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NTU Singapore uses 3D-printed anatomical specimens for medical education

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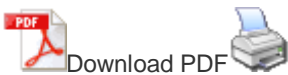
Nanyang Technological University, Singapore (NTU Singapore) is pioneering the use of 3D-printed anatomical specimens for medical education in Singapore.

Just last month, students at the Lee Kong Chian School of Medicine (LKCMedicine), jointly set up by NTU Singapore and Imperial College London, started learning anatomy with 3D-printed specimens.

A collaboration between LKCMedicine and NTU's Singapore Centre for 3D Printing, these 3D-printed specimens come in varying materials, colors, hardness and flexibility to mimic the properties of anatomical structures in a real human body – a first in Singapore.

The made-in-NTU 3D-printed specimens are the latest example of NTU turning to innovative learning tools to prepare its medical students, as the medical education landscape shifts in tandem with the influx of digital technologies.

LKCMedicine is also looking into other pedagogical approaches such as a medical tutor powered by artificial intelligence and a mobile app where virtual 3D animated specimens can be accessed. (See Annex A)

Such innovative teaching tools are highlighted at the **Transform Medical Education (Transform MedEd)**, an inaugural two-day conference that looks at how new pedagogical approaches and the latest technologies are shaping the future of medical education and healthcare practice.

Jointly organized by LKCMedicine and Imperial College London School of Medicine, the conference provides a platform for local and international thought leaders to interact with educators, scientists and students. The interactive program will focus on the latest advances in the science and practice of medical education, and participants will share perspectives on how innovations in technology and pedagogy can transform the way health professionals learn.

NTU President Professor Subra Suresh said, "As the boundaries between the physical, digital, and biological words become increasingly blurred, we should examine as to how we can use technology to break down the walls between classrooms and clinical learning environments. With digital technologies such as artificial intelligence, data science, 3D printing, and augmented reality playing an increasingly significant role in medical care, we want to make sure that we continuously improve teaching and learning methods and their outcomes for students at NTU.

"This means leveraging resources on the NTU Smart Campus and our strengths in areas of computing and computer science to integrate the latest technologies into our pedagogical approach, so that we can help train our medical students to become well-prepared, confident and capable doctors."

Professor Simone Buitendijk, Vice-Provost (Education) at Imperial College London, said: "This international conference reflects Singapore's status as a global hub for medical education.

"From artificial intelligence to curriculum-mapping software, collaboration between Imperial College London and NTU is changing the way future doctors learn. We embrace the challenge of keeping pace with shifting global health priorities – from caring for aging populations to meeting the rising demand for personalized medicine.

"As demonstrated at this conference, educators and industry stand ready with an abundance of ideas that will improve patient outcomes for the better."

Over the two days, there will be practical opportunities for participants to enhance their teaching skills and learn about the latest advances in medical education with hands-on workshops, facilitated discussions and presentations by internationally renowned medical educators.

Invited speakers include Queen Mary University of London Professor of Medicine and Education Dame Parveen Kumar, who will challenge the conventions of textbook learning in medical education, LKCMedicine Visiting Professor Henk Schmidt who will present a research-informed view of *How students learn* in the healthcare setting, and IBM Asia Pacific Director of Healthcare & Social Services Ms Farhana Nakhooda, who will talk about augmented clinical intelligence as a new era in healthcare. (See Annex B)

LKCMedicine Dean Professor James Best said, "Our mission is to train a new generation of doctors who know how and when to use the latest technology, while never losing sight of what matters the most – the patient, who is at the heart of their care.

"To prepare our students to become patient-centred doctors, we at LKCMedicine are harnessing the latest technologies from 3D printing to high-fidelity simulation to offer a modern and interactive medical education, while at the same time retaining the patient's perspective and experience throughout our curriculum, right from the first few weeks of medical school."

Since it was established in 2010, LKCMedicine has employed innovative technologies and the best teaching practices to deliver a modern medical education.

Moving away from the traditional lectures, LKCMedicine adopts the flipped classroom pedagogy, where students learn the course content online before class and face time with professors and classmates is devoted to collaborative learning. In 2013, the school pioneered the use of plastinated specimens, eliminating the need for traditionally preserved cadavers which are in short supply in Singapore.

The first batch of LKCMedicine students graduated in 2017 and are now working in the various public hospitals in Singapore.