A Study on the Application of "Micro Lectures" in the Course Reform of Computer Graphics

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***Abstract*—This study uses Computer Graphics as a platform for the course reform of undergraduate teaching, uses microlectures to make students participate in the teaching, integrate into the classroom teaching and stimulate interest in learning through preview, so that students can achieve "zero obstacles" in curricular and extracurricular learning.**

***Index Terms*—micro lectures, course reform, computer graphics**

I. Introduction

Computer Graphics is an important branch of computer science and technology by using computers to study the representation [1], generation, processing and display of graphics. It is one of the most active branches of computer science. The application of computer graphics is everywhere [2, 3]. The technology of Computer Graphics itself has been developed rapidly and applied widely. Computer graphics has become an important bridge between computer science and technology and other applied disciplines [4, 5, 6]. This course is the specialized course for the undergraduate teaching in major of software engineering online game design in the author's school. It plays an important role in the teaching plan with the main feature of strong combination of theory and practice [7, 8], which is the basic course of many follow-up courses.

Computer Graphics is characterized by its complicated knowledge system [9]. It involves more mathematical knowledge and application development libraries [10]. Therefore, in the course of teaching, students generally find that it is difficult to study computer graphics and easy to cause confusion because there are more knowledge points [11]. As a result, the following questions arise: serious polarization between students, co-existence of "insufficient" and "incapable" phenomenon. Students feel that they can't learn independently after class. The confusion of knowledge occurs from time to time.

II. REFORM CONTENT

The features of the course are used to combine curriculum practice and theory organically after separating them. That is, the ready-made API function of graphics used in practice is made to correspond to the theoretical trivial knowledge of graphics to form "micro lectures" [12]. Students use "micro lectures" for pre-class preview to develop individual problems, common problems and simple knowledge points. Teachers explain key knowledge and common problems, while students explain simple knowledge points, thus completing classroom teaching with the appropriate practice. Teachers complete after-class exercises to solve individual problems through after-class exercises and tutoring, and then use "micro lectures" for pre-class preview, so that the ratio of curricular and extracurricular learning time reaches 1:3 eventually.

A. Arrangement of teaching content

Combining the features of *Computer Graphics*, the knowledge points of graphics is divided specifically to form trivial knowledge points, and then the API function in the API function library of the ready - made graphics is used to correspond to the corresponding knowledge points one by one. Later, various Wacom Bamboos, recording software and voice equipment are used to form a number of 5-to-10-minute "micro lectures", thus facilitating students' self-learning [13]. These knowledge points also correspond to the teaching content. The details are shown in the "Fig.1".

B. Selection of teaching methods

For the selection of teaching methods, participatory teaching method is used. Students preview "micro lectures" before class to familiarize the knowledge points in each class. There will be three different types of problems for students' knowledge points of each class through preview, such as "individual problem," "simple knowledge points," and "common problems." For "common problems", teachers organize the teaching directly in the classroom to complete the explanation of the knowledge points. For the "simple knowledge point", students are directly selected by teachers to explain. In the course of students' explanation, the teacher corrects the deviation of students' understanding in real time. For "individual problems", they shall be carried out directly in the form of after-school tutoring.

C. Organization of teaching operation

The organization of teaching operation focuses on promoting the optimization of classroom teaching system on the basis of system analysis and using Cybernetic organism to realize the optimal control of teaching.

- **Promoting the optimization of classroom teaching system based on system analysis:** System theory holds that as a complete dynamic system, classroom teaching is composed of teachers, students, teaching information and teaching measures. As a dynamic system, teaching process is operated according to four steps, namely, pre-class preparation and preview, classroom delivery acceptance and enlightenment thinking, after-school tutoring and review and final examination and evaluation. To achieve optimal teaching quality by maximize the function of the classroom teaching system, it is necessary to optimize elements of the system such as teachers, students, teaching information and teaching measures according to the integrity principle of system theory and the viewpoint that structure determines function [14]. Four major procedures for optimizing the teaching process require these elements to be organized in a logical and orderly structure to optimize the structure and operation mechanism of the teaching system.

- **Applying control theory to achieve optimal control of teaching:** Classroom teaching is a human control system composed of teachers and students. The degree of effective control in teaching directly affects the efficiency and quality of teaching. Therefore, the effective control and regulation of the theory of cybernetics in classroom teaching is an important guarantee for best results in classroom teaching.

D. Design of curriculum assessment scheme

For the final course assessment, since the ultimate goal of this course is to make the ratio between curricular and extracurricular learning time 1:3, the course assessment plan attaches importance to process assessment [15]. The process assessment has the following features:

- **It can comprehensively assess students' knowledge, ability and comprehensive quality, and enhance students' self-consciousness and initiative.**
- **It can enhance teachers' sense of responsibility. Teachers must assess each class in time and know students' attendance, discipline and performance.**
- **It changes the practice of "testing grades" at the end of the course, prevents the behavior of pre-test preparation to improve students' learning ability.**

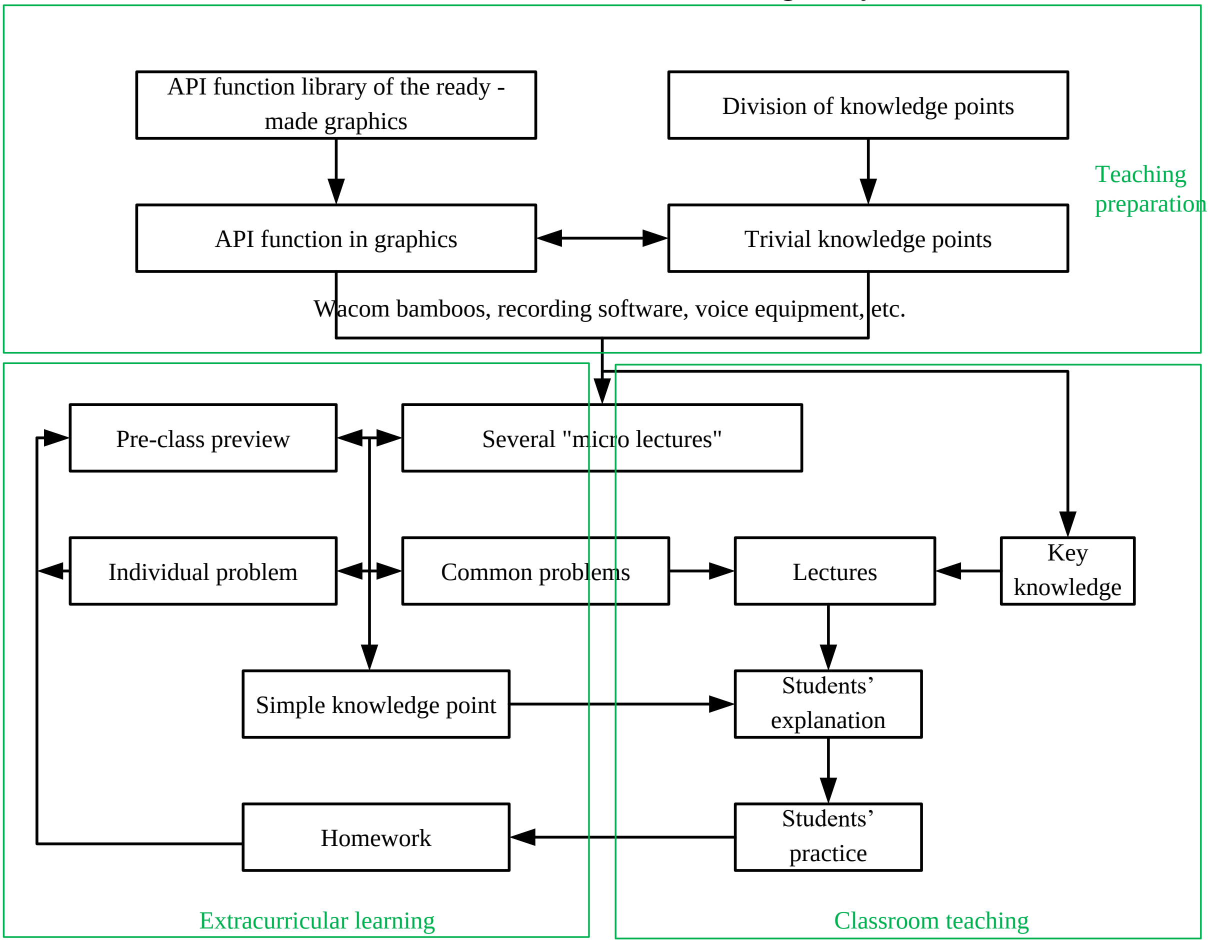

Figure 1. Course reform flow chart

III. SUMMARY

The features of Computer Graphics are used to combine curriculum practice and theory organically after separating them. That is, the ready-made API function of graphics used in practice is made to correspond to the theoretical trivial knowledge of graphics to form "micro lectures". Students use "micro lectures" for preview before class to develop individual problems, common problems and simple knowledge points. Teachers explain key knowledge and general issues, while students explain simple knowledge points, thus completing classroom teaching with the appropriate student practice. Teachers complete after-class exercises to solve individual problems through after-class exercises and tutoring, and then use "micro lectures" for pre-class preview, so that the ratio of curricular and extracurricular learning time reaches 1:3 eventually.

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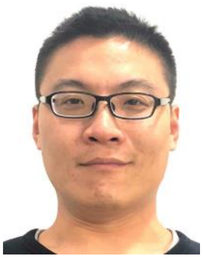

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