British Cardiovascular Society

'Promoting excellence in cardiovascular care'

Intentionality in Cardiology Training: Balancing Dual CCT Demands and Reviving Apprenticeship Practices for the 21st Century

Dr Jhiamluka Solano MD, MSc Med Ed, MRCP (Lon)

Cardiology Registrar, BHF Clinical Research Training Fellow[1] and Council Member[2]

[1]Oxford Centre for Clinical Magnetic Resonance Research, University of Oxford John Radcliffe Hospital, Headington, Oxford, OX3 9DU, United Kingdom

[2]Academy of Medical Educators, Neuadd Meirionnydd Heath Park Way, Cardiff CF14 4YS

Take Home Messages

- Cardiology training has lost intentionality as service pressures, dual-Certificate of Completion of Training (CCT) demands, and curriculum overload fragment experiential learning and mentorship.
- This commentary review highlights how heavy general internal medicine (GIM) workloads disrupt focused cardiology training and reduce time for practice and feedback, both vital for mastering skills. Re-introducing structured, hands-on learning through observation, guided practice, and debriefing can restore training depth and confidence.
- Aligning curricula with real-world resources and protecting training time can produce competent, confident cardiologists without extended fellowships.
- Reform should prioritise mentorship, workload balance, and flexible modular subspecialty pathways. Further study should evaluate the impact of apprenticeship-based approaches on trainee competence and self-efficacy.

Introduction

Cardiology training in the United Kingdom is undergoing a paradigm shift under the 2022 curriculum for Cardiology, which mandates dual accreditation with General Internal Medicine (GIM) and aims to produce consultants capable of both acute internal-medicine and cardiovascular practice.(1) While this change reflects a commitment to versatility and patient-centred care, it also risks unintended educational consequences: the loss of intentionality in cardiology training, as both trainers and trainees face the competing demands of service provision and dual- Certificate of Completion of Training (CCT) workload.

Educational intentionality is central to effective postgraduate training.(2) However, excessive service pressures and curricular overload have displaced structured experiential learning. This raises the question, should we be considering re-introducing core features of traditional apprenticeship learning, blended with contemporary educational frameworks, to restore depth and purpose in cardiology training?

The Loss of Intentionality

The 2022 cardiology curriculum stipulates that trainees must complete stage 2 Internal Medicine alongside specialty training within an indicative five-year window.(1) The rationale is coherent with national and international frameworks(3, 4) promoting generalist competence. A 2024 joint statement from the British Cardiovascular Society (BCS) warned that the current model "ranks among the longest and most burdensome in the world, as the length of postgraduate training from medical school to cardiology specialty accreditation is typically 5–6 years in most comparable systems, including Europe and the United States," with reduced opportunities for key procedures and diminished trainee confidence at CCT.(5) It is known that excessive service duties fragment deliberate practice and feedback cycles, critical components of skill mastery.(6-10)

According to Ericsson's theory of deliberate (intentional) practice, expertise requires focused, feedback-rich repetition in a domain-specific context **(Figure 1).**(8, 11) Beyond the quality of feedback, the temporal pattern of this repetition profoundly influences learning outcomes. High-volume exposure over shorter durations leads to more efficient skill consolidation and longer retention than intermittent practice over extended periods.(11) However, under dual-CCT pressures, much of trainees' time is spent fulfilling acute take duties, eroding the cardiology space for deliberate procedural practice. Trainers simultaneously experience cognitive load and "hidden curriculum" stressors that limit their ability to engage in active mentorship.(12) Consequently, learning becomes reactive rather than intentional, driven by service imperatives rather than planned developmental trajectories leaving the trainees in the arrested development zone (**Figure 2**).

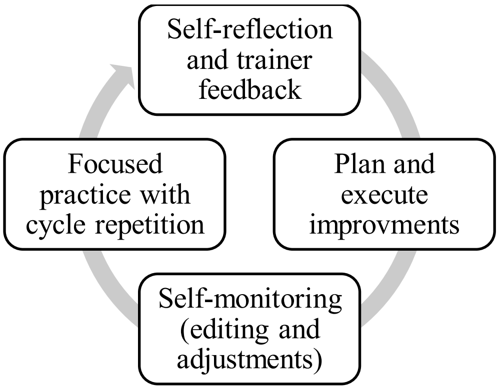

Figure 1. Ericsson's Theory of deliberate practice Principles. Adapted from Ericsson, 2004.

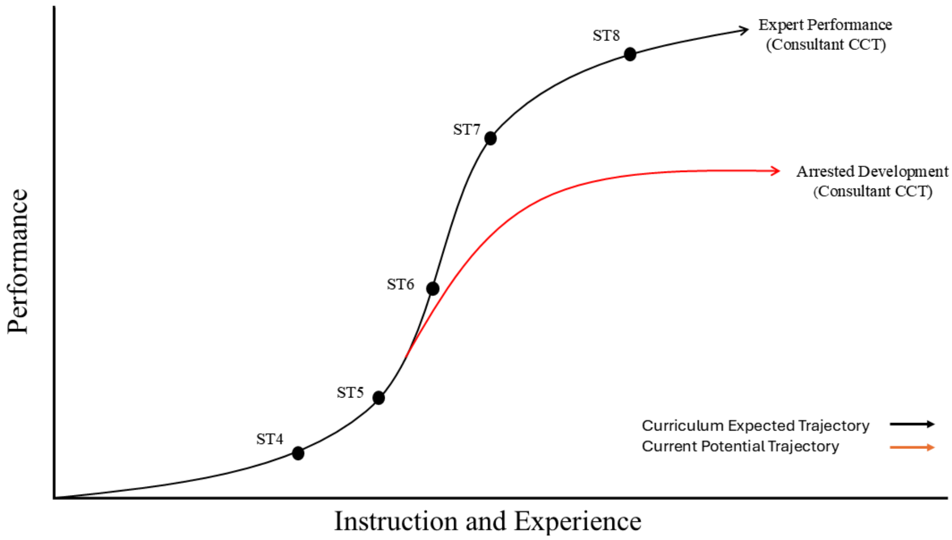

Figure 2. Impact of Dual-Training Pressures on Skill Progression in Cardiology Training. This conceptual diagram illustrates the potential effect of system and curriculum pressures on the developmental trajectory of cardiology trainees.

(CCT=Certificate of Completion of Training)

Mismatch Between Curriculum and Training Reality

The 2022 curriculum defines ambitious outcomes;(1) however, the theory–practice gap, where formal curricula exceed the practical affordances of the clinical environment, is well recognised.(13) Eraut's concept of non-formal workplace learning highlights that much of clinical expertise emerges through tacit, situational exposure rather than curriculum-driven checklists.(14) In smaller centres, procedural volumes and trainer availability may not meet curricular expectations. Without protected training time or structured feedback, learning degenerates into what Schön termed "reflection-in-action" without "reflection-on-action", in other words, action without meaning.(15) This gap explains why many United Kingdom (UK) trainees seek post-CCT fellowships for procedural confidence.(5)

The Old with the New

Medical education has always evolved by balancing tradition with innovation. While 21st-century cardiology training is guided by competency frameworks and technology-enhanced learning, it risks losing the depth and continuity once embedded in the apprenticeship model. By revisiting key principles of traditional mentorship and integrating them with modern educational theory, cardiology training can regain intentionality, reflective depth, and procedural confidence. **Table 1** outlines how established methods can be blended with contemporary approaches to strengthen training outcomes.

Avoiding the Fellowship Catch-Up Model

Educationally, repeated reliance on post-CCT fellowships indicates curricular misalignment with the learning environment capacity and objectives not achievable within designated training time.(27) By re-introducing intentional apprenticeship, reflective feedback, simulation-supported procedural exposure, and realistic workload distribution between cardiology and GIM, the system can produce competent cardiologists with a strong sense of self-efficacy, without the need for extended fellowships.

Table 1. Integrating Traditional Training Practices with Modern Educational Frameworks

Traditional Approach (The Old)	Modern Enhancement (The New)	Educational Framework/Theory
Trainer–Trainee Pairing Close mentorship fostered confidence and skill through guided practice	Protected "apprenticeship clinics" or pairing blocks within rotations; supervision tapers with competence.	Vygotsky's ZPD (16); mentorship improves retention (17,18); EPAs (19).
Procedural Apprenticeship "See one, do one, teach one" enabled gradual independence.	Scaffolded steps—observe, assist, debrief, perform—enhanced by simulation and protected trainer time.	Kolb's Learning Cycle (20); Cognitive Load Theory (21); faculty development (22).
Reflection and Feedback Bedside teaching encouraged reflective learning.	Regular "learning clinics" with structured feedback and digital dashboards for progress tracking.	Schön's Reflection Model (15); reflection improves reasoning (23,24).
Curriculum Flexibility Training adapted to local case mix and mentor expertise.	Flexible, modular, flexible curricula aligned with resources; supported by hub rotations and remote mentorship.	Situated Learning (25); Communities of Practice (26).

ZPD, Zone of Proximal Development; EPAs, Entrustable Professional Activity.

Conclusions

The system's competing service demands, curriculum inflation, and variability of resources threaten to dilute experiential depth. Reinstating structured mentor-trainee continuity, scaffolded procedural apprenticeship, reflective practice sessions, and curriculum adaptability, can restore intentionality and autonomy in training.

Disclosures

The author has no relationships relevant to the contents of this paper to disclose

References

1. Board JRCoPT. Cardiology Curriculum 2022 2022 [cited 2025 November 4th]. Available from: https://www.thefederation.uk/sites/default/files/Cardiology%202022%20curriculum%20FINAL%20July%202022.pdf?utm_source=chatgpt.com.

2. Mandzuk D, Clifton R. Becoming a Critically Reflective Teacher. 1998. p. 115–8. https://doi.org/10.1023/A:1007464807699
3. Frank J, Snell L, Sherbino J. CanMEDS 2015 Physician Competency Framework.
4. Council GM. Generic Professional Capabilities Framework 2017 [cited 2025 November 4th]. Available from: https://www.gmc-uk.org/education/standards-guidance-and-curricula/standards-and-outcomes/generic-professional-capabilities-framework.
5. Brown OI, Morgan H, Jenner WJ, Chapman A, Joshi A, Drozd M, et al. Joint British Societies' position statement on cardiology training in the United Kingdom. Heart. 2025;111(6):e2. https://doi.org/10.1136/heartjnl-2024-325037
6. Ten Cate O. Competency-Based Postgraduate Medical Education: Past, Present and Future. GMS J Med Educ. 2017;34(5):Doc69. https://doi.org/10.3205/zma001146
7. Wiese A, Kilty C, Bennett D. Supervised workplace learning in postgraduate training: a realist synthesis. Medical education. 2018;52(9):951–69. https://doi.org/10.1111/medu.13655
8. Abraham RM, Singaram VS. Using deliberate practice framework to assess the quality of feedback in undergraduate clinical skills training. BMC Medical Education. 2019;19(1):105. https://doi.org/10.1186/s12909-019-1547-5
9. Al-Omary H, Soltani A, Stewart D, Nazar Z. Implementing learning into practice from continuous professional development activities: a scoping review of health professionals' views and experiences. BMC Medical Education. 2024;24(1):1031. https://doi.org/10.1186/s12909-024-06016-7
10. van de Ridder JM, Stokking KM, McGaghie WC, ten Cate OT. What is feedback in clinical education? Med Educ. 2008;42(2):189–97. https://doi.org/10.1111/j.1365-2923.2007.02973.x
11. Ericsson KA. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. Acad Med. 2004;79(10 Suppl):S70–81. https://doi.org/10.1097/00001888-200410001-00022
12. Lawrence C, Mhlaba T, Stewart KA, Moletsane R, Gaede B, Moshabela M. The Hidden Curricula of Medical Education: A Scoping Review. Acad Med. 2018;93(4):648–56. https://doi.org/10.1097/ACM.0000000000002004

13. Billett S. Learning through work: Workplace affordances and individual engagement. Journal of Workplace Learning. 2001;13:209–14. https://doi.org/10.1108/EUM0000000005548
14. Eraut M. Non-formal learning and tacit knowledge in professional work. Br J Educ Psychol. 2000;70 (Pt 1):113–36. https://doi.org/10.1348/000709900158001
15. Schon DA. The Reflective Practitioner: How Professionals Think In Action. Toronto: Canadian Society for the Study of Education; 1986. p. 184.
16. Eun B. The zone of proximal development as an overarching concept: A framework for synthesizing Vygotsky's theories. Educational Philosophy and Theory. 2019;51(1):18–30. https://doi.org/10.1080/00131857.2017.1421941
17. Joe MB, Cusano A, Leckie J, Czuczman N, Exner K, Yong H, et al. Mentorship Programs in Residency: A Scoping Review. J Grad Med Educ. 2023;15(2):190–200. https://doi.org/10.4300/JGME-D-22-00415.1
18. Sambunjak D, Straus SE, Marusić A. Mentoring in academic medicine: a systematic review. Jama. 2006;296(9):1103–15. https://doi.org/10.1001/jama.296.9.1103
19. Cate OT. A primer on entrustable professional activities. Korean J Med Educ. 2018;30(1):1–10. https://doi.org/10.3946/kjme.2018.76
20. Kolb D. Experiential Learning: Experience As The Source Of Learning And Development. Prentice-Hall 1984.
21. van Merriënboer JJG, Sweller J. Cognitive Load Theory and Complex Learning: Recent Developments and Future Directions. Educational Psychology Review. 2005;17(2):147–77. https://doi.org/10.1007/s10648-005-3951-0
22. Steinert Y. Faculty development: from workshops to communities of practice. Med Teach. 2010;32(5):425–8. https://doi.org/10.3109/01421591003677897
23. Mann K, Gordon J, MacLeod A. Reflection and reflective practice in health professions education: a systematic review. Adv Health Sci Educ Theory Pract. 2009;14(4):595–621. https://doi.org/10.1007/s10459-007-9090-2
24. Sandars J. The use of reflection in medical education: AMEE Guide No. 44. Med Teach. 2009;31(8):685–95. https://doi.org/10.1080/01421590903050374.
25. Street C. Situated learning: legitimate peripheral participation. Abingdon: Taylor & Francis; 2005. p. 151–3.

26. Wenger E. Communities of practice and social learning systems. Knowing in Organizations: A Practice-Based Approach. London: Taylor & Francis 2016. p. 76–99. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.4324/9781315290973
27. Harden R. Outcome-Based Education: the future is today. Medical teacher. 2007;29:625–9. https://doi.org/10.1080/01421590701729930