

## Using Computer Simulation Games to Teach Construction Safety and Health Management in Universities

Hana Samad<sup>1</sup> and Goh Yang Miang<sup>2</sup>

<sup>1</sup>Research Assistant, Safety and Resilience Research Unit (SaRRU), Dept. of Building, School of Design and Environment, National Univ. of Singapore. E-mail: [bdghs@nus.edu.sg](mailto:bdghs@nus.edu.sg)

<sup>2</sup>Associate Professor, Safety and Resilience Research Unit (SaRRU), Dept. of Building, School of Design and Environment, National Univ. of Singapore. E-mail: [bdggym@nus.edu.sg](mailto:bdggym@nus.edu.sg)

With the perennial workplace safety and health (WSH) problems in the construction industry, it is important to ensure the effectiveness of WSH education, including preparing industry-ready graduates for a safer and healthier work environment. Current research on construction safety education shows that there is a lack of opportunities for university or college students enrolled in construction-related courses to be exposed to real world WSH knowledge and experiences.

Teaching construction safety and health using the traditional classroom setting is less capable of capturing the complexity involved in WSH management and does not give learners a holistic perspective of WSH risk management processes. On the other hand, training on actual job sites comes with a number of constraints and safety concerns due to the risks students will be exposed to, lack of time and finances for such arrangements, and limited access to on-going construction sites. Effective teaching and learning requires a fine balance between two components: Learning-to-know (traditional instructional method which concentrates more on books and lectures as a means of learning) and Learning-to-do. The latter can be facilitated through educational technologies such as simulation games, 3D, virtual reality (VR) etc. These technologies provide the capability to build learning environment that augment traditional instructional practices, providing an authentic, safe and experiential learning experience.

The NUS Safety and Resilience Research Unit (SaRRU) is currently working on a computer simulation game to explore how simulation game technology can be used to improve WSH education at the undergraduate level. Our current focus is on a prototype game on risk management. The concept is to allow students to conduct a desktop risk assessment for a virtual site and develop an inspection checklist based on their risk assessment. Teams of students will then conduct the inspections in the virtual site as part of their risk management, and they will review their risk assessment after each inspection. The teams will be debriefed and guided to reflect on the risk management of the virtual site. They will then submit a report documenting their reflections on the challenges of WSH risk management and ways to overcome them. The game provides an opportunity for inexperienced undergraduate students to learn about WSH risk management in a collaborative and authentic fashion. At the same time, students learn about common construction hazards and their corresponding controls in a safe and accessible virtual site.

The study is significant because it aims to improve education of construction safety and health management in institutes of higher learning (IHLs), which, if effectively conducted, will assure better trained and knowledgeable construction professionals, who can lead reductions in construction accidents and ill health in the long run. If successful, the game can be adapted for training of practitioners and other IHLs in Singapore and internationally.

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