Using mobile augmented reality to enhancing students' conceptual understanding of physically-based rendering in 3D animation

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Abstract :
Physically-based rendering (PBR) concept is widely use nowadays in 3D rendering works, this concepts interested in the ray of light for describes the interaction of light and materials. Understanding the principles of PBR can be easier to adjust shader parameters to be realistic, react correctly to changes in lighting condition and also giving the same results even in different 3D rendering software. In Shading lighting and rendering (SLR) subject which PBR concepts become important concept instead the 'old style rendering' it was found that students are unable to clearly understand concepts of PBR. According to the problem, in this research bringing mobile augmented reality (AR) to be a media for demonstrate PBR concepts for students. The sample were 35 students from Department of Animation and Digital Media, Bansomdejchaopraya Rajabhat University. The results found that students understand the PBR concepts and can adjust the PBR shader paremeters to be realistic assess from students pre-test, post-test scores and students homework. The mobile AR application media were usable for students and suitable to be a learning media in 3D animation assess form students' response.

Keywords: shader, 3D animation, PBR, augmented reality

Introduction

3D rendering works has been being developed rapidly nowadays from the advances in physics, mathematics and computer science as can be seen from 3D animation and 3D games. Physically-based rendering (PBR) is a method of shading and rendering that interested in the ray model of light as it describes the interaction of light and surface matter to be similar in virtual worlds. The key characteristics of PBR is energy conservation rule which means reflected ray is never brighter than the value it had when it first affect the surface (Substance Academy, 2019). Physically-based rendering (PBR) concepts are widely use nowadays in 3D rendering works togather with shader which is a computer program that used for calculate shading such as the production of light, darkness, and colors (Claudia Doppioslash, 2019).

To adjusting the shader parameters in 3D animation works can be divide into 2 types: 'old style rendering' which is parameters can be flexible and freely to adjust that can give unrealistic results depend on shader artist and 'PBR' concepts rendering which is a newer concepts that focus on the physics to light. Understanding the PBR concepts can be easier to adjust shader parameters to be realistic same as in the virtual world, react correctly to changes in lighting condition and also giving the same results even in different 3D rendering software.

At present, learning 3D animation this concept is not used widely use especially in Shading lighting and rendering (SLR) subject, was one of the important subject which have focused on shader, lighting,