

## **ANNEX A**

### **Current and upcoming innovative teaching tools at NTU's LKCMedicine and Imperial College London School of Medicine**

#### **3D-printed anatomical specimens**

A collaboration between NTU's Singapore Centre for 3D Printing and LKCMedicine, the 3D-printed specimens are multi-material and multi-coloured, thanks to the combination of materials and colours they are printed in.

The specimens were used in teaching for the first time at LKCMedicine in October 2018, giving students more opportunities to handle, examine and interact with accurate copies of real human organs and body parts. The specimens currently mimic the properties of plastinated bodies. Using the same technologies, the materials can be further optimised so the 3D-printed specimen will touch and feel like real soft tissues, which will come in handy for performing clinical tasks such as physical examination, giving injections or placing catheters on real patients.

The 3D-printed parts add on to the range of innovative tools to teach anatomy class, including plastinated specimens and the Anatomage Table which allows for virtual dissection in interactive 3D. So far, eight hearts, three elbows, two hands, a knee, two pelvic models, and a number of airway models have been printed. Upcoming specimens include the spine, and full lower and upper limbs.

#### **Anatomy MagicBook**

This multi-faceted resource, still in the prototype stage, consists of virtual and augmented reality components that enable students to prepare for their anatomy practical at home by accessing virtual 3D animated copies of LKCMedicine's extensive collection of plastinated specimens.

Combined in a mobile app, students will be able to access the specimens outside of the lab and even when they are completing their clinical rotations and need to review a specific body system.

#### **AI medical tutor**

LKCMedicine is leading the development of an artificial intelligence medical school tutor that will harness the School's extensively digitised medical curriculum.

The virtual tutor may take various forms, such as a mobile application, a computer programme with voice command or integrated into the School's Team-Based Learning platform.

The goal is to design a virtual tutor with the ability to adapt learning to each individual, and with algorithms equipped to analyse students' performance, weaknesses and strengths, and help them polish up areas that they may need help with.

It is envisaged that this medical school tutor could be particularly valuable during the later years of training, helping students hone their scientific and clinical knowledge

base to supplement learning in the healthcare environment, which is by nature unpredictable and variable.

## **Serious games**

LKCMedicine has embarked on a systematic approach of using games as a pedagogical tool as well as for innovation and transformation of people and organisation.

This work is done in partnership with the National Healthcare Group, with whom LKCMedicine formed the gAmes for heaLth InnoVation centRE (ALIVE).

Serious games are a genre of games designed for purposes other than pure entertainment. Showcasing a repository of serious games prototypes, which includes more than 30 games, these games are aimed at improving knowledge among health professionals.

## **Sofia**

[Sofia](#) is a revolutionary curriculum-mapping tool designed by Imperial College London School of Medicine. It empowers students and educators to understand their learning and teaching in context, with the ability to search, visually explore and interact with their curricula at any part, level or detail.

Sofia empowers students by linking curriculum content to learning outcomes – clearly and transparently – so learners can track their progress, access resources and review what they've covered. Smart graphics mean students can explore and understand specialities and domains at a glance.

Trainee doctors can immediately see areas of medicine that they have been taught, refer back to learning tools and notes, and focus on weaker areas. They can search by medical condition, enabling new connections to be made between formal learning and the clinical and research environments.

Educators can hone in on potential weak spots in the curriculum or lower quality teaching, and can replace unnecessary repetition with reinforcement and advancement.

At Imperial, the world's fourth highest ranked medical school, Sofia is enabling unprecedented control to educators and learners over a complex, challenging curriculum that encompasses more than 12,000 learning outcomes.