“You’re on mute! – Potentials and pitfalls with remote teaching in skin surgery.”

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Covid-19- Coronavirus Disease 2019

e-Learning- Electronic Learning

UK- United Kingdom

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Introduction

Remote teaching, and by extension remote learning, is far from a novel concept in dermatology education.[1] However, the Covid-19 pandemic has added to its relevance.[2] Social distancing and a lessening caseload of elective dermatologic surgical procedures necessitated adaptation from educators to the turbulent landscape of postgraduate surgical education.[3,4] This essay will look to review some educational measures taken in this context, and where possible I will critically evaluate the potentials and pitfalls.

What can remote teaching entail?

Remote Teaching Method	Definition	Evidence	Evaluation
e-Learning	Large umbrella term for various methods of teaching.[5] Can include streaming of	Davis *et al.*[6] (n=15) and Satterwhite *et al.*[7] (n=17) show significant	Neither study is a dermatological surgery paper, and both contained low

	lectures to be viewed remotely, virtual resources, and surgical skill demonstrations[5].	improvement in surgical skills performance postintervention with e-learning methods.	number of participants. Davis *et al.*[6] also lack any control group, risking internal validity. The studies' relevance to remote surgical education is interesting, but the methods mean conclusions should be viewed with critical scrutiny.
Simulation	Surgical skills can be simulated, allowing mimicking of an aspect of patient care.[8]	Liu *et al.*[9] developed a surgery simulation curriculum for dermatology trainees. A validated Objective Assessment of Technical Skills tool was used, which	This multicentre study is highly relevant and shows promising evidence for remote learning of dermatologic surgical skills via simulation. However, the study

		showed a statistically significant increase in performance ($p < 0.001$). Trainees also stated they were highly satisfied.	is American and so the conclusions cannot necessarily apply to UK-based training. The small sample size (n=31) for a quantitative study contributes to the lack of methodological rigour.

Table 1: An outline of two remote teaching methods with some evidentiary discussion.

e-Learning

Given the graduated return to normalcy in the UK, we are now in the position to question whether e-Learning is beneficial to postgraduate skin surgery teaching and patient safety. Cook[10] discussed the conditions for successful implementation of e-Learning and emphasised that it is not suitable for every learning need. Indeed, it is recommended that the learning outcomes of an educational program should be designed first, and e-Learning should only be introduced if it enhances knowledge.[10] This view contradicts the current model within which e-Learning has been adopted during the Covid-19 pandemic.[11] Much of this is due to necessity, however, evaluation of an educational intervention is mandatory to ensure training of safe practitioners.[12]

In an American survey-based study, 83 dermatology trainees were introduced to a Mohs surgery[13] video module.[14] The results showed that trainees' confidence improved post-intervention ($p < 0.05$). However, this measure was self-rated; thus, constituting a Kirkpatrick[15] level 1 study (see figure 1). This is considered the least robust form of evaluation. Demand exists for better quality appraisal in education research.[5,10] Given the lack of translational outcomes measured from the learning, whether the video modules were effective at promoting technical surgical skills and safe practices cannot be determined.

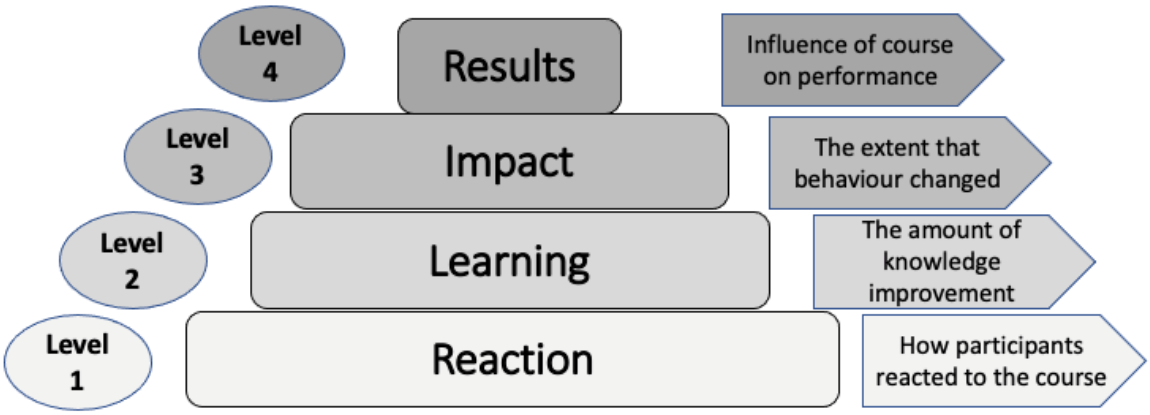

Figure 1: Information adapted from the Kirkpatrick model of evaluation.[15] As you ascend the pyramid, there is increasing quality of evaluation of educational interventions.

This does not mean that there is no place for e-Learning in skin surgery teaching. Indeed, it has been shown that the pandemic fostered a virtual environment of more collaboration between experts and educators.[4] Phillips discusses this in their study of Slack™, an online discussion platform.[16] Social learning theory is thought to contribute to the success of teaching using this medium.[16] This means that context and a community of learning are vital in adults.[17] As such, learning must feel applicable to one's own professional identity and

environment. This is easier facilitated by flexible and personalised learning methods, including social media e.g., Slack™, Twitter™ and Instagram™.[16,18,19] Learning and engagement via online methods in dermatology was also attributed to the visual nature of the diagnosis and pathologies.[1] Therefore, online learning via social media has a theoretical basis, early supporting evidence for its implementation, with scope for further research in surgical education.

eLearning and Skin Surgery	
Potentials	Pitfalls
Flexible learning	Lack of evidence surrounding its value in dermatologic surgery, especially UK-based evidence
Adaptable to each adult learners' needs	Not suitable for every learning need
Social	
Accessible	
Liked by students	

Table 2: Summary of some potentials and pitfalls incurred via e-Learning, a form of remote learning widely used throughout the covid-19 pandemic.

Simulation

Simulation is defined as an educational tool with which a learner engages to facilitate cognitive, psychomotor, or affective learning.[20,21] When viewed under a mastery learning approach, particularly relevant to the fine-motor skill of dermatologic surgery, it facilitates 'over-learning', a means of making technical proficiency automatic.[21] There also exist different forms of simulation, with part-task trainers commonly used when training novices

in procedural steps. With more experience comes an increased need for higher fidelity simulation mimicking the psychological and physical environment surrounding a skill.[22]

This is relevant when evaluating a recently published randomised control trial. Following use of a facial flap simulator, trainees showed a statistically significant improvement in expertise, compared to no improvement in the control group.[23] While this study did include trainees, it did not stratify the participants by skill level, as Phillips *et al.*[16] did in their 2021 pilot study. As mentioned before, expertise is an important factor to consider when designing simulation education, with increasing expertise typically requiring more advanced simulators. Whether accessible, portable simulation is of benefit to more expert skin surgeons requires further research and is a source of academic discourse.[24,25] A major stipulation of simulation is that it should not be used to replace clinical experience. However, given the lessening caseload of elective cosmetic procedures in the context of the pandemic, simulation could bridge this gap.[26] This study identified a need for further research on the benefit gained from portable part-task trainers for remote use.

Simulation and Skin Surgery	
Potentials	Pitfalls
Increased practice	Lack of evidence specific to dermatologic surgery and simulation training
Increased confidence of trainees	Potentially expensive if requiring high-cost, high-fidelity simulators
Well-received by trainees	
Can sometimes be used remotely	

Table 3: Summary of the potentials and pitfalls of simulation in dermatologic surgery education.

Conclusions

This essay has outlined a number of ways in which remote teaching in skin surgery education is beneficial. However, it is not the best way to deliver a dermatologic surgery teaching intervention in every instance and without further research proving its value, widespread implementation would not be recommended due to a lack of supporting evidence.

Reference List

1. Hanson AH, Krause LK, Simmons RN, Ellis JI, Gamble RG, Jensen JD, et al. Dermatology education and the Internet: traditional and cutting-edge resources. Journal of the American Academy of Dermatology [Internet]. 2011 [cited 2022 July 23];65(4):836-42. Available from: https://pubmed.ncbi.nlm.nih.gov/21820206/ doi: 10.1016/j.jaad.2010.05.049

2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet [Internet]. 2020 [cited 2022 May 15];395(10223):497-506. Available at: https://pubmed.ncbi.nlm.nih.gov/31986264/ doi: 10.1016/S0140-6736(20)30183-5

3. Hooper J, Feng H. The Impact of COVID-19 on Micrographic Surgery and Dermatologic Oncology Fellows. Dermatological Surgery [Internet]. 2020 [cited 2022 July 24];46(12):1762-3. Available at: https://pubmed.ncbi.nlm.nih.gov/32897946/ doi: 10.1097/DSS.0000000000002766

4. Watchmaker J, Gwinn C, Dover JS. Positive and Negative Impact of the COVID-19 Pandemic on American Society for Dermatologic Surgery Cosmetic Fellowships. Dermatological Surgery [Internet]. 2021 [cited 2022 July 8];47(8):1175-6. Available at: https://pubmed.ncbi.nlm.nih.gov/34397551/ doi: 10.1097/dss.0000000000003038

5. Jayakumar N, Brunckhorst O, Dasgupta P, Khan MS, Ahmed K. e-Learning in Surgical Education: A Systematic Review. Journal of Surgical Education [Internet]. 2015 [cited 2022 July 8];72(6):1145-57. Available at: https://pubmed.ncbi.nlm.nih.gov/26111822/ doi: 10.1016/j.jsurg.2015.05.008

6. Davis JS, Garcia GD, Wyckoff MM, Alsafran S, Graygo JM, Withum KF, et al. Knowledge and usability of a trauma training system for general surgery residents. American Journal of Surgery [Internet]. 2013 [cited 2022 July 15];205(6):681-4. Available at: https://pubmed.ncbi.nlm.nih.gov/23388423/ doi: 10.1016/j.amjsurg.2012.07.037

7. Satterwhite T, Son J, Carey J, Zeidler K, Bari S, Gurtner G, Chang, J, Lee GK. Microsurgery education in residency training: validating an online curriculum. Annals of Plastic Surgery [Internet]. 2012 [cited 2022 July 15];68(4):410-4. Available at: https://pubmed.ncbi.nlm.nih.gov/22421490/ doi: 10.1097/SAP.0b013e31823b6a1a

8. Cook DA, Hatala R, Brydges R, Zendejas B, Szostek JH, Wang AT, et al. Technology-Enhanced Simulation for Health Professions Education: A Systematic Review and Meta-analysis. Journal of the American Medical Association [Internet]. 2011 [cited 2022 May 16];306(9):978-88. Available at: https://pubmed.ncbi.nlm.nih.gov/21900138/ doi: 10.1001/jama.2011.1234

9. Liu KJ, Tkachenko E, Waldman A, Boskovski MT, Hartman RI, Levin AA, et al. A video-based, flipped classroom, simulation curriculum for dermatologic surgery: A prospective, multi-institution study. Journal of the American Academy of Dermatology [Internet]. 2019 [cited 2022 June 24];81(6):1271-6. Available at: https://pubmed.ncbi.nlm.nih.gov/30953701/ doi: 10.1016/j.jaad.2019.03.078

10. Cook DA. Where are we with Web-based learning in medical education? Medical Teacher [Internet]. 2006 [cited June 15];28(7):594-8. Available at: https://pubmed.ncbi.nlm.nih.gov/17594549/ doi: 10.1080/01421590601028854

11. Bhargava S, Negbenebor N, Sadoughifar R, Ahmad S, Kroumpouzos G. Virtual conferences and e-learning in dermatology during COVID-19 pandemic: results of a web-based, global survey. Clinics in Dermatology [Internet]. 2021 [cited 2022 July 8];39(3):461-6. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8452843/ doi: 10.1016/j.clindermatol.2021.06.002

12. Lovato C, Wall D. Programme evaluation. In: Tim S, editor. Understanding Medical Education. Chichester: Wiley-Blackwell; 2013. pp. 385-99.

13. Prickett KA, Ramsey ML. Mohs Micrographic Surgery. StatPearls [Internet]. Updated 2022 May 19 [cited 2022 July 24]. Treasure Island (FL): StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK441833/#_NBK441833_pubdet_

14. McNeil E, Reich H, Hurliman E. Educational video improves dermatology residents' understanding of Mohs micrographic surgery: A survey-based matched cohort study. Journal of the American Academy of Dermatology [Internet]. 2020 [cited 2022 June 24];83(3):926-7. Available at: https://pubmed.ncbi.nlm.nih.gov/31935427/ doi: 10.1016/j.jaad.2020.01.013

15. Kirkpatrick D. Great ideas revisited. Training & Development [Internet]. 1996;50(1):54-60. [cited 2022 July 6]. Available from: https://eric.ed.gov/?id=EJ515660.

16. Phillips AL, Edwards S, Parmesar K, Soltan M, Guckian J. Slack as a virtual undergraduate dermatology community: a pilot study. Clinical and Experimental Dermatology [Internet]. 2021 [cited 2022 July 08];46(6):1028-37. Available from: https://pubmed.ncbi.nlm.nih.gov/33583049/ doi: 10.1111/ced.14601.

17. Taylor DC, Hamdy H. Adult learning theories: implications for learning and teaching in medical education: AMEE Guide No. 83. Medical Teacher [Internet]. 2013[cited 2022 January 14]; 35(11):e1561-e72. Available from: https://pubmed.ncbi.nlm.nih.gov/24004029/ doi: 10.3109/0142159X.2013.828153

18. Zheng DX, Mulligan KM, Scott JF. #DermTwitter and digital mentorship in the COVID-19 era. Journal of American Academy of Dermatology [Internet]. 2021;85(1):e17-e8. Available

at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8019239/ doi: 10.1016/j.jaad.2021.03.101

19. Harp T, Szeto MD, Presley CL, Meckley AL, Geist R, Anderson J, et al. Usage and engagement with Instagram by dermatology residency programs during the COVID-19 pandemic compared with Twitter and Facebook. Journal of American Academy of Dermatology. 2021;85(5):e313-e5. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8372473/ doi: 10.1016/j.jaad.2021.05.071

20. Zendejas B, Wang AT, Brydges R, Hamstra SJ, Cook DA. Cost: the missing outcome in simulation-based medical education research: a systematic review. Surgery [Internet]. 2013 [cited 2022 June 15];153(2):160-76. Available at: https://pubmed.ncbi.nlm.nih.gov/22884087/ doi: 10.1016/j.surg.2012.06.025

21. Ker J, Bradley P. Simulation in medical education. In: Tim S, editor. Understanding medical education: evidence, theory, and practice. Chichester: Wiley-Blackwell; 2014. pp. 164-80.

22. Dieckmann P, Gaba D, Rall M. Deepening the theoretical foundations of patient simulation as social practice. Simulation in Healthcare [Internet]. 2007 [cited 2022 June 15]; 2(3):183-93. Available from: https://pubmed.ncbi.nlm.nih.gov/19088622/ doi: 10.1097/SIH.0b013e3180f637f5

23. Yang SF, Powell A, Srinivasan S, Kim JC, Baker SR, Green GE, et al. Addressing the Pandemic Training Deficiency: Filling the Void with Simulation in Facial Reconstruction. The Laryngoscope [Internet]. 2021 [cited 2022 July 16];131(8):E2444-E8. Available from: https://pubmed.ncbi.nlm.nih.gov/33656188/ doi: 10.1002/lary.29490

24. Norman G, Dore K, Grierson L. The minimal relationship between simulation fidelity and transfer of learning. Medical Education [Internet]. 2012 [cited 2022 July 16];46(7):636-47. Available at: https://pubmed.ncbi.nlm.nih.gov/22616789/ doi: 10.1111/j.1365-2923.2012.04243.x

25. Dawe SR, Pena GN, Windsor JA, Broeders J, Cregan PC, Hewett PJ, et al. Systematic review of skills transfer after surgical simulation-based training. British Journal of Surgery [Internet]. 2014 [cited 2022 May 22];101(9):1063-76. Available at: https://pubmed.ncbi.nlm.nih.gov/24827930/ doi: 10.1002/bjs.9482

26. British Association of Dermatologists and Royal College of Physicians. Recommencing Dermatology Services 2020 [Internet]. London:BAD;[cited 2022 July 8]. Available from: https://cdn.bad.org.uk/uploads/2021/11/29200301/NHSE-Recommencing-dermatology-services-21.05.20-FINALRM-with-logos.pdf.