Implementation and Assessment of a Novel Mobile Web Based Virtual Interactive System for Teaching Art Courses

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Abstract – In this paper we review the feedback methods which conventional art courses usually employs. After analyzing the characteristics of art conventional classroom teaching, we find asymmetry of feedback channels between students and instructor. In order to improve teaching interaction in art courses, a Mobile-Web-Based (MWB) classroom interactive response system is proposed, designed and implemented. The application of the proposed MWB combined with smart phones suggest great potential in promoting the students’ understanding and inner construction of teaching contents.

Keywords - art courses, interactive instruction, classroom interactive feedback system.

I. INTRODUCTION

Modern information society requires that talented graduates from universities of science and engineering must have the ability to understand the principles of arts, to operate or maintain art animation equipment. Therefore, art courses are preliminary course for students who major in science and engineering. Commonly, the art courses include a sets of courses such as principles of art animation design art, analog design art, digital design art and electro-technics. However, as foundation courses, these courses sometimes are scheduled in a single semester. As for teachers, it is significant and challengeable to make these courses interesting and their instruction effective due to the reduced class hours. Various teaching methods and instructional technologies are introduced in order to improve the teaching of art courses [1-2].

In this work, we designed and realized a web-based classroom feedback system for art courses teaching. This system is used to enhance the interaction in a large-scale art animation theory lecture and these course are organized in a novel style of flipped classroom [3]. The system is designed to support mainstream smart mobile devices for the convenience of access.

II. ANALYSIS OF INSTRUCTION FEEDBACK IN CONVENTIONAL ARTS COURSES

Art courses involve a series of concepts, theorems, analysis methods and application samples. In a traditional art animation lectures, these theories are introduced and demonstrated only by the teacher, and the main form of the students’ learning is listening. But for a high-efficiency lecture, the teaching and learning activates in the classroom should be interactive. That is, effective feedback channels should be set up between the teacher and the students. Commonly, the feedbacks obtained by the instructor from the students include emotional, verbal and behavioral info are instant but not overall and difficult to distinguish [4], thus sometimes quiz is used to get more concrete feedbacks. However, due to the large scale of art animation courses and limited class time, the whole results of the quiz cannot be received and evaluated immediately. As a result, the feedback channel between the teacher and the students is asymmetric: the students get feedback easily from the teacher because of the teacher’s “broadcast”, but not the same to the teacher due to the large number of students.

III. DESIGN AND REALIZATION OF MWB FOR ART COURSES

From the above analysis, the lack of effective feedback channels from the students to the teacher is the main reason that an effective and interactive lecture cannot be carried out.

Fig. 1 Schematic of the Interactive Feedback Classroom
Therefore, the issues on feedback channel must be resolved for constructing smooth interactive environment. Here, we propose a feedback scheme which would substantially improve the interaction mode between the teacher and the students.

Figure 1 shows the schematic of the proposed interactive feedback configuration. The students can access the syllabus, lecture slides and other reference materials from the server through the wireless LAN (WLAN). They also can send the teacher feedbacks such as requesting lower speed, asking some questions or submitting a quiz simultaneously through their smart mobile devices. In the way as shown in Fig. 1, the teacher can obtain the exact status of the students’ learning. For example, how many students have the same issues on understanding a knowledge point? Is there any request for a lower speech speed? Based on these received and analyzed feedbacks, the teacher could adjust their teaching methods and decide how to handle these matters correspondingly. The project screen also acts as an interactive wall, which shows the summary results of a quiz, or present the discussion of the students on a specific topic.

Based on the feedback model, we design and realize a mobile web based classroom interactive response system (MWB) for improving the teaching interaction in art course. The framework of the web based MWB is shown in Figure 2. The whole system is configured with open source software’s [5] such as Sqlite, mongoose web server and PHP server script language. Considering the universal use of smart mobile phones, we use Jquery-Mobile and Ajax to design the front-end user interface. Although the web server is configured in lightweight level, all the involved software’s and hardware’s are able to enable concurrent access from hundreds of students in a typical large scale art lectures. Either due to the open source web framework and the employment of smart phones, this system is easy to implement, management and maintain.

The key technologies used by this project include the following: protection fusion splicing technology, green laser identification interactive technology, virtual reality technology. The topology graph is designed as shown in fig 3.
A. Projection Fusion Splicing Technology

Seamless splicing: Seamless splicing is a special, higher-requirement projection display applications, from the aspect of splicing effect, the development of seamless splicing technology has gone through three stages so far: the hard edge splicing, overlapping splicing and soft edge fusion splicing. In view of the project cost limitation, the project uses the method of overlapping many sets of low grade commercial projectors together. Each projector is driven by a different computer, or the different graphics channels in the same computer. In this project, technology principles of projection splicing fusion are generally as follows:

A1. Overlapping

The first step in the process is to make the two image overlapped, the pixel in the overlapping area will be conducted the fusion processing in the entire overlapping area, that is to say, the two images will be faded to black. The general method is applicable to any number of images, also applicable to those images which may not be arranged in rectangular way. The projector used in this project is XGA X1024\768), the pixel in the overlapping area is 256. The final width of the image is 2 X 1024-256=1792 pixels, and the height is 768 pixels.

A2. Fusion

Blending is each pixel at the overlapping area in one image at is multiplied by a value, so that when it is added to the corresponding pixel on another image, the pixel can be expected.

A3. Geometric Correction of the Playback Screen

The program also built in the curved surface correction system, when the projector projects the images to cylindrical arc curtain wall, the image will be geometrically distorted because of the curved projection wall, which affects multi-screen splicing and viewing, especially when many sets of projections project the all-around cylindrical screen, the broadcast system with curved surface correction system is indispensable particularly;

The curved surface correction of this program adopts advanced Bessel equation grid correction system, which is easy to adjust a variety of geometric distortions, its interface is as shown in figure 4.

Figure 4. Geometric Correction Interface.
IV. APPLICATION OF THE FEEDBACK SYSTEM IN ART COURSE TEACHING

The realized system is tested in a Xiaomi smart phone with Chrome browser and Android 4.0 operating system. Figure 5 shows a typical login page for the students who wish to use the system. The QR code in Fig. 5 make the access feasible in mobile platform without typing complex website address. Because of the excellent performance of Jquery mobile JavaScript library, the UI is accessible by a smart mobile and the students will have good use experiences.

![Typical User Interfaces of the MWB](image)

In order to use this system in our art course teaching, we built quiz and question libraries of semiconductors, amplifiers design art, art feedback amplifiers, digital logical design art and comprehensive application cases. We organize our art teaching with a mode named flipped classroom. So the main form of teaching in the classroom is discussion, interaction and inner construction of knowledge’s. It should be noted that the students must have self-learned the related knowledge points before the classroom teaching. Figure 5(b) shows an example of discussion topic which the students need to decide and make a choice. In this manner, all the students can take part in the exercise through their smart mobile phones and the results can be received and evaluated in time. Then the whole analyzed results (Figure 6) are sent to the instructor for dynamic adjustment of the lecture. In our teaching experiments, we also noted that some students use their mobile phones for non-learning purpose such as surfing the

![Typical Statistic Report of the Students’ Answers](image)
Internet, play games. These issues need to be further studied and well-controlled.

V. CONCLUSION

In summary, we analyzed the feedback mechanism in traditional art lectures, and found that the feedback channel in the class is asymmetry between the instructor and the students. To resolve this issue, we proposed and designed a mobile-web-based classroom interactive response system. Through this system, the feedback information is collected and analyzed in real time, and the statistic results are sent to the teacher for dynamically controlling the teaching interactive activity. With the prevalence of smart phone, we expect that the present MWB will play an important role in promoting and improving the teaching of art courses.

REFERENCES