Project Title :	Collaborative Learning through Immersion Project (CLIP)
Leading University :	City University of Hong Kong
Participating UGC-funded University(ies) :	Hong Kong Baptist University, The Hong Kong Polytechnic University, The University of Hong Kong
Project Leader(s) :	Professor Jeffrey Shaw, School of Creative Media, City University of Hong Kong

Layman Summary of Proposal

The Collaborative Learning through Immersion Project (CLIP) brings immersive visualization into university classrooms. Students will experience real and virtual places through 3D and 2D graphical representations, allowing them to visualize and interact with the depicted systems at a high level of realism. The resulting next-generation classrooms will develop students' problem solving and lateral thinking using interactive digital tools. Such classrooms address the need to foster innovative thinking and creativity, thereby supporting City University of Hong Kong (CityU)'s Discovery-enriched Curriculum. Underlying the CLIP design is the understanding that learning is embedded in doing; unlike traditional forms of learning associated with task and content analysis, the structuring of this immersive learning paradigm is focused on discovery through engagement. In immersive visualization, students are not merely onlookers but actors within an information space, where they actively influence the outcomes. CLIP will effect this development by transforming complex information into accessible real-world learning scenarios through an integrated educational process, where pedagogy and instruction design inform the creation of immersive learning experiences. This approach will give Hong Kong universities the opportunity to lead a teaching and learning transformation.

CLIP will be implemented across diverse subject areas in the sciences and engineering, as well as the social sciences and humanities, drawing on the expertise of four Hong Kong universities (CityU, The University of Hong Kong (HKU), Hong Kong Baptist University (HKBU), The Hong Kong Polytechnic University (PolyU)) and one international partner (University of New South Wales (UNSW) in Australia). Experts from CityU and HKU together with educational collaborators and subject coordinators

from PolyU, HKBU, and UNSW will design and implement user experiences in virtual environments that are dynamic and creatively challenging. CLIP impacts will be carefully evaluated to determine the impact on learning outcomes.

CLIP is intended to expose a large number of local students (approximately 3 500) to immersive learning and its benefits, as well as to disseminate the practice of immersive teaching across partner universities. To achieve this, the following effort will be undertaken:

1. Development and documentation of a pedagogy for immersive learning with immersive visualization, which will be shared across partner institutions (as well as other interested Hong Kong institutions). CLIP methods and interaction strategies will be used as well-documented and repeatable case studies and templates for effective immersive teaching and learning in a range of cross-disciplinary subject areas that use a variety of emergent platforms and technologies.
2. Provision of teaching support resources for course adopters, intended to enable them to adopt immersive learning without significant additional effort.
3. Support for distributed learning, provided by a project team member who specialises in improving student interaction.
4. Widespread ability to explore immersion through a non-credit Massive Open Online Course (MOOC) offered by the project. The CLIP project will develop one course in MOOC format, allowing it to reach a much wider audience than normal courses.
5. Set-up of development teams to create reusable immersion assets at multiple partner sites.
6. Development of solutions that can be experienced with high sophistication, as well as in a regular classroom environment through a mobile virtual reality (VR) device, or TV screens and 3D glasses.
7. Assessment of learning outcomes.

Layman Summary of Final Report

The Collaborative Learning through Immersion Project (CLIP) has brought immersive visualization into university classrooms. Around 4 000 students experienced real and virtual places through 3D and 2D graphical representations, allowing them to visualize and interact with the depicted systems at a high level of realism. The resulting next-generation classrooms developed students' problem solving and lateral thinking using interactive digital tools. The resulting learning environments addressed the need to

foster innovative thinking and creativity, thereby supporting CityU's Discovery-enriched Curriculum (DEC). Underlying the CLIP design is the understanding that learning is embedded in doing; unlike traditional forms of learning associated with task and content analysis, the structuring of this immersive learning paradigm is focused on discovery through engagement. In immersive visualization, students are not merely onlookers but actors within an information space, where they actively influence the outcomes. CLIP effects this development by transforming complex information into accessible real-world learning scenarios through an integrated educational process, where pedagogy and instruction design inform the creation of immersive learning experiences. A new pedagogy has been defined to take advantage of the immersive learning experiences. This approach gives Hong Kong universities the opportunity to lead a teaching and learning transformation.

CLIP was implemented across diverse subject areas in the sciences and engineering, as well as the social sciences and humanities, drawing on the expertise of four Hong Kong universities (CityU, HKU, HKBU, PolyU) and one international partner (UNSW). Experts from CityU and HKU together with educational collaborators and subject coordinators from PolyU, HKBU, and UNSW designed and implemented user experiences in virtual environments that are dynamic and creatively challenging. CLIP impacts have been carefully evaluated and shown to positively impact learning outcomes.

CLIP exposed a large number of local students (over 3 500) to immersive learning and its benefits, and disseminated the practice of immersive teaching across partner universities. To achieve this, the following efforts were undertaken:

1. Development and documentation of a pedagogy for immersive learning with immersive visualization, shared across partner institutions (as well as other interested Hong Kong universities). CLIP methods and interaction strategies were used as well-documented and repeatable case studies and templates for effective immersive teaching and learning in a range of cross-disciplinary subject areas that use a variety of emergent platforms and technologies.
2. Teaching support resources were provided to course adopters, to enable them to embed immersive learning without significant additional effort.
3. Development teams created reusable immersion assets at multiple partner sites.
4. Immersive solutions that can be experienced with high sophistication, as well as in a regular classroom environment through a mobile VR device, or TV screens and 3D glasses to enhance sustainability of the learning experiences were created.

5. Learning outcomes were formally assessed.
6. Results were shared in workshops and conferences.
7. A book manuscript that summarizes the project and its experiences for further result dissemination has been created.