Research Theme (Please indicate as appropriate)

☐ Dermatology & Skin Biology
☐ Health Systems & Population Health
☐ Metabolic Disorders
☒ Medical Education
☐ Family Medicine & Primary Care
☐ Infection & Immunity
☐ Neuroscience & Mental Health
☐ Others (Please specify):

Research Project Title:

Efficacy of 3D printed models in Anatomical Education

Project Description:

Three-dimensional (3D) printing (3DP) technology has been widely used in the field of Engineering and begun to be adopted in medical education and training. Anatomy is an essential part of medical education and it has traditionally been acquired through dissection of human cadavers. The extensive infrastructure requirements, difficulty in sourcing cadavers and high recurring cost of the dissection laboratory are also putting pressure on medical schools to explore alternative ways to deliver effective anatomy teaching. We hypothesize that anatomical models printed in multi-materials could be a viable teaching tool for anatomical education. The existing commercial 3DP models are constructed using a single material (powder or plastic type material) which results in rigid models. A novel approach will be developed using high resolution CT scans of LKCMedicine’s collection of plastinated specimens and novel 3D printing technology that blending of materials with different tactile elasticity and a variety of colours to create anatomically accurate models. We believe that innovative 3D printed models could replace or supplement cadaveric specimens and improve quality of anatomical education especially where students have no access or extreme shortage of cadavers.

Objectives:
1. Development of 3D printed human anatomical models that mimic the features of the human body with haptic qualities.
2. To assess their effectiveness compared to plastinated specimens in terms of student' knowledge acquisition.
3. Role of 3D printed human anatomy models in enhancing student-learning experience compared to the plastinated specimens.
Brief summary of main Methodologies and/or Techniques to be learned during the proposed PhD (experimental or analytical):

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<th>Major methods includes:</th>
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<td>1. Reconstruction of medical imaging data by segmentation</td>
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<td>2. Testing the efficacy of the models compared to traditional methods of anatomy teaching by randomised controlled studies</td>
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<td>3. Evaluating the students’ perceptions using mixed methods such as questionnaire (survey design and validation of items) and focus group studies.</td>
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In addition to above, successful candidate will develop analytical skill using statistical package, and writing skills by means of peer reviewed publications and conference abstracts.

**Keywords:** Gross anatomy, 3D printing, Medical Education, Multi-material printing, Education tools, Simulation
## Supervisor(s)

### Primary Supervisor

<table>
<thead>
<tr>
<th>Name of Supervisor:</th>
<th>Asst Prof Sreenivasulu Reddy Mogali</th>
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</thead>
<tbody>
<tr>
<td>Designation:</td>
<td>Assistant Professor and Head of Anatomy</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:Sreenivasulu.reddy@ntu.edu.sg">Sreenivasulu.reddy@ntu.edu.sg</a></td>
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### Co-Supervisor *(need not be determined at this time)*

<table>
<thead>
<tr>
<th>Name of Supervisor:</th>
<th>A/Prof Yeong Wai Yee</th>
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<tbody>
<tr>
<td>Designation:</td>
<td>Associate Professor</td>
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<tr>
<td>Email:</td>
<td><a href="mailto:WYYeong@ntu.edu.sg">WYYeong@ntu.edu.sg</a></td>
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## Main Location of Research Work *(Please indicate as appropriate)*

- ☑ LKCMedicine Clinical Sciences Building @ Novena Campus
- ☑ Others *(Please specify):* Singapore Centre for 3D Printing (SC3DP), NTU

## Other Information

1. Does the proposal need IRB’s approval? ☑ Yes ☐ No
   
   If “Yes”, is the IRB’s approval in place? ☑ Yes ☐ No

2. Does the project involve contact with patients? ☐ Yes ☑ No

3. Is there a potential for overseas academic exchange as part of this research project? ☐ Yes ☑ No
   
   If “Yes”, please specify: ________________________________