

Reforming education and pedagogy in medicine and health with digital innovations to enhance learning practices and outcomes

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Countries around the world are experiencing widespread challenges in health workforce expansion to manage the health implications of dramatic changes in demographic, socio-economic, epidemiological, climatic, and technological factors. These changes require health providers to demonstrate increasing flexibility and creativity, along with a more proactive approach in terms of addressing the interactions among diverse factors associated with health and healthcare in an ever-changing environment.¹ However, traditional didactic methodologies have been widely utilised to emphasise the central role of the teacher in knowledge transfer and learning practices mainly via planned lectures with large amounts of theoretical content in a fixed environment. This approach offers limited opportunities for students to practise and share their knowledge, hindering the development of adaptability to meet the growing demand for lifelong learning.

In this issue of the *Hong Kong Medical Journal*, Ng et al² evaluated the effectiveness of online micromodule teaching in knowledge transfer within the urology subspecialty among medical students without prior exposure to urology practice. The ‘flipped classroom’ demonstrated similar efficacy in knowledge transfer, as measured by pre-intervention and post-intervention multiple-choice questions and objective structured clinical examinations, compared with the traditional didactic lecture model.² The findings suggest that the adoption of micromodules as a ‘flipped classroom’ component can maximise time for practical training and experience sharing between clinicians and medical students. This

approach incorporating the use of digital media echoes previous research which highlighted the need for urology training innovation because of the impact of the COVID-19 (coronavirus disease 2019) pandemic.³ Despite the non-inferiority trial design used in their study, the efforts by Ng et al² to create a culture of autonomy and establish a self-paced learning environment have demonstrated the substantial potential of online digital learning for improving student engagement and sustaining knowledge development.

In healthcare and clinical practice, knowledge acquisition is particularly important for both health professionals and the general population. Recent studies have identified widening gaps in health knowledge, awareness, and practice in the fields of hepatology and nephrology.^{4,5} Additionally, diverse educational resources for health advocacy and self-learning have become available because of the growing popularity of electronic material, combined with increasing access to digital technologies and social media platforms.⁵ The expansion of internet-based channels has led to broader education outreach, as reflected in a large-scale survey among >3000 respondents who reported regular access to digital platforms for rapid communication of health-related information.⁶

The World Health Organization has identified five key domains for interventions to transform and enhance the education available to health professionals: education and training institutions, accreditation and regulation, financing, monitoring and evaluation, and governance.⁷ Online learning (e-learning) has been highlighted as an innovative

teaching and learning strategy that can support the establishment of institutions with sufficient strength to produce the desired quantity and quality of health professionals in both high-income and resource-limited settings.⁷ The ‘flipped classroom’ model is gaining popularity as an innovative teaching technique. In contrast to the primarily passive listening approach involved in traditional direct-instruction classroom lectures, students in ‘flipped classrooms’ receive digital learning material (eg, pre-recorded video lectures, podcasts, narrated presentations, and other internet-based material) prior to the traditional in-class session. This approach permits ‘in-class’ time to be used for knowledge consolidation and application through student-centred learning activities such as group discussion, peer projects, problem-solving exercises, and individualised assessments of student understanding. A literature review identified the many opportunities presented by digital technologies, which include (but are not limited to) more effective use of traditional ‘class’ time, greater diversity of learning materials, and additional opportunities to revitalise the learning process.⁸ For example, the integration of virtual patients and clinical simulation scenarios offers students unique learning opportunities to consolidate practical skills via digitally enhanced clinical practice.^{8,9} This approach may be ideal for the reformation of medical school curricula to address social stigma associated with various diseases (eg, human immunodeficiency virus/acquired immunodeficiency syndrome,¹⁰ mental illness, and cancer¹¹) by incorporating interventions that involve experiential and affective teaching components.

The inclusion of digital innovations in education and pedagogy reform enhances clinical competencies among students, while creating environments for resilience building. There is a need to manage physicians’ increasing clinical responsibilities that arise from rapid progress in health systems, in addition to the growing demand for medical and translational research conducted in clinical settings.¹² Longer working hours can lead to significant work-life imbalance and greater risks of dissatisfaction and depression among physicians. A territory-wide survey revealed a high prevalence of burnout among training and practising physicians in Hong Kong.¹³ In the United States, the implementation of an innovative ‘flipped classroom’ mindfulness training programme significantly reduced physician burnout, emotional exhaustion, and depersonalisation among both residents and faculty.¹⁴ The design of online modules focused on mind-body skills training, combined with interactive discussion sessions, has demonstrated efficacy in terms of increasing resilience, thereby improving the provision of calm and compassionate care.¹⁴

Among the various innovative components

of the ‘flipped classroom’ model, multimedia tools with digital elements contribute to greater improvements in visualisation and student engagement throughout the teaching and learning process.¹⁵ A combination of interactive text, graphics, sound, animation, and video delivered by electronic means may be appropriate for children with intellectual disabilities—such children have an increased risk of infection because their limited cognitive ability hinders absorption and retention of health knowledge.¹⁶ A study conducted in Hong Kong showed that the development of multimedia visualisation teaching strategies with visual prompts (eg, lyrics and posters) helped the target population to learn proper hand-washing procedures.¹⁶

From the perspective of health communication, health awareness among patients (who are enhanced through effective physician-patient education) and clinical skills among physicians have equal importance in terms of ensuring excellent care.¹⁷ With respect to eye health, a sustained school-family partnership is critical for achieving the desired goal of ‘Vision for Everyone’.¹⁸ Advances in digital communication to share, disseminate, and amplify health messages—to target audiences and the wider community—have key roles in promoting universal eye health and preventing avoidable blindness. Digital technologies are also expected to play major roles in out-of-class settings where the communication of health knowledge between school teachers and students’ parents via digital routes (eg, instant messengers) may have long-term effects on students’ abilities to learn and maintain healthy behaviours.¹⁹

In recent decades, dramatic advances in digital technologies (eg, mobile computing, artificial intelligence, blockchain, virtual reality, and augmented reality) have facilitated widespread exploration of digital innovations in clinical practice and public health.²⁰ Digitally enhanced learning has become a key driver of health system changes that can empower patients, physicians, and students. Therefore, the expansion of digitally enhanced learning practices should be encouraged and supported, both within and across medical specialities, to generate evidence that can guide education and pedagogy reform in response to the changing environment and health profiles in the post-COVID-19 era.

Author contributions

All authors contributed to the editorial, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

The authors have declared no conflict of interest.

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