectional Exploration'. *BMC Nursing* 20, no. 1 (December 2021): 161. https://doi.org/10.1186/s12912-021-00681-5.

A Norwegian university invited universities in Spain and the United Kingdom to adapt and translate e-learning resources originally developed for Norwegian nursing students for use within their respective Bachelor in Nursing programmes to gain insights into the usability and value for learning of shared e-compendiums

Patients and Service Delivery

Agra, Yolanda, Víctor García-Álvarez, Carlos Aibar-Remón, Jesús Aranaz, Yuri Villán, and Miguel Recio. 'E-Learning on Risk Management. An Opportunity for Sharing Knowledge and Experiences in Patient Safety'. *International Journal for Quality in Health Care*, 8 November 2018. https://doi.org/10.1093/intqhc/mzy223.
Team learning based on real cases was one of the most positive aspects of the e-course. The improvement projects developed are transferable examples of good practices that facilitate the application of RM tools in different clinical settings.
PAYWALL

Bowsher, Gemma, Nassim El Achi, Katrin Augustin, Kristen Meagher, Abdulkarim Ekzayez, Bayard Roberts, and Preeti Patel. 'EHealth for Service Delivery in Conflict: A Narrative Review of the Application of EHealth Technologies in Contemporary Conflict Settings'. *Health Policy and Planning* 36, no. 6 (25 June 2021): 974–81. https://doi.org/10.1093/heapol/czab042.
eHealth in conflict presents a clear scope for the delivery of medical care, despite system destruction, health workforce flight and diffuse insecurity

Brands, Brigitte, Ngoc Nhan Tran, Erin Baudendistel-Happ, Marina Sanchez-Garcia, Martin R. Fischer, and Berthold Koletzko. 'Global E-Learning in Early Nutrition and Lifestyle for International Healthcare Professionals: Design and Evaluation of the Early Nutrition Specialist Programme (ENS)'. *Nutrients* 13, no. 3 (27 February 2021): 775. https://doi.org/10.3390/nu13030775.
pure e-learning has limitations, and blending e-learning with face-to-face teaching may be desirable, e-learning can provide barrier-free global teaching of the healthcare and nutrition community and hence has enormous potential to help tackle the double burden of disease and to improve health

Eze, Paul, Lucky Osaheni Lawani, and Yubraj Acharya. 'Short Message Service (SMS) Reminders for Childhood Immunisation in Low-Income and Middle-Income Countries: A Systematic Review and Meta-Analysis'. *BMJ Global Health* 6, no. 7 (July 2021): e005035. https://doi.org/10.1136/bmjgh-2021-005035.
SMS reminders can contribute to achieving high and timely childhood immunisation coverage.

Gaupp, Rainer, Julia Dinius, Ivana Drazic, and Mirjam Körner. 'Long-Term Effects of an e-Learning Course on Patient Safety: A Controlled Longitudinal Study with Medical Students'. Edited by Mojtaba Vaismoradi. *PLOS ONE* 14, no. 1 (18 January 2019): e0210947. https://doi.org/10.1371/journal.pone.0210947.

eLearning interventions can produce significant long-term effects on patient safety knowledge, however, study did not show long-term effects on attitudes towards patient safety. Our study implies two potential developments for future research: e-learning might be used in combination with face-to-face sessions, or more intensive (in terms of frequency and duration) e-learning sessions may be needed to achieve lasting changes in attitude.

Hanlon, Michelle, Michael Hogan, Hannah Durand, Monika Pilch, Owen Harney, Gerard Molloy, and Andrew W. Murphy. 'Designing an E-Learning Tool to Support Health Practitioners Caring for Patients Taking Multiple Medications'. *HRB Open Research* 3 (6 April 2021): 59. https://doi.org/10.12688/hrbopenres.13110.2.
data was used in the design of a flexible e-learning tool for continuous professional development, that has been integrated into general practice and clinical education programmes as a supportive tool. Conclusions: Using CI and SBD methodology was an effective way of facilitating collaboration, idea-generation, and the co-creation of design solutions

Houwink, Elisa J. F., Marise J. Kasteleyn, Laurence Alpay, Christopher Pearce, Kerryn Butler-Henderson, Eline Meijer, Sanne van Kampen, et al. 'SERIES: EHealth in Primary Care. Part 3: EHealth Education in Primary Care'. *European Journal of General Practice* 26, no. 1 (16 December 2020): 108–18. https://doi.org/10.1080/13814788.2020.1797675.
How eLearning can improve doctor-patient communication

Kiberu, Vincent Micheal, Richard E. Scott, and Maurice Mars. 'Assessing Core, e-Learning, Clinical and Technology Readiness to Integrate Telemedicine at Public Health Facilities in Uganda: A Health Facility – Based Survey'. *BMC Health Services Research* 19, no. 1 (December 2019): 266. https://doi.org/10.1186/s12913-019-4057-6.
Telemedicine users and non-users who were aware of telemedicine showed core, clinical, and learning readiness. Patients were aware of telemedicine but identified barriers to its use

Kurbanoğlu, Serap, Sonja Špiranec, Yurdagül Ünal, Joumana Boustany, Maija Leena Huotari, Esther Grassian, Diane Mizrachi, and Loriene Roy, eds. *Information Literacy in Everyday Life: 6th European Conference, ECIL 2018, Oulu, Finland, September 24-27, 2018, Revised Selected Papers*. 1st ed. 2019. Communications in Computer and Information Science 989. Cham: Springer International Publishing : Imprint: Springer, 2019. https://doi.org/10.1007/978-3-030-13472-3.
Includes: Developing Food and Nutrition Literacy with the Croatian Facebook Group "Homemade Food for Babies"; Developing Health Information Literacy in Disadvantaged and Dependent Circumstances: The Everyday Role of Family Nurses

LeBlanc, Michele, Samuel Petrie, Saambavi Paskaran, Dean Carson, and Paul Peters. 'Patient and Provider Perspectives on EHealth Interventions in Canada and Australia: A Scoping Review'. *Rural and Remote Health*, 19 September 2020. https://doi.org/10.22605/RRH5754.
It is hoped that this focus will highlight the importance of patient voices in evaluating important healthcare interventions such as eHealth and associated technologies.

Levonian, Zachary, Marco Dow, Drew Erikson, Sourojit Ghosh, Hannah Miller Hillberg, Saumik Narayanan, Loren Terveen, and Svetlana Yarosh. 'Patterns of Patient and Caregiver Mutual Support Connections in an Online Health Community'. *Proceedings of*

the ACM on Human-Computer Interaction 4, no. CSCW3 (5 January 2021): 1–46. https://doi.org/10.1145/3434184.
user behavior in an online health community---CaringBridge.org---where finding peers is not explicitly supported. This context lets us use social network analysis methods to explore the growth of such connections in the wild and identify users' peer communication preferences PAYWALL but free access at https://arxiv.org/pdf/2007.16172.pdf

Lima-Toivanen, Maria, and Rubens Martins Pereira. 'The contribution of eHealth in closing gaps in primary health care in selected countries of Latin America and the Caribbean'. *Revista Panamericana de Salud Pública* 42 (28 December 2018): 1–11. https://doi.org/10.26633/RPSP.2018.188.
eHealth helps improve the quality and effectiveness of the prevention and management of chronic conditions at the Primary Health Care level

Michalowski, Martin, Szymon Wilk, Wojtek Michalowski, Dympna O'Sullivan, Silvia Bonaccio, Enea Parimbelli, Marc Carrier, Grégoire Le Gal, Stephen Kingwell, and Mor Peleg. 'A Health ELearning Ontology and Procedural Reasoning Approach for Developing Personalized Courses to Teach Patients about Their Medical Condition and Treatment'. *International Journal of Environmental Research and Public Health* 18, no. 14 (9 July 2021): 7355. https://doi.org/10.3390/ijerph18147355.
proposed framework creates a personalized course that prepares patients for their meetings with specialists and educates them about their prescribed treatment

Nahm, Eun-Shim, Hyojin Son, and Jung Min Yoon. 'Older Adults' Use of Patient Portals: Experiences, Challenges, and Suggestions Shared through Discussion Board Forums'. *Geriatric Nursing* 41, no. 4 (July 2020): 387–93. https://doi.org/10.1016/j.gerinurse.2019.12.001.
our research team developed an older-adult-friendly Theory-based PP eLearning Program (T-PeP) and tested its impact on older adults with chronic conditions. As part of T-PeP, participants used discussion forums. The aim of this study was to explore older adults' experiences with using Patient Portals, perceived impact of PP on their health, and suggestions for improvement through analysis of discussion posts. PAYWALL

Nutbeam, D., & McGill, B. (2018). Improving health literacy in community populations: A review of progress. *Health Promotion International*, *33*(5), 901–911. https://academic.oup.com/heapro/article/33/5/901/3091768

Paglialonga, Alessia, Raffaella Gaetano, Leema Robert, Marine Hurard, Luisa Maria Botella, Natasha Barr, Guillaume Jondeau, and Alessandro Pini. 'EHealth for Patients with Rare Diseases: The EHealth Working Group of the European Reference Network on Rare Multisystemic Vascular Diseases (VASCERN)'. *Orphanet Journal of Rare Diseases* 16, no. 1 (December 2021): 164. https://doi.org/10.1186/s13023-020-01604-4.
the eHealth Working Group of VASCERN can be seen as a pilot experience that may serve as a basis to for collaborative development of patient-centred eHealth tools that answer the needs of patients with various rare diseases, not limited to rare multisystemic vascular diseases

Robinson, A, A K Husband, R D Slight, and S P Slight. 'Digital Technology to Support Lifestyle and Health Behaviour Changes in Surgical Patients: Systematic Review'. *BJS Open* 5, no. 2 (5 March 2021): zraa009. https://doi.org/10.1093/bjsopen/zraa009.

aim of this study was to examine the effectiveness of digital technologies in supporting patients undergoing elective surgery to change their health behaviours

Sin, Jacqueline, Claire Henderson, Luke A Woodham, Aurora Sesé Hernández, and Steve Gillard. 'A Multicomponent EHealth Intervention for Family Carers for People Affected by Psychosis: A Coproduced Design and Build Study'. *Journal of Medical Internet Research* 21, no. 8 (6 August 2019): e14374. https://doi.org/10.2196/14374.
participatory research work led to the coproduction of a eHealth intervention called COPe-support (Carers fOr People with Psychosis e-support). We believe the study methodology, results, and output have optimized the intervention design

Stotz, Sarah A, Jung Sun Lee, and Jennifer Jo Thompson. '"It Was an Unexpected Bond": How an Emerging Participant-Driven Online Social Network May Be Enhancing an ELearning Nutrition Education & Supplemental Produce Intervention'. *DIGITAL HEALTH* 7 (January 2021): 205520762110149. https://doi.org/10.1177/20552076211014978.
peer-to-peer nutrition education-focused text message conversation ... participants became agents in their own learning experience

Stotz, Sarah A., Jennifer Jo Thompson, Vibha Bhargava, Andrea Scarrow, Krissy Capitano, and Jung Sun Lee. 'A Supplemental Produce and ELearning Nutrition Education Program for Georgians Who Use Safety-Net Clinics for Their Health Care'. *Journal of Nutrition Education and Behavior* 51, no. 9 (October 2019): 1099–1106. https://doi.org/10.1016/j.jneb.2019.06.018.
dissemination model may decrease barriers to healthful eating and increase engagement in eLearning nutrition education.

Throfast, Victoria, Lina Hellström, Bo Hovstadius, Göran Petersson, and Lisa Ericson. 'E-Learning for the Elderly on Drug Utilization: A Pilot Study'. *Health Informatics Journal* 25, no. 2 (June 2019): 227–39. https://doi.org/10.1177/1460458217704245.
Examines attitudes of elderly people to use of electronic educational technology (e-learning) on drug utilization, with particular emphasis on the layout, usability, content, and level of knowledge .. qualitative and quantitative analyses of responses showed mostly positive reviews. The results indicate that the e-learning modules are a suitable tool for distributing information and education for elderly individuals familiar with computers

Peer learning

A common theme in articles on e-learning is the difficulty of replicating the informal support which grows out of casual interaction before and after lectures and around eg coffee breaks and interaction in student cafeterias. Although cited as a common problem, little work seems to have been done SPECIFICALLY in Medical and Health education on how the problem might be rectified… among more general work studies are:

Chen, Cheng-Chia, and Karen Swan. 'Using Innovative and Scientifically-Based Debate to Build e-Learning Community'. *Online Learning* 24, no. 3 (2020): 67–80. https://olj.onlinelearningconsortium.org/index.php/olj/article/view/2345/986
researchers developed an approach in an obesity awareness class that students found useful in six different dimensions: enhancement of active learning, critical thinking, interaction and engagement among students

and between the instructor and students, the usefulness of Google Docs for student collaboration, Google Docs usefulness to enhance learning, and willingness to use Google Docs for future collaborative projects.

El Morr, Christo, Paul Ritvo, Farah Ahmad, Rahim Moineddin, and MVC Team. 'Effectiveness of an 8-Week Web-Based Mindfulness Virtual Community Intervention for University Students on Symptoms of Stress, Anxiety, and Depression: Randomized Controlled Trial'. *JMIR Mental Health* 7, no. 7 (17 July 2020): e18595. https://doi.org/10.2196/18595.

Katzman, Neil F., and Michael P. Stanton. 'The Integration of Social Emotional Learning and Cultural Education into Online Distance Learning Curricula: Now Imperative during the COVID-19 Pandemic'. *Creative Education* 11, no. 09 (2020): 1561–71. https://doi.org/10.4236/ce.2020.119114.
Suggests emotional literacy can be taught and integrated into online courses to foster sense of belonging, especially where course leaders and participants factor in awareness of cultural difference; this is also considered in the context of Brazil in a study by Cidral, Wilmar, Manuela Aparicio, and Tiago Oliveira. 'Students' Long-Term Orientation Role in e-Learning Success: A Brazilian Study'. *Heliyon* 6, no. 12 (December 2020): e05735. https://doi.org/10.1016/j.heliyon.2020.e05735.

Kaufmann, Renee, and Jessalyn I. Vallade. 'Exploring Connections in the Online Learning Environment: Student Perceptions of Rapport, Climate, and Loneliness'. *Interactive Learning Environments*, 10 April 2020, 1–15. https://doi.org/10.1080/10494820.2020.1749670.
(on the 'climate' of the learning experience, not on learning about Climate)
PAYWALL

Lind, Kristina. 'Mutual Aid During a Pandemic: A Group Work Class Example'. *Social Work with Groups* 43, no. 4 (1 October 2020): 347–50. https://doi.org/10.1080/01609513.2020.1790230.

Stoytcheva, Maria. 'Developing a Sense of Belonging in a Collaborative Distance Learning Course: Breaking Isolation in Online Learning', 050010. Tomsk, Russia, 2021. https://doi.org/10.1063/5.0043330.
This paper discusses effective relationship building and friendship arising from collaborative (team) learning in a French language course

Sun, Na, Xiying Wang, and Mary Beth Rosson. 'How Do Distance Learners Connect?' In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–12. Glasgow Scotland Uk: ACM, 2019. https://doi.org/10.1145/3290605.3300662.
Suggests design directions that might address their social needs. (PAYWALL)

...and on the value of peer-relations in the first place

Maunder, Rachel E. 'Students' Peer Relationships and Their Contribution to University Adjustment: The Need to Belong in the University Community'. *Journal of Further and Higher Education* 42, no. 6 (18 August 2018): 756–68. https://doi.org/10.1080/0309877X.2017.1311996.
PAYWALL

Nanton, Veronica, Julkia Roscoe, Rebecca Appleton, Amy Clarke, and Dale, Jeremy. 'Students' Peer Relationships and Their Contribution to University Adjustment'. London Met Repository, 2020. http://repository.londonmet.ac.uk/5732/1/manuscript.pdf.

Otherwise, there are various practical ideas produced by individual institutions, for instance, Imperial College London has 'Supporting Students with Online Learning' aimed at teaching staff, and the University of the Highlands and Islands in Scotland has this resource aimed at the students themselves 'Effective peer support: online study groups' https://www.uhi.ac.uk/en/t4-media/one-web/university/students/support/mentoring/documents/Effective-peer-support---online-study-groups.pdf

School & Child Health

Bashirian, Saeed, Majid Barati, Manoochehr Karami, Behrooz Hamzeh, and Elahi Ezati. 'Effectiveness of E-Learning Program in Preventing WP Smoking in Adolescent Females in West of Iran by Applying Prototype-Willingness Model: A Randomized Controlled Trial'. *Journal of Research in Health Sciences* 20, no. 4 (2020). http://journals.umsha.ac.ir/index.php/JRHS/article/view/5789/pdf
WP = water-(shisha-) pipe

Brands, Brigitte, Sirinuch Chomtho, Umaporn Suthutvoravut, Christopher Chiong Meng Boey, Swee Tang, Keith Godfrey, Berthold Koletzko, and for the ENeA SEA Project Group. 'Early Nutrition EAcademy Southeast Asia E-Learning for Enhancing Knowledge on Nutrition during the First 1000 Days of Life'. *Nutrients* 12, no. 6 (18 June 2020): 1817. https://doi.org/10.3390/nu12061817.
Dedicated e-learning can reduce major gaps in HCP training in SEA regarding nutrition during the first 1000 days of life at scale and is highly valued by both users and key stakeholders.

Eley, Charlotte V., Vicki L. Young, Catherine V. Hayes, and Cliodna A. M. McNulty. 'Evaluation of an E-Learning Platform for Educators to Improve Education around Infection Prevention and Antibiotics'. *Technology, Pedagogy and Education* 28, no. 5 (20 October 2019): 485–501. https://doi.org/10.1080/1475939X.2019.1634138.
e-Bug, an international educational resource for educators to teach children about hygiene and antibiotics, developed free e-Learning for educators ... e-Bug e-Learning is a valuable continuous professional development resource to improve educator knowledge, confidence and skills to teach about hygiene topics PAYWALL

Eörsi, D, D Árva, and V Herczeg. 'Digital Module of a Complex School-Based Health Education Program Tries to Maintain Equality'. *European Journal of Public Health* 30, no. Supplement_5 (1 September 2020): ckaa166.067. https://doi.org/10.1093/eurpub/ckaa166.067.
online system was built on novel educational techniques in gamification and rewarding to enhance motivation and engagement . The same e-learning modules are available for all students from different type of education and sociocultural background. We try to assess if this concept provides equality. PAYWALL

Golshah, Amin, Mahya Salahshour, Maryam Kiani, and Ali Fatahi. 'Effect of Traditional and Virtual Oral Hygiene Instruction to School Health Instructors on Plaque Index of Elementary Schoolchildren'. *Open Access Macedonian Journal of Medical Sciences* 9, no. D (26 March 2021): 68–71. https://doi.org/10.3889/oamjms.2021.5867.
Both instruction methods significantly enhanced the oral hygiene knowledge of instructors (p < 0.001) but virtual instruction was significantly more effective (p = 0.02)

Katsagoni, Christina N., Aris Apostolou, Michael Georgoulis, Glykeria Psarra, Eirini Bathrellou, Christina Filippou, Demosthenes B. Panagiotakos, and Labros S. Sidossis. 'Schoolteachers' Nutrition Knowledge, Beliefs, and Attitudes Before and After an E-Learning Program'. *Journal of Nutrition Education and Behavior* 51, no. 9 (October 2019): 1088–98. https://doi.org/10.1016/j.jneb.2019.07.001.
The e-learning program was effective in strengthening teachers' nutrition knowledge and improving their beliefs and attitudes
PAYWALL

López Núñez, Juan Antonio, Jesús López-Belmonte, Antonio-José Moreno-Guerrero, and José Antonio Marín-Marín. 'Dietary Intervention through Flipped Learning as a Techno Pedagogy for the Promotion of Healthy Eating in Secondary Education'. *International Journal of Environmental Research and Public Health* 17, no. 9 (26 April 2020): 3007. https://doi.org/10.3390/ijerph17093007.
flipped learning is effective both in primary education and in secondary education, being more influential in student development in this last stage

Nagamatsu, Miyuki, Kenichi Hara, Kiyoko Yano, Kazuki Ota, and Mitsuhiro Takasaki. 'Web-Based Education for Preventing Sexual Violence among Junior High School Students in Japan'. The Japanese Association of School Health, 2019. https://doi.org/10.20812/jash.SH_092.
study suggested that web-based education on prevention of sexual violence is effective for decreasing the occurrence of violence and increasing healthy conflict resolution.

Prince, M Mohamed. 'Mobile Games and Applications for High School Level Students as Physical Education E Learning Platform'. *International Journal of Health, Physical Education and Computer Science in Sports* 40, no. 1 (2020): 1–4. https://www.researchgate.net/profile/Rajesh-Kumar-345/publication/352478906_Issue_1_ISRA_Journal_Impact_Factor_7217_A_Peer_Reviewed_Refereed_International_Research_Journal_International_Journal_of_Health_Physical_Education_and_Computer_Science_in_sports_ISSN_2231-3265_On-line/links/60cb1abf458515dc178a11b9/Issue-1-ISRA-Journal-Impact-Factor-7217-A-Peer-Reviewed-Refereed-International-Research-Journal-International-Journal-of-Health-Physical-Education-and-Computer-Science-in-sports-ISSN-2231-3265-On-lin.pdf#page=6
Developed to transform monotonous practice into a more enjoyable activity, these systems are being successfully used in different settings, including rehabilitation and sports training; fun and fitness combined with various digital gaming products can change the ordinary physical education activities to extra-ordinary

Scull, Tracy, Christina Malik, Abigail Morrison, and Elyse Keefe. 'Promoting Sexual Health in High School: A Feasibility Study of A Web-Based Media Literacy Education Program'.

Journal of Health Communication 26, no. 3 (4 March 2021): 147–60.
https://doi.org/10.1080/10810730.2021.1893868.
web-based Media Literacy Education sexual health programming is a feasible ... strategy for improving media-related and sexual health outcomes among adolescents.
PAYWALL

Ugwu, Ndubuisi Friday. 'E-Option for Health Education Amidst COVID-19: An Examination of Somalia Contexts'. *International Studies in Educational Administration* 49, no. 1 (2021): 86–93.
http://cceam.net/wp-content/uploads/2020/11/ISEA-2021-49-No-1.pdf#page=92
study examined constraints that might impede e-learning in Somalia. Power poverty, network snags, poverty, harsh socio-cultural practices and the activities of the insurgents are the major constraints against e-learning. Recommendations that may address these constraints were proffered.

Social Media Applications and Mobile Learning

Bashingwa, Jean Juste Harrisson, Neha Shah, Diwakar Mohan, Kerry Scott, Sara Chamberlain, Nicola Mulder, Sai Rahul, et al. 'Examining the Reach and Exposure of a Mobile Phone-Based Training Programme for Frontline Health Workers (ASHAs) in 13 States across India'. *BMJ Global Health* 6, no. Suppl 5 (August 2021): e005299.
https://doi.org/10.1136/bmjgh-2021-005299.

Chan, Teresa M., Kristina Dzara, Sara Paradise Dimeo, Anuja Bhalerao, and Lauren A. Maggio. 'Social Media in Knowledge Translation and Education for Physicians and Trainees: A Scoping Review'. *Perspectives on Medical Education* 9, no. 1 (February 2020): 20–30. https://doi.org/10.1007/s40037-019-00542-7.
Dominant types eg Twitter, blogs, Facebook, podcasts tend to be descriptive studies and innovation reports on practice improvement, types of technology, and evidence-based practice.

Chan, Windy SY, and Angela YM Leung. 'Facebook as a Novel Tool for Continuous Professional Education on Dementia: Pilot Randomized Controlled Trial'. *Journal of Medical Internet Research* 22, no. 6 (2 June 2020): e16772. https://doi.org/10.2196/16772.
Education delivered through Facebook was significantly more effective at improving participants' knowledge of how people with dementia communicate and behave.

Coleman, E., and E. O'Connor. 'The Role of WhatsApp® in Medical Education; a Scoping Review and Instructional Design Model'. *BMC Medical Education* 19, no. 1 (December 2019): 279. https://doi.org/10.1186/s12909-019-1706-8.

Désormeaux-Moreau, Marjorie, Charlie-Maude Michel, Mélanie Vallières, Maryse Racine, Myriame Poulin-Paquet, Delphine Lacasse, Pascale Gionet, Melissa Genereux, Wael Lachiheb, and Véronique Provencher. 'Mobile Apps to Support Family Caregivers of People With Alzheimer Disease and Related Dementias in Managing Disruptive Behaviors: Qualitative Study With Users Embedded in a Scoping Review'. *JMIR Aging* 4, no. 2 (16 April 2021): e21808. https://doi.org/10.2196/21808.
Small scale Canadian investigation on using mobile apps for dementia interventions by carers

Gaspar, Juliano De Souza, Eura Martins Lage, Fernando José Da Silva, Érico Mineiro, Isaias José Ramos De Oliveira, Igor Oliveira, Rayner Guilherme De Souza, Juan Rodrigues Oliveira Gusmão, Camila Fernanda Donadoni De Souza, and Zilma Silveira Nogueira Reis. 'A Mobile Serious Game About the Pandemic (COVID-19 - Did You Know?): Design and Evaluation Study'. *JMIR Serious Games* 8, no. 4 (22 December 2020): e25226. https://doi.org/10.2196/25226.
Gamification strategy for health education content on the theme of COVID-19 reached a young audience, Specific educational reinforcement measures were based on players' performance. Improvement in users' performance on topic on use of masks may reflect increase in information over to mask use over time.

Kanekar, Amar. 'Designing an E-Learning Health Promotion Course: Meeting the National Benchmarks'. *Pedagogy in Health Promotion* 4, no. 3 (September 2018): 184–89. https://doi.org/10.1177/2373379917733752.
'design of a fully distance learning health program and planning course applying the Quality Matters and Blackboard Exemplary Course rubric frameworks'
PAYWALL

Lall, Priya, Rebecca Rees, Gloria Chun Yi Law, Gerard Dunleavy, Živa Cotič, and Josip Car. 'Influences on the Implementation of Mobile Learning for Medical and Nursing Education: Qualitative Systematic Review by the Digital Health Education Collaboration'. *Journal of Medical Internet Research* 21, no. 2 (28 February 2019): e12895. https://doi.org/10.2196/12895.
portability of mobile devices can enable interactions between learners and educational material, fellow learners, and educators. Devices need to be incorporated institutionally, and learners and educators need additional support to fully comprehend device or app functions

Latif, Muhammad, Intzar Hussain, Rizwan Saeed, Muhammad Qureshi, and Umer Maqsood. 'Use of Smart Phones and Social Media in Medical Education: Trends, Advantages, Challenges and Barriers'. *Acta Informatica Medica* 27, no. 2 (2019): 133. https://doi.org/10.5455/aim.2019.27.133-138
commonly used applications having multiple benefits like collaboration, feedback and engagement but negative aspects including addiction, distraction and maintenance of privacy

Onyeka, Tonia C., Nneka Iloanusi, Eve Namisango, Justus U. Onu, Kehinde S. Okunade, Alhassan Datti Mohammed, Muktar A. Gadanya, et al. 'Project OPUS: Development and Evaluation of an Electronic Platform for Pain Management Education of Medical Undergraduates in Resource-Limited Settings'. Edited by Filomena Papa. *PLOS ONE* 15, no. 12 (10 December 2020): e0243573. https://doi.org/10.1371/journal.pone.0243573.
Future iterations of e-Learning approaches will need to consider facilitating the download of data and content for the platform to increase user uptake and engagement. The platform was piloted as an optional adjunct to existing curricula. Future efforts to advocate and support integration of e-Learning for pain education should be two-fold; both to include pain education in the curricula of medical colleges across Nigeria and the use of e-Learning approaches to enhance teaching where feasible.

Oyewole, Bankole K., Victor J. Animasahun, and Helena J. Chapman. 'A Survey on the Effectiveness of WhatsApp for Teaching Doctors Preparing for a Licensing Exam'. Edited by Elisa J. F. Houwink. *PLOS ONE* 15, no. 4 (2 April 2020): e0231148. https://doi.org/10.1371/journal.pone.0231148.

Park, Bu Kyung, Ji Yoon Kim, and Valerie E Rogers. 'Development and Usability Evaluation of a Facebook-Based Intervention Program for Childhood Cancer Patients: Mixed Methods Study'. *Journal of Medical Internet Research* 22, no. 7 (28 July 2020): e18779. https://doi.org/10.2196/18779.
This study of Korean teens achieved "good usability, and met the expressed needs and preferences of target end users".

Stotz, Sarah A, Jung Sun Lee, and Jennifer Jo Thompson. '"It Was an Unexpected Bond": How an Emerging Participant-Driven Online Social Network May Be Enhancing an ELearning Nutrition Education & Supplemental Produce Intervention'. *DIGITAL HEALTH* 7 (January 2021): 205520762110149. https://doi.org/10.1177/20552076211014978.
peer-to-peer nutrition education-focused text message conversation.... participants became agents in their own learning experience

Takenouchi, Akane, Etsuyo Otani, Masayo Sunaga, Takako Toyama, Hiromi Uehara, Kyoko Akiyama, Takae Kawashima, Kanade Ito, Hiromi Izuno, and Atsuhiro Kinoshita. 'Development and Evaluation of E-learning Materials for Dental Hygiene Students in Six Schools: Using Smartphones to Learn Dental Treatment Procedures'. *International Journal of Dental Hygiene* 18, no. 4 (November 2020): 413–21. https://doi.org/10.1111/idh.12452.
Learning dental treatment procedures through e-learning on a smartphone was effective in developing participants' understanding of dental treatment procedures and four-handed techniques.

Tyagi, Hanu, Manisha Sabharwal, Nishi Dixit, Arnab Pal, and Sarang Deo. 'Leveraging Providers' Preferences to Customize Instructional Content in Information and Communications Technology–Based Training Interventions: Retrospective Analysis of a Mobile Phone–Based Intervention in India'. *JMIR MHealth and UHealth* 8, no. 3 (3 March 2020): e15998. https://doi.org/10.2196/15998.
targeting providers by catering to individual provider content preferences could result in a higher provider engagement when compared with targeting them based on demographic variables

Specific Morbidities and Conditions Applications

Ali, Mohammad, Amirah Adlia, and Auliya A Suwantika. 'The Effect of E-Learning on the Attitude Toward Dengue Prevention and the Acceptance of Dengue Vaccination'. *Patient Preference and Adherence* Volume 15 (April 2021): 785–92. https://doi.org/10.2147/PPA.S296758.
Indonesian study concluding E-learning could have significant effects to increase the community's attitude toward dengue prevention and their acceptance of dengue vaccine and vaccination.

Andrews, Christine, Natasha Meredith, Sean Seeho, Megan Weller, Alison Griffin, David Ellwood, Philippa Middleton, Belinda Jennings, and Vicki Flenady. 'Evaluation of an Online Education Module Designed to Reduce Stillbirth'. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 7 June 2021, ajo.13380. https://doi.org/10.1111/ajo.13380.
Safer Baby Bundle (SBB) eLearning is an online education module that addresses practice gaps in stillbirth prevention in Australia. It provides healthcare professionals with evidence-based resources for: smoking cessation; fetal growth restriction; decreased fetal movements; maternal safe going-to-sleep position; and timing of birth for women with risk factors for stillbirth. The proigramme has been well-received.

PAYWALL

Annan, Reginald Adjetey, Linda Nana Esi Aduku, Samuel Kyei-Boateng, Ho Ming Yuen, Trevor Pickup, Andy Pulman, Michele Monroy-Valle, Ann Ashworth, Alan A. Jackson, and Sunhea Choi. 'Implementing Effective ELearning for Scaling up Global Capacity Building: Findings from the Malnutrition Elearning Course Evaluation in Ghana'. *Global Health Action* 13, no. 1 (31 December 2020): 1831794. https://doi.org/10.1080/16549716.2020.1831794.

Brewer, LaPrincess C., Sharonne N. Hayes, Amber R. Caron, David A. Derby, Nicholas S. Breutzman, Amy Wicks, Jeyakumar Raman, et al. 'Promoting Cardiovascular Health and Wellness among African-Americans: Community Participatory Approach to Design an Innovative Mobile-Health Intervention'. Edited by Robert L. Newton. *PLOS ONE* 14, no. 8 (20 August 2019): e0218724. https://doi.org/10.1371/journal.pone.0218724.
study demonstrated a process that can be used by others for designing new mobile technology–based interventions for behavior change to prevent CV disease among AAs and other underserved communities. Our efforts to integrate formative research and CBPR approaches to intervention design yielded a culturally relevant tool (FAITH! App) aimed at addressing CV health disparities

Callinan, Joanne. 'Barriers and Facilitators to E-Learning in Palliative Care'. *International Journal of Palliative Nursing* 26, no. 8 (2 December 2020): 394–402. https://doi.org/10.12968/ijpn.2020.26.8.394.
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Chan, Windy SY, and Angela YM Leung. 'Facebook as a Novel Tool for Continuous Professional Education on Dementia: Pilot Randomized Controlled Trial'. *Journal of Medical Internet Research* 22, no. 6 (2 June 2020): e16772. https://doi.org/10.2196/16772.
Education delivered through Facebook was significantly more effective at improving participants' knowledge of how people with dementia communicate and behave.

Désormeaux-Moreau, Marjorie, Charlie-Maude Michel, Mélanie Vallières, Maryse Racine, Myriame Poulin-Paquet, Delphine Lacasse, Pascale Gionet, Melissa Genereux, Wael Lachiheb, and Véronique Provencher. 'Mobile Apps to Support Family Caregivers of People With Alzheimer Disease and Related Dementias in Managing Disruptive Behaviors: Qualitative Study With Users Embedded in a Scoping Review'. *JMIR Aging* 4, no. 2 (16 April 2021): e21808. https://doi.org/10.2196/21808.
Small scale Canadian investigation on using mobile apps for dementia interventions by carers

El Morr, Christo, Paul Ritvo, Farah Ahmad, Rahim Moineddin, and MVC Team. 'Effectiveness of an 8-Week Web-Based Mindfulness Virtual Community Intervention for University Students on Symptoms of Stress, Anxiety, and Depression: Randomized Controlled Trial'. *JMIR Mental Health* 7, no. 7 (17 July 2020): e18595. https://doi.org/10.2196/18595.
Web-based program informed by CBT constructs and featuring online videos, discussion forums, and videoconferencing, was developed to target depression, anxiety, and experiences of excess stress among university students

Henriques, Susana, Gregor Burkhart, and Michal Miovsky. 'The First University E-Learning Study Programme Based on the Adaption of the EUPC: Portuguese Implementation Study'. *ADIKTOLOGIE Journal*, no. 1 (2020). https://doi.org/10.35198/01-2019-001-0004.
Distance learning course on Addictions devised by Universidade Aberta (Portugal)

Hierden, Yannick van, Timo Dietrich, and Sharyn Rundle-Thiele. 'Designing an EHealth Well-Being Program: A Participatory Design Approach'. *International Journal of Environmental Research and Public Health* 18, no. 14 (6 July 2021): 7250. https://doi.org/10.3390/ijerph18147250.

Jones, Sarah E, Penny K Campbell, Alexander J Kimp, Kim Bennell, Nadine E Foster, Trevor Russell, and Rana S Hinman. 'Evaluation of a Novel E-Learning Program for Physiotherapists to Manage Knee Osteoarthritis via Telehealth: Qualitative Study Nested in the PEAK (Physiotherapy Exercise and Physical Activity for Knee Osteoarthritis) Randomized Controlled Trial'. *Journal of Medical Internet Research* 23, no. 4 (30 April 2021): e25872. https://doi.org/10.2196/25872.
Videoconference-based telehealth has been shown to be an effective and acceptable mode of service delivery for exercise-based interventions for chronic knee pain; however, specific training in telehealth is required for physiotherapists to effectively and consistently deliver care using telehealth.

Keenan, Julia, Fiona Poland, Jill Manthorpe, Cathryn Hart, and Esme Moniz-Cook. 'Implementing E-Learning and e-Tools for Care Home Staff Supporting Residents with Dementia and Challenging Behaviour: A Process Evaluation of the ResCare Study Using Normalisation Process Theory'. *Dementia* 19, no. 5 (July 2020): 1604–20. https://doi.org/10.1177/1471301218803195.
ResCare, a cluster randomised controlled trial in England, tested an online individualised intervention, comprising e-learning and decision support e-tools, designed to enable staff to better support residents with such symptoms... Take up of e-learning and e-tools proved hard

Jackson, Leigh, Anita O'Connor, Milena Paneque, Vaclava Curtisova, Peter W. Lunt, Radka Kremlíková Pourova, Milan Macek, et al. 'The Gen-Equip Project: Evaluation and Impact of Genetics e-Learning Resources for Primary Care in Six European Languages'. *Genetics in Medicine* 21, no. 3 (March 2019): 718–26. https://doi.org/10.1038/s41436-018-0132-3.
Gen-Equip modules are effective in improving genetic knowledge, skills, and attitudes for primary care professionals. They provide both continuing professional development and just-in-time learning for a potentially large global audience at a practical level.

Keutzer, Lina, Sebastian G Wicha, and Ulrika SH Simonsson. 'Mobile Health Apps for Improvement of Tuberculosis Treatment: Descriptive Review'. *JMIR MHealth and UHealth* 8, no. 4 (21 April 2020): e17246. https://doi.org/10.2196/17246.
review highlights a need for new, high-quality mHealth apps supporting tuberculosis treatment, especially those supporting individualized optimized treatment through model-informed precision dosing and video observed treatment

Mackenzie, Scott C, Kirsten M Cumming, David Garrell, Doogie Brodie, Lyn Wilson, Salma Mehar, Scott G Cunningham, Alex Bickerton, and Deborah J Wake. 'Follow-Up of a Massive Open Online Course in Type 2 Diabetes Self-Management Education'. *Journal of*

Diabetes Science and Technology 15, no. 4 (July 2021): 976–77. [Letter to the Editor] https://doi.org/10.1177/1932296821997178.
MOOC found to be user-friendly, engaging, and motivating and ongoing changes to behaviour were found at six months.

Moreira, Inês C., Isabel Ramos, Sandra Rua Ventura, and Pedro Pereira Rodrigues. 'Learner's Perception, Knowledge and Behaviour Assessment within a Breast Imaging E-Learning Course for Radiographers'. *European Journal of Radiology* 111 (February 2019): 47–55. https://doi.org/10.1016/j.ejrad.2018.12.006.
These global results show that e-learning can provide statistically relevant knowledge gains in Radiographers. This course is an important contribution to the improvement of mammography education, impacting on the development of students' and radiographers' skills.

Pickup, Andy Pulman, Michele Monroy-Valle, Ann Ashworth, Alan A. Jackson, and Sunhea Choi. 'Implementing Effective ELearning for Scaling up Global Capacity Building: Findings from the Malnutrition Elearning Course Evaluation in Ghana'. *Global Health Action* 13, no. 1 (31 December 2020): 1831794. https://doi.org/10.1080/16549716.2020.1831794.

Prescott, Julie, Amy Leigh Rathbone, and Gill Brown. 'Online Peer to Peer Support: Qualitative Analysis of UK and US Open Mental Health Facebook Groups'. *DIGITAL HEALTH* 6 (January 2020): 205520762097920. https://doi.org/10.1177/2055207620979209.
how open Facebook groups are used for online peer to peer support [and] ...can increase feelings of connectedness, reduce feelings of isolation, and provide a platform for comparison of perspectives relating to personal experiences

Raluca-giorgiana, Chivu, Luiza-Maria Turlacu, Mihai Cristian Orzan, and Otilia Elena Platon. 'Evolution of ELearning Tools: Advantages and Disadvantages of using E-Learning in Nutritrion and Human Health'. paper presented at International Scientific Conference eLearning and Software for Education, 2020, Bucarest https://www.proquest.com/docview/2454718320?pq-origsite=gscholar&fromopenview=true PAYWALL

Reavley, Nicola J., Amy J. Morgan, Julie-Anne Fischer, Betty A. Kitchener, Nataly Bovopoulos, and Anthony F. Jorm. 'Longer-Term Effectiveness of ELearning and Blended Delivery of Mental Health First Aid Training in the Workplace: 2-Year Follow-up of a Randomised Controlled Trial'. *Internet Interventions* 25 (September 2021): 100434. https://doi.org/10.1016/j.invent.2021.100434.
Study of Australian public servants. MHFA blended learning (online plus face-to-face) led to greater improvements than online only MHFA in knowledge and in confidence and intentions to help a person with depression.

Rhodes, Darson, Joseph Visker, Karl Larson, and Carol Cox. 'Rapid E-Learning for Professional Development in School-Based Diabetes Management'. *Nurse Education in Practice* 38 (July 2019): 84–88. https://doi.org/10.1016/j.nepr.2019.06.009.
e-modules are a convenient and effective way to provide professional development opportunities and improve nurses' knowledge….significant improvement in knowledge after completion of module…. practical improvement in new training information….major improvement in disease information knowledge PAYWALL

Sinclair, Peter M., Ashley Kable, Tracy Levett-Jones, Carl Holder, and Christopher J. Oldmeadow. 'An Evaluation of General Practice Nurses' Knowledge of Chronic Kidney Disease Risk Factors and Screening Practices Following Completion of a Case Study-Based Asynchronous e-Learning Module'. *Australian Journal of Primary Health* 25, no. 4 (2019): 346. https://doi.org/10.1071/PY18173.
results suggest that an asynchronous web-based e-learning module can improve general practice nurses' knowledge about chronic kidney disease risk factors and screening practice. Efforts are required to increase practice nurses' access to educational opportunities with aim of increasing opportunistic screening in the general practice setting
PAYWALL

Stotz, Sarah A, Jung Sun Lee, and Jennifer Jo Thompson. '"It Was an Unexpected Bond": How an Emerging Participant-Driven Online Social Network May Be Enhancing an ELearning Nutrition Education & Supplemental Produce Intervention'. *DIGITAL HEALTH* 7 (January 2021): 205520762110149. https://doi.org/10.1177/20552076211014978.
novel nature by which these participants voluntarily engaged in this peer-to-peer nutrition education-focused text message conversation exemplifies participants becoming agents in their own learning experience

Strand, Monica, Lillian Sofie Eng, and Deede Gammon. 'Combining Online and Offline Peer Support Groups in Community Mental Health Care Settings: A Qualitative Study of Service Users' Experiences'. *International Journal of Mental Health Systems* 14, no. 1 (December 2020): 39. https://doi.org/10.1186/s13033-020-00370-x.
online and offline peer support groups complement each other, and that combining them is mainly described as beneficial by service users

Suppan, Mélanie, Loric Stuby, Emmanuel Carrera, Philippe Cottet, Avinash Koka, Frédéric Assal, Georges Louis Savoldelli, and Laurent Suppan. 'Asynchronous Distance Learning of the National Institutes of Health Stroke Scale During the COVID-19 Pandemic (E-Learning vs Video): Randomized Controlled Trial'. *Journal of Medical Internet Research* 23, no. 1 (15 January 2021): e23594. https://doi.org/10.2196/23594.
Compared to the traditional didactic video, a highly interactive e-learning module enhances asynchronous distance learning and NIHSS knowledge acquisition in senior medical students

Thornton, Marianne, Jennifer Harris, Krista Breithaupt, Tracey Dyks, Hillel Finestone, and Marilyn MacKay-Lyons. 'Development of a Digital Learning Program for Physiotherapists to Enhance Clinical Implementation of Aerobic Exercise in Stroke Rehabilitation'. *Archives of Physiotherapy* 11, no. 1 (December 2021): 17. https://doi.org/10.1186/s40945-021-00110-5.
development process of an eLearning continuing professional education program primarily for post-licensure physiotherapists –"Electronic Aerobic Exercise Recommendations to Optimize Best Practices in Care after Stroke" (eAEROBICS). Our objective was to develop an evidence-based, clinically relevant, user-friendly eLearning program

Wang, Zi-Yue, Li-Jie Zhang, Yu-Hong Liu, Wei-Xi Jiang, Jing-Yun Jia, Sheng-Lan Tang, and Xiao-Yun Liu. 'The Effectiveness of E-Learning in Continuing Medical Education for Tuberculosis Health Workers: A Quasi-Experiment from China'. *Infectious Diseases of Poverty* 10, no. 1 (December 2021): 72. https://doi.org/10.1186/s40249-021-00855-y.

effectiveness of E-learning in CME varies across different types of training formats, organizational environment, and target audience. Clinicians and primary care workers improved their knowledge

Wang, Zi-Yue, Li-Jie Zhang, Yu-Hong Liu, Wei-Xi Jiang, Sheng-Lan Tang, and Xiao-Yun Liu. 'Process Evaluation of E-Learning in Continuing Medical Education: Evidence from the China-Gates Foundation Tuberculosis Control Program'. *Infectious Diseases of Poverty* 10, no. 1 (December 2021): 23. https://doi.org/10.1186/s40249-021-00810-x.
online training for TB health workers in three provinces of China. We aim to evaluate the implementation of E-learning CME programs, analyse the barriers and facilitators during the implementation process, and to provide policy recommendations

Watt-Watson, Judy, Michael McGillion, Leila Lax, Jon Oskarsson, Judith Hunter, Cameron MacLennan, Kerry Knickle, and J Charles Victor. 'Evaluating an Innovative ELearning Pain Education Interprofessional Resource: A Pre–Post Study'. *Pain Medicine* 20, no. 1 (1 January 2019): 37–49. https://doi.org/10.1093/pm/pny105.
this pre-post study examined the impact of an innovative eLearning model: the Pain Education Interprofessional Resource (PEIR) on usability, pain knowledge, beliefs, and understanding of pain assessment skills including empathy.

Wilroy, Jereme D, Kathleen A Martin Ginis, James H Rimmer, Huacong Wen, Jennifer Howell, and Byron Lai. 'An E-Learning Program for Increasing Physical Activity Associated Behaviors Among People with Spinal Cord Injury: Usability Study'. *JMIR Formative Research* 3, no. 3 (21 August 2019): e14788. https://doi.org/10.2196/14788.
evidence-based framework for developing a 30-min e-learning program for increasing physical activity behavior among people with SCI. The Exercise Strategies Through Optimized Relevant Interactive E-learning Storytelling (e-STORIES) program could be completed in a timely manner and was reported by participants as valuable

In Conclusion

Some common themes emerge from the references above:

Course design
- Rethink from scratch, don't take what you have and shoehorn it into an elearning format.
- Involve students - their desired way of learning may not be what their tutors assume
- Consider impact of good design
- Possibility of course development jointly with kindred institutions
- Potential for instant updating
- Computer graphics may permit clearer explanation of process / phenomenon
- Gaming, quizzes etc may reinforce learning – if done well
- Facilitate ongoing staff development to share best eLearning practice, ideas and tips

Software compatibilities
- Ensure what you want to do will actually work on the technology available to your students

- Consider "digital poverty" for those without access to satisfactory (or any) equipment and how it might be addressed

Institutional support
- Need to provide technical support through long service hours (preferably 24/7) for students experiencing technical difficulties, especially those less digitally aware
- Need to provide tutor support in a timely manner
- Be careful of security issues in using social media not designed for academic use

Study environment
- Some students will have poor domestic study space. Need to compensate for those through provision of adequate institutional library and/or lab space
- Elearning facilitates rerunning of explanations in a way that lab demo or lectures do not
- Learning can be synchronous or asynchronous. Asynchronous learning enables students to study at a time which suits then, rather than a time that suits timetabling imposed by course administrators

Loss of direct human contact, friendship building, peer to peer support
- Blended learning may be the solution here (mix of remote and institutional-based study)
- Students need greater self-discipline and motivation in order to cope with independent study and research

If you have any comments and suggestions, please contact david.alcock@nida-net.org

* building on the resource discovery *The impact of Science Literacy delivery methods - what works? (2017 - 2020)*