

Project Title : Fostering an Innovation Mind-set in a MakerSpace environment via flipped/flicked Cornerstone Design Framework

Leading University : The Hong Kong University of Science and Technology

Participating UGC-funded University(ies) : The Hong Kong Polytechnic University, The University of Hong Kong

Project Leader(s) : Professor Ben Y B CHAN, Associate Director, Center for Engineering Education Innovation; Assistant Professor of Engineering Education, Department of Civil and Environmental Engineering, School of Engineering, The Hong Kong University of Science and Technology

Summary of Proposal

The word “Innovation” is often overused but is not addressed enough, especially in the education sector. This is especially true in the modern setting where technological advancements, including crowdfunding and 3D printing, have turned the production process from factory-orientated to customer-centered. It is generally agreed that innovation cannot be made to happen and does not depend on the effort involved, which makes it extremely difficult to teach and measure in a curriculum. However, if we consider innovation as the end result or product of an engineering design process, it is possible to define the “innovability” of a person, or the prerequisites needed for someone to be able to innovate. The project is indeed a consortium of innovative ideas for modern innovation mindset development. The 3 major components of the proposed framework are -

1. Student-centered MakerSpace initiative
2. “Flipped Laboratory” modelling and prototyping modules (powered by Open edX platform)
3. Integrated cornerstone design course for first year students.

All three components are unique initiatives in Hong Kong and their integration means

that students can create things freely at any time. Lack of venue, tools or technical skills will no longer be a constraint for Hong Kong students. The cornerstone design course aims to provide first-year students with the insight to innovate and practice engineering design processes in a systematic manner.

The research ground work in this project will contribute to the whole education sector and the assessment instrument will be applicable to all design-based courses. The interactive online learning materials and the flipped laboratory approach will also significantly enhance the creation and prototyping ability of the coming generations. The cornerstone design concept has been proven to be a best practice in higher education for design thinking development. The design team will scale up the scope of the course by inviting students from partner universities to participate when the framework is fully developed.

This is not an engineering project! The MakerSpace initiative and the Flipped Laboratory are intended to cultivate innovators and provide a one-stop technical and professional advice service to those who have no engineering background.

Summary of Final Report

Innovativeness development is a mind-changing process, it requires continuous deep reflections and distance transfer capabilities. Only innovators can nurture innovators and innovators coming together can inspire more innovators.

One MakerSpace and three years, there are six engineering design courses developed and offered 16 times; 46 student-initiated projects created; 200 workshop instructors and senior technical advisors trained; 150 technical training workshops delivered composing a total of 427 hours and 1 908 participants; over 100 make-it-yourself online training videos produced. It proves that crafting programs around a student-operated makerspace and empowering students to make, create and innovate is an effective approach to promote innovativeness.

What more encouraging is that this is just the beginning. With the success of this project, MakerSpaces with a similar nature are currently under development in other universities in Hong Kong, Asia and the HKUST Guangzhou campus, the idea of innovativeness education using experiential learning approach will continuous to growth in the foreseeable future.