

The Disconnect Era: Revitalizing Physiology Education in Nepal for the 21st Century

Agrawal K

Medical physiology forms the bedrock of healthcare education. It bridges fundamental biological principles to clinical reasoning, preparing medical students to think critically and apply knowledge to patient care. Globally, medical education is transforming traditional didactic lectures toward active, competency-based learning enriched by technology, with strategies such as flipped classrooms, team-based learning, and problem-based approaches gaining traction. These pedagogies foster deeper scientific understanding, encourage lifelong learning, and improve clinical reasoning skills required in the modern healthcare system.^{1,2}

In Nepal, policy frameworks like the Medical Education Commission's National Curriculum and the adoption of competency-based medical education (CBME) models such as SPICES (Student-centered, Problem-based, Integrated, Community-based, Elective-oriented, Systematic), provide a clear vision aligned with global educational shifts.³ Yet, a dissonance remains palpable between policy and practice. Physiology teaching in classrooms across the country continues to rely heavily on lecture-driven instruction, with outdated syllabi and assessments primarily focused on memorization rather than cultivating analytical and clinical thinking.

Challenges Rooted in Tradition and Transition

Drawing on over 15 years of experience teaching physiology across diverse health programs, the struggle to reconcile ambitious reforms with operational realities is evident. The MBBS curriculum, for example, has remained substantively unchanged since 2013, despite significant advances in medical science and understanding of physiological mechanisms. This stasis hampers the inclusion of emerging concepts, novel clinical correlations, and breakthroughs in fields like cardiovascular and neurological sciences.³

Amid this curricular inertia, students many of whom are digital natives accustomed to dynamic, interactive content face a learning environment dominated by passive lectures and voluminous content delivered through didactic slideshows. This mismatch disengages students, who report difficulty linking abstract physiological theories to practical, clinical applications. Alongside, many faculties grapple with heavy workloads, insufficient preparation time, limited access to updated resources, and a general lack of systematic pedagogical training or institutional incentives to innovate teaching methods.^{4,5}

Systemic and Cultural Barriers Impeding Progress

A complex web of barriers further constrains educational reform:

- **Regulatory and Faculty Challenges:** Minimum faculty requirements enforced through regulatory bodies inadvertently burden individual educators with multiple programs and massive student groups. This leaves scant space for curriculum innovation or the adoption of active learning methods.
- **Infrastructure Limitations:** Many institutions lack essential infrastructure computers, reliable internet, modern laboratory equipment necessary to support interactive and technology-enabled education.
- **Assessment Culture:** Emphasis on high-stakes final examinations reinforces memorization and surface learning. Students' behavior gravitates toward "passing the exam," rather than mastering physiological principles and reasoning processes critical for clinical competence.⁶
- **Equity Concerns:** The common entrance exam system places students of differing academic preparedness into colleges with varying resources and faculty quality, demanding uniform competencies regardless of disparate educational support, fostering inequity and low morale.⁷
- **Cultural Resistance:** Both students and faculty demonstrate hesitation toward active, participatory learning. Many students, shaped by prior didactic schooling, expect "spoon feeding" and experience anxiety about non-traditional methods. Senior educators often express skepticism or discomfort with pedagogical change, compounded by the challenges of multilingual instruction and language proficiency obstacles.^{8,9}

Emerging Perspectives: The Role of Innovation and AI in Nepali Physiology Education

Recent discourse, including insights from Nepal O, highlights the evolving role of technology and artificial intelligence (AI) in transforming physiology education within Nepali medical schools.⁸ The emphasis is shifting toward personalized, interactive learning environments that transcend traditional boundaries, encouraging social interaction, community engagement, and resource accessibility. These changes underscore a movement beyond textbooks and examination-focused teaching toward fostering humanistic values such as empathy, patient-centeredness, and cultural sensitivity in healthcare.⁸

Proposed Strategies for Meaningful Reform

Meaningful transformation of physiology education in Nepal requires carefully contextualized, incremental actions guided by inclusivity, sustainability, and pragmatism:

- **Curriculum Revision:** Systematic curriculum updates should incorporate current scientific knowledge, emphasize vertical integration linking basic and clinical sciences, and rationalize content to reduce overload.
- **Pilot Active Learning Models:** Introducing flipped classrooms, team-based learning (TBL), and problem-based learning (PBL) starting with small student groups allows adaptation, gradual faculty capacity building, and fosters positive student attitudes.
- **Faculty Capacity Building:** Structured training focused on practical pedagogical skills suitable for diverse class sizes and resource settings is essential to empower educators.
- **Assessment Reform:** Transition toward competency-based, continuous assessments reduces reliance on high-stakes exams and supports timely remediation to maintain learning momentum.
- **Infrastructure Investment:** Improving laboratory facilities, internet connectivity, and access to digital educational tools will enable active, technology-integrated pedagogy.
- **Equity and Differentiated Instruction:** Recognizing diverse student backgrounds necessitates tailored teaching strategies across programs, avoiding one-size-fits-all approaches.
- **Cultural Change Facilitation:** Promoting open dialogue, reflective practice, and peer mentoring can mitigate skepticism and build buy-in among faculty and students alike.¹⁰

Bridging Policy and Practice for Future-Ready Physicians

The chasm between policy-level aspirations and ground-level realities in Nepal's physiology education is unmistakable. While the vision for a competency-based, learner-centered framework aligns with global standards, entrenched structural, cultural, and logistical constraints stifle meaningful change. Faculty and students, despite constraints, remain eager to embrace innovation if supported appropriately.

The future of Nepal's medical education anchored in physiology must reconcile time-honored traditions with emerging pedagogies and technological advancements. Efforts should focus on phased, sustainable reforms that promote clinical relevance, active engagement, and critical reasoning over rote learning.

Adapting global educational innovations with sensitivity to Nepal's unique health challenges, resource limitations, and cultural context will produce physicians equipped not merely to excel academically but to meet the complexities of 21st century healthcare with competence and compassion.

Kopila Agrawal

Department of Physiology

Birat Medical College Teaching Hospital,

Morang, Nepal.

Email: drkopilabmcth@gmail.com

REFERENCES

1. Michael J. Where's the evidence that active learning works? *Adv Physiol Educ.* 2006;30(4):159-67.
2. Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H, et al. Active learning increases student performance in science, engineering, and mathematics. *Proc Natl Acad Sci U S A.* 2014;111(23):8410-5.
3. Medical Education Commission. National Curriculum Framework for Undergraduate Medical Education in Nepal. Kathmandu: MEC; 2017.
4. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *Lancet.* 2010;376(9756):1923-58.
5. Mehanni S, Nesari M, Dahal S, Bilali S, Acharya D. Implementing active learning in rural medical schools in Nepal: challenges and opportunities. *Int J Med Educ.* 2018;9:65-72.
6. Ten Cate O, Hart D, Ankel F, Busari J, Englander R, Glasgow N, et al. Entrustment decisions: bringing clarity to the concept. *Med Teach.* 2016;38(2):104-7.
7. Khanal S, Chalise P, Paudel P, Sapkota S, Shrestha S. Physiology teaching in Nepal: current trends and future directions. *Nepal Med Coll J.* 2020;22(2):87-92.
8. Nepal O. Physiology teaching trends in current Nepali medical schools: navigating the road ahead in the AI era. *J Physiol Soc Nepal.* 2024;3(2):1-3.
9. Kathmandu University School of Education. Ethics Approval for Medical Education Research. Dhulikhel, Nepal: KUSOED; 2024.
10. Thapa GB, Mahotra NB, Pun M. Physiology and applied sciences in Nepal: 1st annual conference. *Extrem Physiol Med.* 2014 Mar 1;3(1):5.