

Engineering Education through Students' Engagement in Virtual Learning Space

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Abstract

Virtual Reality is likely to be a part of future education especially when addressing the Net Generation also known as Generation Why. Delivering course material via a virtual environment is beneficial to them because it offers the interactivity and social presence. As student and educator become interconnected through collaboration and interaction, the virtual environment becomes perpetual learning experience. VR in engineering education offers the ability to explore places, simulate machines functional or practices technical processes without leaving the classroom. Plus, educator can demonstrate dangerous or complex task in the virtual environment, and students can try completing the task repeatedly, minus the cost and danger.

Even though many studies have linked virtual technologies with improvements in students' academic performance and motivation [1,2,3,4], students' social and collaborative skills [5], and students' psychomotor and cognitive skills [6,7]. The actual usage of virtual in engineering education is still relatively low. The drawbacks are caused by not enough VR content available, too expensive VR devices and difficulty in delivering VR contents to capture students' engagement.

Thus, we are introducing ViLeCube, that aims in providing a solution by developing an interactive cross-device and cross-platform virtual learning space for building deep students' engagement. Cross-device means a user does not need to have expensive head mounted display (HMD) such as Rift, but he or she could experience our virtual learning space using only smart phone or desktop computer, with or without the HMD. Cross-platform means our solution could be deploy into several different platform such as Android, iOS and Windows. Interaction in our solution will be a real time interaction of voice and gesture in multiplayer setting.

The basic concept of ViLeCube is a cloud learning environment, where engineers and students can join in from anywhere using their computer or mobile devices. Inside the ViLeCube, engineer can directly speak and show simple gesture to interact with virtual machines parts or explain engineering concepts. Gesture is control by gaze direction and locomotion sensors inside mobile devices. Students are able to respond in their lesson using voice, button selection and chatting (optional).

The first prototype has been develop and tested in computer engineering subject, where three problem based situations are created. The preliminary result reveals that educators and students are keen to use ViLeCube in their engineering subject. Students engagements are measured during problem solving situation, where we found that the engagement are raise due to representation of avatar. Most students felt that these avatars increase self confidence and allows them to experience more of hostile situations.

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Keywords

Engineering education, virtual reality, virtual classroom, multi-user interaction,

Biography

Puteri Suhaiza Sulaiman is a senior lecturer in Universiti Putra Malaysia. She has Degree of Science (Computer) and Masters of Science (Computer Science), both from Universiti Teknologi Malaysia (UTM). She then received her PhD in Computer Graphics at in Universiti Putra Malaysia (UPM). She has more than 15 years experience in the field of computer graphics, computer vision, information visualization and advanced interaction. Her current research explores the realm of virtual and mixed reality, focusing on the interaction and visualization elucidation. She has been involved in designing and developing computer games for children and people with special needs.