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Curriculum Design System Based on AR Glasses for Interest-Driven Learning

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Abstract: In the context of the Fourth Industrial Revolution, emerging technologies have been applied in the field of education more frequently, including Augmented Reality (AR) technology. However, many teachers in China find it a challenge to use AR technology to create specific courses. This may be due to their lack of experience in integrating AR materials curriculum to create an interesting AR course. In this paper, our research group has defined a curriculum design system based on AR glasses and has proposed the process for creating an interest-driven lesson based on Interest Driven Creator (IDC) theory.

Keywords: AR, interest-driven learning, curriculum design

1. Introduction

Presently, with the rapid development of information technology, all kinds of new technologies are springing up and developing. It has always been the focus on how to use these technologies to better promote teaching reform in education. Augmented reality technology, an emerging technology, has also received great attention from researchers in the field of education (Pereira, Arezes, Alves & Duarte, 2019).

Many studies have shown that the application of AR technology in education has numerous advantages such as enhancing students' participation and interest in learning. (Södervik, Katajavuori, Kapp, Laurén, Aejmelaeus & Sivén, 2021; Gutiérrez & Fernández, 2014; Wang, Md Khambari, Wong & Razali, 2021). Augmented reality has become more ingrained in education due to its intuitive nature. Smartphones with cameras allow students to experience AR glasses by using their phones to combine real world and virtual information (Gutiérrez & Fernández, 2014). Compared with smartphones, smart glasses can augment students' vision by allowing them to continuously view information through see-through displays while doing other activities. The device allows students to access information without holding it in their hands. This is because smart glasses can view information by placing it directly in the user's field of vision (Rzayev, Korbely, Maul, Schark, Schwind & Henze, 2020).

In China, although the advantages of the application of AR technology have been an area of concern and recognized by many teachers and researchers, the application of AR technology in teaching encounters significant challenges especially in the design of courses (Qiu, Zheng & Huang, 2021). The design of courses based on AR technology not only requires university teachers to master the relevant augmented reality technology and computer knowledge, but also requires teachers to combine AR materials with specific courses. These high requirements regarding technical and course expertise for teachers make it difficult to develop courses based on AR technology (He, Wang & Zhang, 2018). Although there are available AR teaching courses available on the market, the contents courses are relatively fixed, thus making it different for teachers to integrate the technology with their specific course needs. Because teachers are the subject-matter expert and know what is best for their teaching, it is imperative for them to be able to develop their own system to suit their needs.

Researchers in the Asian region have found that too much focus has been given on examinations, causing lack of interest in learning (Chan et al., 2018). As an effort to combat this problem, Wang et al. (2021) have used gamified AR mobile apps to design an English course at a Vocational College to trigger students' interest in learning, this study aims to conduct a similar approach which is to develop a system that can help teachers design AR glasses courses that could trigger interest among students.

2. The architecture of the system based on AR glasses

The system is mainly composed of two modules and AR glasses (Figure 1). The first module is a back-end module for teachers; it mainly includes the editing field, saving field and material pool. Teachers can edit the recognition content of AR glasses and the performance after recognition by importing their own course materials including videos, audio, images and 3D objects into the material pool or using all kinds of course materials in the material pool directly. The editing server supports these editing functions, and the course materials are stored on the object storage server. The second module is a front-end module for students. This module is developed based on the XR OS SDK, which allows course materials to be converted into augmented reality applications. Students can install the module into their phones and select the courses on their phones and view augment learning materials through AR glasses under the support of a display server.

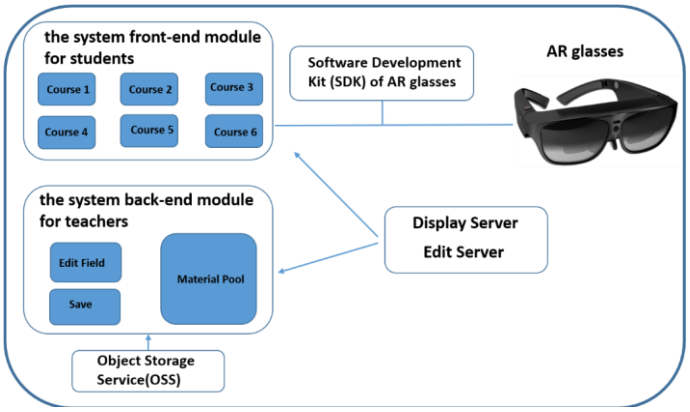

Figure 1. The architecture of the system.

3. The process of designing an interest-driven course

The steps of the design of an interest-driven course by using the system are shown in Figure 2. The interest loop of Interest Driven Creator (IDC) theory proposed by Chan et al. (2018) is utilized to guide the design of the course which involves three steps, namely triggering, immersing, and extending.

Step 1 (triggering): At the beginning of the lesson, teachers focus on triggering students' interest by piquing students' curiosities. This is done by using various types of AR materials. In this process, teachers use different types of AR materials including AR videos, audio, pictures, 3D, and physical objects to provide students with visual, auditory, and tactile perceptions to stimulate students' perceptual curiosity; teachers provide students with rich AR materials so that students can view the rich augmented information in a real environment through AR glasses to actively explore, thus promoting students' interest epistemic curiosity. Teachers provide real objects and scenarios related to the context of what they are learning to stimulate deprived epistemic curiosity as they begin to explore using AR glasses.

Step 2 (immersing): By combining the three key elements of "play", "challenge" and "interaction", teachers make students immersed in learning. In this step, teachers should make full use of the virtual-real function of AR technology and provide students with opportunities to use AR glasses to "play" in real scenes. Meanwhile, teachers should set different types of optional challenges, so that students can gain confidence in the process of completing the challenges; Teachers should pay attention to students' interaction with the real environment by providing discussion opportunities.

Step 3 (extending): In this step, teachers guide students to describe, relate to the real environment and apply knowledge by setting tasks. In this process, teachers set tasks in relevant AR materials. After students learn relevant content, they need to discuss and describe what they have learned, and think and apply what they have learned in combination with the real environment.

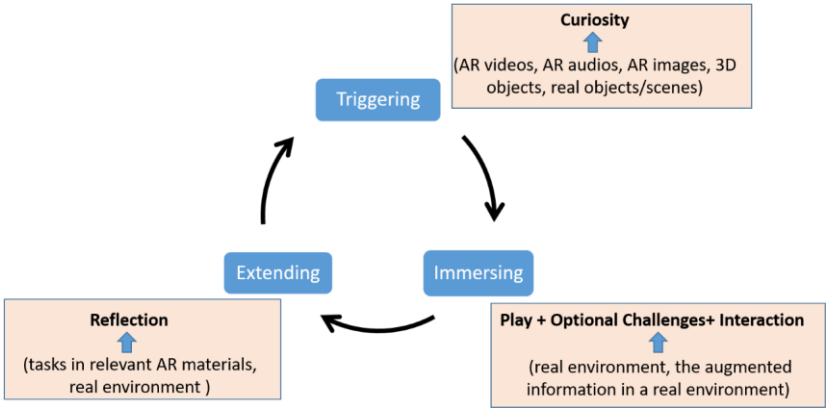

Figure 2. IDC Theory underpinning the course design.

4. Conclusion and Future Work

This study proposed to develop a technology enhanced interest-driven lesson. In a way, it could help teachers design courses that could instill students' interest, even if the teachers know little about the basic technical knowledge of AR. Future studies shall explore on the system's feasibility, students' acceptance and use of the technology as well as its impact on students' interest in learning. The system is currently under development, with follow-up research scheduled to begin in 2023.

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