

# Construction practice of "3D scene modeling" course based on learning platform

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**Abstract.** Information technology and the new crown pneumonia epidemic have impacted the traditional teaching environment. This article combines the construction practice of "3D scene modeling" in the learning platform, and introduces the "3D scene modeling" course platform construction process, construction modules, use experience and experience. The construction of the learning platform can improve students' interest in learning 3D courses, and at the same time, it can improve the teaching level of teachers, hoping to provide reference for peers.

## 1 INTRODUCTION

Joyce and Weir in the United States mentioned in the "Teaching Model" that "a teaching model is a teaching framework composed of teaching objectives, learning resources, course content, teaching activities and homework" [1]. It is usually composed of basic elements such as relevant theories, conditional support, teaching objectives, teaching activities and teaching evaluation [2-3]. With the in-depth integration of the new generation of information technology and teaching in my country, the impact of media and technology, the education ecology and teaching mode have presented a series of changes [4]: The teaching method has changed from "teaching first and then learning" in traditional classrooms to "flipped classrooms". First learn and then teach", and then to the transformation of "learning to teach" in the smart classroom [5-6]. In order to make better use of network technology and at the same time combine the characteristics of students' majors in Guangzhou Xinhua University (hereinafter referred to as the school), an online course learning platform of "3D Scene Modeling" suitable for local colleges and universities is established. Based on this, this course started construction on Chaoxing Erya's on-campus cooperation platform in February 2020, and has been running for 3 semesters so far. After three years of construction, the team is now writing an article on the practice and harvest of course construction, hoping to provide valuable reference for peers and readers.

## 2 PREPARATION FOR BUILDING A COURSE

The school has established intra-campus cooperation with Chaoxing Company, and uses the teacher's job number to log in directly to the platform. In the early stage, the school's academic affairs office connected with

the company to import teaching classroom data uniformly. Learning Pass has good compatibility and supports both PC and mobile applications. The computer terminal needs to connect to the platform through the on-campus learning, and the mobile terminal needs to download the Learning Pass App, both of which can be logged in with the teacher's ID. The interface of the learning platform is clear, and the user-friendly interface can quickly and efficiently create courses. Students log in to the platform with their student ID and automatically enter the class. The campus cooperation platform is easy to use, eliminating the tedious steps such as registration, class construction and class invitation.

## 3 COURSE MODULE MANAGEMENT AND CONSTRUCTION

Course homepage templates are diversified, including course panorama type, high-quality course type, paper printing style type, coursera style and Khan style, which can be selected according to the characteristics of the course. Before the course starts, the course portal needs to be carefully designed according to the selected style to enrich the information of each module. The content of the module covers: course introduction, teacher team, reference materials, course evaluation, teaching resources and course chapters and other basic parts. The teaching team window displays the teaching and scientific research results that match the course, the reference textbook displays the group-recommended teaching materials, and the course evaluation displays the learner's learning summary and experience. The teaching resource framework can be designed and used at multiple levels according to the diversity of course resources, usually including video resources, audio resources, professional research hotspot documents and journal articles, etc. This part can be gradually enriched and expanded with the platform construction.

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## **4 COURSE CHAPTER LAYOUT AND CONTENT CONSTRUCTION**

Course chapters are the main content of course construction. The course content of "3D Scene Modeling" is complex, with many chapters and detailed knowledge points. The optimization of the course system is particularly important. The textbook consists of 17 chapters, covering 4 major knowledge blocks of model building, material allocation, lighting addition and camera application. On the basis of sorting out the curriculum system, the course team optimizes and adjusts the teaching system to form small knowledge points that are both independent and intrinsically linked. Follow the focus rules of student learning, and control the video of knowledge points within 15 minutes. There are two sources of knowledge point videos, one part is produced by professional companies, and the other part is made by team members. The platform construction is completed with limited funds, which is more conducive to the sustainable development of the course. Each specific chapter building module includes micro-lecture videos, courseware, chapter tests and discussions. Micro-lecture videos are knowledge points or skill points in each section, and each section contains 1~2 videos. Students are not limited by space and time for learning, which is convenient for students to make full use of their spare time. The courseware is an offline teaching PPT, which systematically displays the content of the entire chapter, which is different from the independent knowledge points. It is a whole, which is convenient for students to grasp the overall knowledge framework of the chapter. Chapter tests are based on what students have learned and mastered weakness predominates. According to the actual situation, micro-lecture videos and chapter tests can be set as task points to encourage students to strengthen their learning. According to the feedback results of the task points, the teacher designs the discussion content in a targeted manner, uses the mobile phone to edit the tasks and publish them in the classroom, solve the problems in a targeted manner, and effectively digest the difficult points.

## **5 USE DISCUSSION AND COMMUNICATION TO DESIGN AN INTERACTIVE LEARNING ENVIRONMENT**

The discussion board is an important way for teachers and students to communicate online. It gives students full freedom to ask any questions in their studies, hot research issues in professional fields. This plate is easy to use and difficult to use. In the early stage, teachers need to consciously guide and set interesting questions, and give full play to the active influence and driving role of learning. Team members comment on and summarize relevant problems in a timely manner, allowing students to discuss and exchange problems, and have a positive response, gradually forming a positive and active learning atmosphere. With the familiarity and adaptation

of students to the learning platform and the in-depth study of the course, the question design in the later stage is intended to guide the examination of students' ability to use knowledge flexibly. Design problems should be moderate in difficulty and difficulty, students are not interested in problems that are too easy; students who are too difficult have no thoughts, and it is difficult to participate in them. Difficult or too simple questions will affect the effect of students' interactive communication. The key to the success or failure of interactive learning environment design is the design of learning activities, and it is also the most difficult part of innovative learning activities to design. According to the knowledge characteristics of the chapters, the design of learning activities is carried out according to the classification of goals. Based on the "learner behavioral goals", the flexible use of autonomous exploration tasks, display and communication tasks, evaluation and optimization tasks, and group discussion and analysis tasks. Receive task sheets in groups, recommend students to complete intra-group discussions in a collaborative way, and complete inter-group discussions in a competitive way, so as to expand the scope of interaction and achieve the purpose of improving learning effects.

## **6 FLEXIBLE DESIGN FOR DIVERSIFIED CLASSROOM ACTIVITIES**

The Learning Pass platform has a variety of classroom activities, including sign-in, selection, in-class practice, quick answer, questionnaire, voting, scoring, live broadcast and synchronous classroom, etc. According to the classroom situation, it can be used at any time, and an activity library suitable for the class and knowledge teaching can also be designed and edited in advance, saving classroom editing time. Classroom activities can also be used for out-of-class learning. Several commonly used activity forms, such as sign-in, include ordinary sign-in, gesture sign-in, location sign-in and QR code sign-in. Use the location to sign in skillfully, and 50m around the location is the sign-in range, which can effectively prevent students from skipping classes. Make good use of quick answer and selection in classroom interaction. Students will take the initiative to answer, and the correct answers will be rewarded with usual points. Teachers can shake a random person or designate a person. This form mobilizes the classroom atmosphere and improves the students' initiative in learning. The design should be reasonable, too difficult and easy to cause no one to answer, too easy and easy to cause disorder in the classroom order.

## **7 THE APPLICATION OF STUDENTS' ONLINE LEARNING BEHAVIOR DATA TO FORM A PROCESS EVALUATION OF LEARNING BEHAVIOR**

The learning behavior data of the Learning Pass platform is very comprehensive, and it can collect the total

statistics of different classes, the overall completion data of students, and the learning statistics of individual students. Class statistics can be used to compare different teaching classes. Students' individual learning behavior data includes the number of visits to the platform, the completion of posted tasks, the degree of task completion, the number and duration of video viewing, the number of discussions, the number of participants in discussions and mutual evaluation, class test scores, check-in scores, and comprehensive scores. Teachers can adjust class teaching activities based on the platform's statistical learning behavior reports, and urge students who are not highly engaged in learning to take targeted activities to change the status quo. Another function of learning behavior data is to provide reference standards for course assessment and evaluation. According to the degree of correlation between the design content of each teaching activity and the course objectives, the proportion of activities to design the usual grades, usual grades = 30% chapter test + 20% video task learning + 25% discussion + 15% visit + 10% check-in. If the data monitoring feedback abnormal accumulation of visits or brushing of visit scores, it is necessary to appropriately reduce or remove the visit scores, and increase the proportion of other related activities, such as video task learning and class test scores. The final assessment of the course can be conducted online using the platform examination module. At the beginning of the school using the course platform to assist teaching, when the data system has not been perfected, the final evaluation score of the course = 40% of the usual grades + 60% of the offline test results, of which 40% of the usual grades are from the platform scoring system. After the information on the Xueting platform is improved, the utilization rate of teaching activities is improved. The final evaluation score of the latest course assessment = 50% of the usual score + 50% of the offline test score. The proportion of grades can be adjusted appropriately according to the utilization of course learning activities.

## 8 MAKE GOOD USE OF THE STATISTICAL MODULE OF THE LEARNING PASS PLATFORM

The main page of the statistics module includes four parts: class statistics, resource statistics, course reports and course statistics. The overall learning statistics of the class can be exported with one click, and there are as many as a dozen tables in the exported file, which is convenient for teachers to selectively use according to the actual situation, generally including the comprehensive completion status table of students, the completion status table of task points, the audio and video viewing status table, and the discussion table. Details, chapter study times table, grade details table, chapter test statistics table, homework statistics table, exam statistics table, offline score statistics table and comprehensive course statistics table, etc. Teachers have selective access to the category table. The statistics main page displays the statistics details of the class, as shown

in Figure 1. The task point module can obtain the details of the released tasks; the chapter learning times module displays the number of chapters of students, and can feedback the time frequency of students' specific learning and the distribution of concentrated time periods of learning. Figure 2 shows the study frequency of students on a certain day, and Figure 3 presents the study period of students on a certain day. Through the feedback information of the statistical module, teachers can timely grasp the students' learning habits, learning depth and other conditions, and adjust the course activities in a timely manner. For students with low learning activity, teachers can set early warning conditions for each activity participation, covering the content as shown in Figure 4. Students with low learning engagement will receive warning information issued by the system to urge learning role. Figure 5 shows the job submission page, where you can clearly see the job submission time, number of people who submitted the job and the number of jobs with corrections. Figure 6 shows the page data statistics of this course in the latest semester. In the figure, you can see the relevant links of the platform, the number of students applying for this semester and other information. The total page views reached 149239.

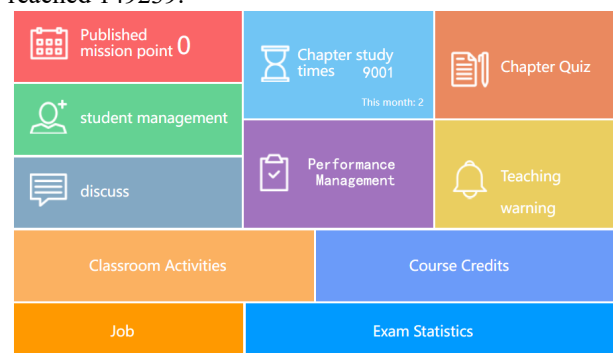


Fig. 1. Course statistics interface of unit class

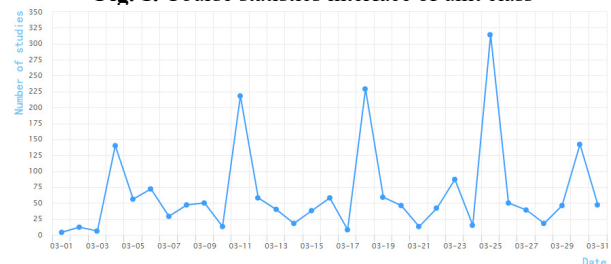


Fig. 2. Learning Frequency Distribution Diagram

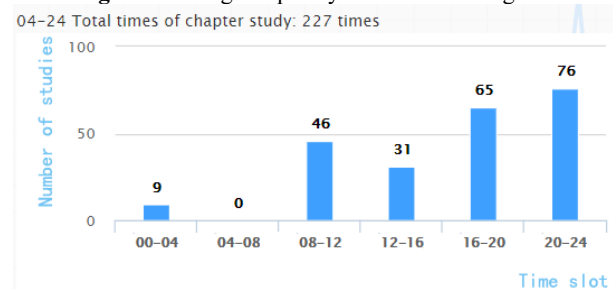
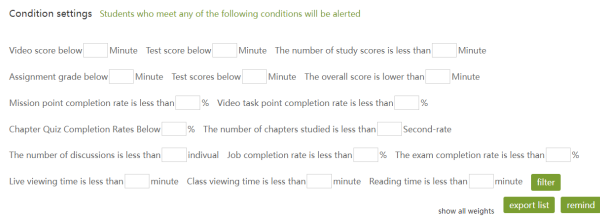
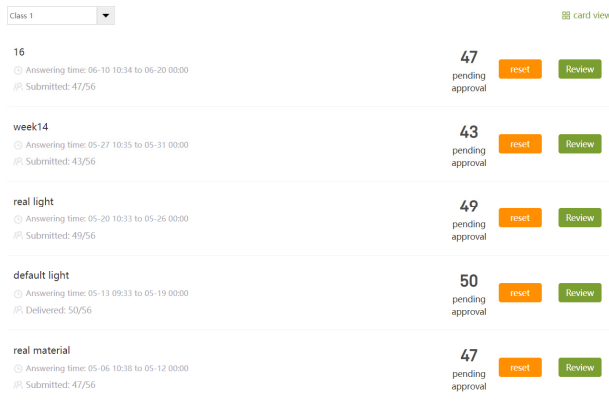


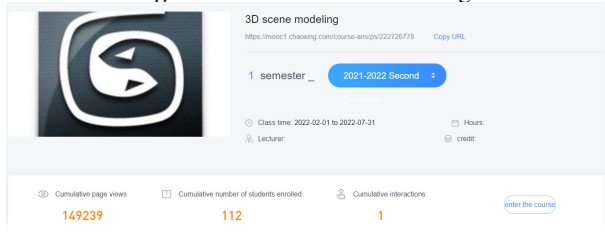
Fig. 3. Distribution map of learning period



**Fig.4.** Setting diagram of teaching warning conditions



**Fig. 5.** Homework Submission Page



**Fig. 6.** Statistics of page data of this course in the last semester

## 9 Conclusions

In short, after 3 years of construction of the course platform, the cumulative page views are nearly 500,000. Especially in the most recent session, the total number of participants in activities, total number of participants in quizzes and assignments, total number of online interactions and total number of people who passed the assessment were all. Reaching the highest level indicates that the platform has obviously become an indispensable and important part of course learning. The environment of the times has not only impacted the traditional classroom, but also brought development to the course teaching. Making good use of the live learning platform has a double promotion effect on students' learning input and the improvement of teachers' teaching level.

## Acknowledgment

2022 Guangdong Undergraduate Universities Online Open Course Steering Committee Research Project: OBE-based Online Open Course Construction Research - Taking "3D Scene Modeling" as an example (2022ZXKC570); Guangzhou Xinhua University 2022 school-level higher education teaching reform project: Research on the Dilemma and Countermeasures of the Construction of Training Courses in Private Undergraduate Universities—Taking the Digital

Media Technology Major as an Example (2022J023); 2021 Guangdong Province Science, Industry and Education Integration Practice Teaching Base: Guangzhou Xinhua College - Guangzhou Roaming Computer Technology Co., Ltd. Science, Industry and Education Integration Practice Teaching Base (2021KCJ001).

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