

Technology-enhanced learning and the pursuit of cognitive justice: Perils, pearls, and possibilities

Technology continuously challenges us to reevaluate how we teach and how our students learn. Virtual simulations replace scarce clinical encounters, mobile apps deliver clinical guidelines, and AI tools generate contextualised case studies. These shifts hold immense promise for health professions education (HPE) but also raise profound questions: whose knowledge is taught, whose realities are represented, who benefits, and whose voices remain silent in our teaching materials. As Achille Mbembe reminds us, decolonising knowledge requires moving beyond the mere inclusion of African content toward fundamentally questioning how knowledge is produced, validated, and transmitted.^[1] Cognitive justice, as articulated by Boaventura de Sousa Santos and echoed in the Ubuntu philosophy of Mogobe Ramose, demands not merely the coexistence of diverse knowledge systems but their genuine dialogue.^[2,3] Rather than positioning biomedical and Indigenous knowledge as separate entities, we might follow African scholars who demonstrate how African healing practices have always been hybrid, adaptive, and contextual.^[4] The challenge lies in recognising complex, interconnected ways of knowing that resist binary categorisation.^[5] For HPE in Africa, this entails ensuring that technology facilitates dialogue that critically interrogates, rather than merely digitises, existing hierarchies.

Perils

The first peril is reproducing inequality. Many African scholars remind us that technology often amplifies existing disparities rather than addressing them.^[1] The 'Matthew Effect' is clear: free MOOCs, sophisticated AI tools, and open resources tend to benefit those already equipped to take advantage of them.^[6] Thus, students without devices, reliable internet, or strong digital literacies risk being left further behind.

A second peril is epistemicide, which is the systematic devaluation or erasure of entire knowledge systems.^[3] Primus argues that Africa's more than 2,000 languages are being systematically excluded from AI development, creating a self-perpetuating cycle: the lack of data leads to a lack of technological development, which in turn reinforces linguistic exclusion.^[7] Therefore, AI trained primarily on Global North data produces cases that ignore African contexts and recommend treatment plans assuming urban, resource-rich settings.^[8,9] When African languages and realities are missing from AI datasets, we are not just excluded -we are digitally colonised all over again.^[7,10]

Ethical tensions are also mounting. When reflective pieces are written with the assistance of generative AI, questions of authorship and intellectual ownership emerge. Without the skills to critically interrogate algorithmic outputs, graduating health professionals may either accept AI recommendations uncritically or dismiss them entirely, undermining both clinical judgment and potential benefits.^[11,12]

Finally, there is the risk of tokenism. Slapping on African imagery or translated phrases is not localisation—it is digital window dressing. Without co-design, inclusion is not transformative. Surface-level adaptation simply masks deeper misalignments in teaching, cultural context, and relevance to local health priorities.

The Pearls

Despite these challenges, there are shining examples of technology's transformative potential when grounded in context and justice.

African-led innovation, as emphasised in the Science, Technology and Innovation Strategy for Africa (STISA) 2024, adopted by the African Union (AU), guides the continent's development through science, technology, and innovation (STI). It is rooted in cultivating a strong science culture and affirming trust in the intellectual capacity of the continent's people by prioritising local ownership and cautioning against over-reliance on external support for STI development.^[14] The AI Patient Actor app at Aga Khan University exemplifies this approach, helping students practise diagnostic reasoning through interactive patient conversations.^[15] To achieve this, Africa's pursuit of digital sovereignty should be coordinated and driven by African-led policy frameworks that prioritise human-centric, cooperative governance over imported models.^[16]

Ubuntu philosophy offers a framework for understanding technology not as a neutral tool but as an extension of human relationships.^[3,17] A sociomaterial perspective reinforces this, recognising that technology and social relationships are entangled; successful technology-enhanced learning therefore emerges from understanding these interconnections rather than treating technology as separate from human practice.^[18] This provides a foundation for an African-rooted, holistic AI ethics framework emphasising the interconnectedness of humanity, spirituality, and the environment.^[17]

The affordances of technology - such as scalability, multilingual delivery, and high-fidelity simulation for clinical reasoning development - are clear.^[9] Well-designed digital platforms extend experienced scholars' reach beyond physical classrooms. Multilingual interfaces break down language barriers, making concepts more accessible and culturally relevant. Simulation technologies allow safe practice with immediate feedback before real patient encounters.^[9] In resource-limited environments, mobile devices provide evidence-based guidelines exactly when needed. When combined, these affordances offer a pathway to more equitable, context-responsive, and agile health professions education systems.

Perhaps most valuable is the cognitive justice framework itself, enriched by African philosophical traditions. Drawing on Santos' ecology of knowledges, Bhabha's Third Space, and Ubuntu ethics, this approach invites us to design technologies that honour multiple ways of knowing and foster dialogue across difference, supporting inclusive, contextually grounded innovation that serves African realities.^[3,19]

Finally, collaborative digital ecosystems are emerging. Integrating virtual exchanges into curriculum design fosters intercultural competence, enabling students to engage meaningfully across cultures and preparing them as emerging professionals who can navigate diverse ways of knowing, being, and doing to deliver more contextually responsive healthcare.^[20] These digital collaborations allow students and faculty from different regions to work together without geographical constraints, comparing patient care approaches and developing intercultural competence in ways purely local curricula cannot. Transnational networks of African scholars facilitate

the pooling of scarce resources, the co-development of open educational materials, and the sharing of contextually relevant innovations.

The Possibilities

To move from promise to practice, we must design technology-enhanced learning for justice from the ground up. Here are three practical, justice-oriented strategies:

Co-design with communities: Innovation is most powerful when done with communities, not to them. Grounded in critical pedagogy and community-based research, this approach ensures digital tools reflect the lived realities, health priorities, and cultural contexts of users, transforming technology from an imported solution into a locally rooted instrument for change.^[21]

Embed critical AI and digital literacies: Building on Maha Bali's model of critical AI literacy, digital literacies must enable individuals to understand how AI works, question outputs, identify bias, and evaluate the ethics of use.^[22] This involves developing a critical digital consciousness that supports ethical professional practice and enables navigation of an AI-augmented world with discernment.

Integrate cultural humility into digital learning: When we design with cultural humility, we create space for students to reflect on assumptions and engage meaningfully with different ways of knowing. This encourages respectful dialogue rather than one-way knowledge transfer, allowing Indigenous, biomedical and community-based knowledge systems to coexist^[23].

By embracing these strategies, technology moves beyond passive content delivery to become a catalyst for equity, epistemic diversity and human connection in African health professions education. Realising this vision requires faculty development, including not only technical upskilling, but ethical, cultural and pedagogical reflection.

HPE in Africa must approach technology-enhanced learning as a platform for cognitive justice and a space where multiple ways of knowing are actively engaged, challenged, and valued. The goal is not replicating external standards, but creating new ones reflecting both scientific excellence and the deep wisdom of our communities.

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