

Project Title :	Developing Active Learning Pedagogies and Mobile Applications in University STEM Education
Leading University :	The Hong Kong Polytechnic University
Participating UGC-funded University(ies) :	Hong Kong Baptist University, The Chinese University of Hong Kong, The University of Hong Kong
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Science, Technology, Engineering and Mathematics (STEM) education is crucial to continuing Hong Kong's worldwide competitiveness in our modern society. With the implementation of the 3-3-4 system in Hong Kong, however, tertiary institutions found that many STEM students lack the necessary background and skills to integrate and apply their knowledge to solve problems practically and creatively. One possible solution to this dilemma is to introduce “active learning” to our Hong Kong STEM university students. Active learning is simply anything other than traditional passive teaching. However, despite extensive evidenced based research on the benefits of active learning strategies to our students in STEM, the majority of STEM instructors in Hong Kong do not put these teaching methods into practice due to (i) lack of incentives or support from their tertiary institutions; (ii) instructor’s own background education is in, and contrasting deeply held beliefs in, passive learning and teaching; and (iii) the fact that STEM education in Hong Kong has not been advocated until recently, and is routinely emphasized more for secondary or high schools than in tertiary institutions.

A positive approach to the above dilemma of increasing active learning in STEM education in Hong Kong universities is based on the following four observations: (i) approximately 98% of our Hong Kong students today carry a mobile phone, tablet or

laptop to the classroom; mobile applications (m-apps) for education (ii) enable teachers to improve their teaching practices; (iii) engages and highly motivates students by providing them with new opportunities to participate and construct their own learning, individually or collaboratively; and (iv) improves students' achievement, understanding and application of concepts. These four observations, coupled with a meta-analysis which indicates that active learning increases Asian student examinations scores by more than an average of 6% in STEM university subjects, suggests that increasing active learning with the aid of m-apps can greatly enhance Hong Kong students' learning outcomes in STEM tertiary education.

Therefore, the main objectives of this proposal are to explore and develop new pedagogies to increase active learning in STEM Hong Kong education and to cultivate innovative m-apps to enhance active learning. Increased engagement and collaboration between teacher and students in STEM education will equip our students with the necessary practical/social skills and theoretical foundation essential to tackle our current economic, scientific and technological challenges.