

Seeing the Forest for the Trees: A Medical Education Focused on Concepts

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Journal of Medical Education and Curricular Development
Volume 8: 1–2
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DOI: 10.1177/23821205211064439



ABSTRACT: A pedagogical shift in medical education that emphasizes concepts and skills over memorization and recall will strengthen the broad-based foundation of knowledge unique to physicians and free up time for students to engage important new areas that need physician leaders.

KEYWORDS: Education, medical, teaching, learning

RECEIVED: August 17, 2021. **ACCEPTED:** November 15, 2021

TYPE: Perspective

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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The Krebs Cycle. As a busy clinical cardiologist in a large academic medical center, a fuzzy memory of the Krebs Cycle lies deep in the cobwebs of my mind, as it does for all physicians across vastly different fields and specialties. Ingesting, memorizing and then forgetting massive amounts of rote information is a ubiquitous rite of passage for all medical students. But this practice comes at a costly price, particularly as medical knowledge grows at an exponential pace in a digital world in which nearly all information is accessible within seconds. Medical educators have responded by transitioning education and training from a knowledge-based framework to a competency-based one built on improving health outcomes for the patient. As a clinician and academic educator, I strongly support a pedagogical shift that emphasizes principles and skills over memorization and recall, a shift that will strengthen the broad-based foundation of knowledge unique to doctors and free up time for bright young minds to engage important new areas that need physician leaders.

Medical training is a long and expensive career investment and as academic educators, we must ensure that the time and effort we ask of students is maximally used to develop them into competent and dynamic doctors. Despite dramatic changes in the scope of medical knowledge, current medical school curricula still require large amounts of memorization and recall of facts and esoterica throughout the basic and clinical sciences. Clearly, there are benefits to this wide-ranging approach which cultivates discipline, strengthens mental fortitude and pays homage to the vast accomplishments of those before us.¹ But ultimately, this pursuit is time-consuming, absorbs valuable years of the medical training pathway and continues in an era of doctor shortages, growing competition from alternate career paths, rising medical school debt, and clinician burnout.^{2,3} And the poignant reality is that the majority of this information is understandably forgotten, due to the limits of human memory and lack of relevance to our daily responsibilities.⁴

In response, medical educators have proposed shifting from a knowledge-based educational framework to a competency-based one focused on patient health outcomes. The most famous and successful framework is CanMEDS, developed by Canada's Royal College in the 1990s to enhance patient care through the continual improvement of physician training based on research, foundational principles and stakeholder engagement. CanMEDS places the patient's health needs as central then emphasizes seven key roles that constitute a competent physician: Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar and Professional.⁵ These roles have been validated internationally and have led to numerous innovative programs, from preparing medical students for challenging roles to organizational improvement and assessment tools.^{6–8} These changes are compelling and exciting, but arguably a deeper reform of medical education curricula and testing is needed for future doctors to better assume these important roles.

A comprehensive basic and clinical science education is intrinsically valuable and distinguishes physicians from other healthcare professionals. However, the benefit largely depends on the ability to effectively draw on relevant ideas and principles at some future date.⁴ For example, understanding the Krebs Cycle's main inputs, outputs and overall role in biochemical metabolism constitutes the valuable building block of knowledge, not the individual enzymatic steps or molecular structures. Requiring students to absorb minutiae depletes precious cognitive bandwidth and time that can instead be used to entrench underlying principles and concepts. In gross anatomy, students memorize countless individual muscles, nerves and structures instead of appreciating the deeper functional relationships and how that contributes to pathology.⁹ In my field of cardiology, students dutifully recall numerous formulas and numbers but are far less exposed to the fundamental physics principles that elegantly tie them all together and characterize disease states. In this way, the pedagogical framework



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should build a strong conceptual scaffolding that will endure for years to come, requiring memorization of only the critical facts needed to successfully build this foundation. This realization is ever more relevant in our digital world in which our cliched pocket computer brains are always within reach to instantly access any specific fact. Given that medical school curricula must prepare students for board examinations, successful execution of this strategy requires simultaneous reform of testing and evaluation. This concept-based paradigm will ultimately equip the next generation of doctors to be dynamic and adaptable life-long learners in a changing knowledge landscape.

Moreover, this educational shift will free up significant time to invest in the oft-neglected but essential CanMEDS roles of Communicator, Leader and Health Advocate. Many medical students bemoan the limited development of practical bedside skills such as giving basic nutritional advice and communicating effectively.¹⁰ But even more consequential is the lack of formal exposure to nascent fields that need informed physician leaders such as social determinants of health, machine learning and artificial intelligence, healthcare information technology, and healthcare economics and policy. Exposing bright young minds to these important topics during medical school will allow future doctors to more readily venture into these areas for the betterment of medicine and society.

As physicians, we hold ourselves to the highest standards of internal reflection, continuous self-improvement and growth to stay competent as medical knowledge and clinical practice evolves. In this same way, we must seriously consider

a fundamental reboot of the medical education and training landscape to a more relevant and enduring framework of conceptual knowledge that will also better nurture the rising generation of physician leaders.

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