Example 46

Using virtual reality and augmented reality technologies to support learning and teaching in PSHE subjects

Virtual Reality and Augmented Reality

Virtual reality (VR) is computer technology used to create a three-dimensional computer-generated simulation of a real or imagined environment that can be explored and allows for user interaction. In contrast, augmented reality (AR) projects images of a real-world physical environment in which elements are augmented by sound, graphics, GPS data, etc. to enhance perceptions of the real-world environment.

With the implementation of the Fourth Strategy on Information Technology in Education in Hong Kong schools, e-learning tools using VR and AR technologies have become more popular, and attempts have been made to promote these technologies in the school curriculum to enhance learning and teaching effectiveness. For example, virtual field trips and the use of VR and AR devices and apps are promoted in PSHE subject curricula such as Chinese History, Geography, History, and Life and Society.

Virtual Field Trips

Field trips are important learning elements in PSHE subjects, as they provide opportunities for students to see, hear, smell and sometimes touch or taste the things around them and thus actively participate in their learning. However, field trips sometimes are not feasible because of time and resource constraints or adverse weather conditions. Under such circumstances, virtual field trips can be a good alternative to conventional field trips.

Virtual field trips provide students at all levels, from primary to senior secondary, with convenient access to remote locations such as Antarctica and the Himalayas and to restricted and dangerous areas such as the Chernobyl Nuclear Power Plant. Thus, students can experience the benefits of actual field trips without concern for liability and safety issues or time and financial constraints. In addition, virtual field trips can cater for learner diversity, as students have the flexibility to plan their own routes and pace their progress to meet their individual needs. Virtual field trips also make it easier for teachers to monitor student progress.

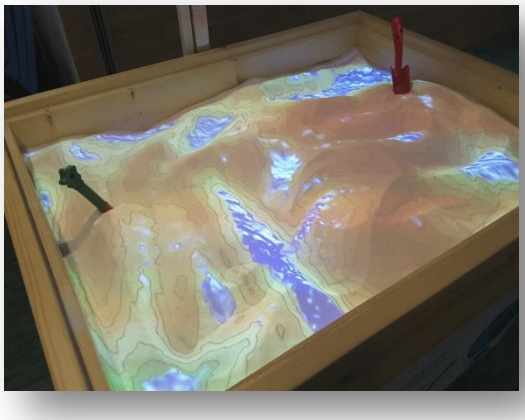
Students of Pak Kau College experiencing a Geography virtual field trip inside the classroom.

The History virtual field trip app developed by the PSHE Section, CDI of Education Bureau enables students to visit the three-dimensional 360-degree festival arena of Cheung Chau Jiao Festival anytime and study intangible aspects of their cultural heritage.

AR devices and apps

Augmented Reality Sandbox[1]

AR combines elements of the real-world and virtual environments and enables users to interact with virtual content in a real-world environment. AR is helpful in teaching abstract concepts, such as spatial conversion between a two-dimensional paper map and three-dimensional real-world scenes in the learning and teaching of map reading in Geography lessons. The hands-on AR Sandbox allows teachers and students to create topographic models by shaping real sand and to instantly transform the topography into a colour contour map by projecting topographic contour lines, simulated water, etc. onto the models in the sandbox. The AR Sandbox system can also simulate rain and the flow of rainwater according to the topography.



The AR Sandbox built by Pak Kau College.

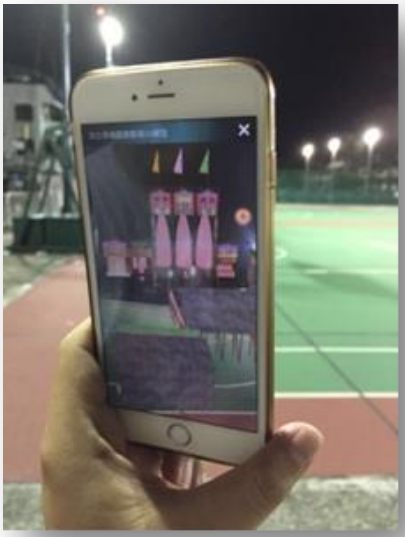
The teacher and S3 Students create a topographic model and experience the formation of relief rain by using the AR Sandbox in a Geography lesson.

[1] In 2012, Dr Oliver Kreylos of the W. M. Keck Center for Active Visualization in the Earth Sciences, University of California, Davis, developed the Augmented Reality Sandbox, which is a real-time integrated augmented reality system (http://idav.ucdavis.edu/~okreylos/index.html).

AR apps for Field Trips

AR technology may complement field trips by enhancing students' learning interests. Students may use an AR app to support History field trips to help them to experience the Cheung Chau Jiao Festival on non-festival days. This AR app supports video playback and pop-up information of specific features when students reach designated waypoints along the planned route in Cheung Chau based on GPS calculation. Students can experience the reconstruction of Jiao Festival scenarios using the AR app on mobile computing devices and can view the Jiao Festival in the same locations during non-festival days.

Mr Leung Kai Chung, the History teacher of Confucian Tai Shing Ho Kwok Pui Chun College, guiding students to use an AR app of the Cheung Chau Jiao Festival on a History field trip.



In a mobile device, a 3D model showing the festival arena projected onto the real location through AR.

If you are interested in learning and teaching resources, read also Examples 43-45 and 47-49.