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Construction and Practice of "Virtual Scene" Experimental Teaching Project

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***Abstract**: Experimental teaching project is the basic unit of experimental teaching in universities. Virtual simulation technology is an important technical means of education modernization and informationization. At present, cultural communication technologies such as digital technology, information technology, and new media technology are developing rapidly. The introduction of virtual simulation technology into the experimental teaching process has become a key strategy for the current experimental teaching reform. This article is guided by government policies and clarifies the background and necessity of the construction of the "virtual studio" experimental teaching project, and elaborates and summarizes the construction theory and content of the project.*

***Keywords**:* Photography and Video*; Virtual simulation; Experimental teaching project*

Introduction

As the basic unit of experimental teaching in colleges and universities, the experimental teaching project, its construction level directly determines the overall quality of teaching. In recent years, the number of students conducting experiments has increased sharply due to the widespread expansion of colleges and universities. However, due to the high cost of laboratory construction and limited experimental instructors, traditional experimental teaching methods are single, and knowledge learning and experimental hands-on operations are separated from each other, resulting in students' lack of learning initiative and creativity. For example, in the experimental "Photography and Video" course, when it comes to the content of the working principle of the equipment, it is difficult for the teacher to let the students fully understand the more abstract principles with only a single traditional experimental teaching. At the same time, traditional experimental teaching requires a lot of labor and equipment maintenance costs, and is restricted by external factors such as light, venue, and climate. Students cannot really get professional training. This also leads to accidental experimental results, which is not conducive to the development of experimental teaching.

Virtual simulation technology is an important technical means of education modernization and informationization. The construction of virtual simulation experimental teaching projects is an important measure to promote the deep integration of modern information technology and experimental teaching projects, expand the breadth and depth of experimental teaching content, extend the time and space of experimental teaching, and improve the quality and level of experimental teaching. Virtual simulation experiment teaching occupies a very important position in the cultivation of students majoring in art. Based on the environment of the great development of cultural communication technology such as digital technology, information technology, and new media technology, the introduction of virtual simulation

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technology into the experimental teaching process is conducive to the development of experimental teaching in the direction of modernization and informatization. This has become the key strategy of the current experimental teaching reform.

Construction Theory

General Teaching Ideas

The "virtual studio" experimental teaching project takes the national strategy of "education modernization and informatization" as its guiding principle. Through virtual simulation experimental projects, students can experience and practice the process of photography on computers or VR equipment. This is a key experimental project in the "Photography and Video" course.

This experimental project is developed with the top UE4 engine and has a "Sub Era" model expressiveness. A virtual space is constructed based on a movie studio, and a large number of professional virtual equipment is used inside the space. Rich in details and exquisite models. The technology is leading in the education field and has a low operating threshold.

Due to the high cost, high professionalism and fast update speed of professional camera equipment, it is difficult for laboratory equipment to keep pace with the market. The "virtual studio" experimental teaching project uses virtual simulation experimental teaching software independently developed by the teaching team. Among them, the two scenes of equipment cognition and large-scale green screen mainly covered by the camera course are realistically restored. The software has a rich model library for experiment selection. Through the three-dimensional software, the teacher introduces the latest equipment into the curriculum to ensure the cutting-edge of students' learning knowledge. Through exposure to virtual devices, students can understand the structure and function of the device, as well as the method of coordinated operation of a single device and multiple devices.

The "virtual studio" experimental teaching project attaches great importance to the connection between virtual simulation experimental teaching and course practice and course maintenance, and can be combined with 3D software courses. For example, in the development and update phase of the "virtual studio" teaching system, the 3D model, lighting, material and other technologies used in teaching are similar to the content in the 3D software course. Therefore, the course results can be used as a technical supplement to the virtual simulation experiment teaching course. Radiate the visual performance, engine development, and three-dimensional model of the "virtual studio" experimental teaching system to more majors and courses. For example, it can be applied to the virtual space display of environmental art design majors; the virtual studio of advertising majors and other experimental projects. At the same time, students in animation, digital media art, environmental art design, product design and other majors have their own model building capabilities, which can update and customize the scene in real time, providing a strong guarantee for the development and maintenance of experimental teaching.

Give full play to the important role of "Project Teaching Method" in the teaching process. Take "inspiring

creativity" as the purpose of project teaching, and use actual projects as teaching cases. The teaching cases of the experimental link are used to guide the practical operation of the course, and the cases of the practical operation link can support the maintenance and update of the course cases. Subsequently, the updated case was used to feed back the virtual simulation system, forming a chain of interlocking and promoting knowledge development, while highlighting the teaching characteristics of inspiration, creativity, and practice, and realizing the integration of thinking, learning and use Run through (Figure 1).

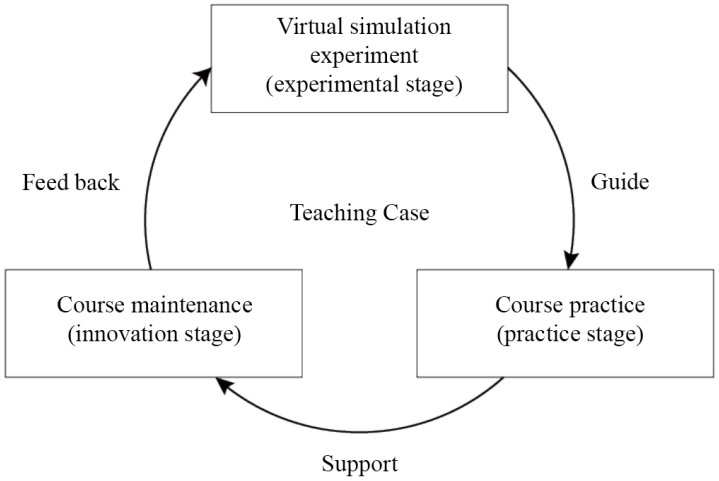

Figure 1. Circular knowledge development chain

Experimental Design Ideas

(1) Interact with students through the "instruction interface" and inform them of the basic operations of the "virtual studio" program.

(2) Reserve time for students to explore the virtual space. At the same time, professional introductions are carried out through virtual space broadcasting to satisfy students' curiosity for unfamiliar spaces.

(3) Through virtual simulation technology, analyze the structure of professional photography and videography equipment, which can solve the abstract and difficult problems in traditional practice teaching. Students learn to operate photographic equipment through simulation experiments. After passing the assessment, they are allowed to enter the practical operation. In this way, the possibility of instrument damage caused by students' misoperation can be reduced, and the "combination of virtual and real" can be achieved. Solve the problems of high labor consumption, high maintenance cost, and uncontrollable external environment in traditional practical teaching, and save resources.

(4) Through preset animation, explain to students the lighting theory, light bitmap, "Butterfly Lighting", "Rembrandt Lighting" and other lighting methods, as well as character dialogue scene shooting methods, so that students understand these methods in film and television production Important role.

(5) In the actual operation part, the teacher will complete the experimental project in the virtual environment after assigning tasks to achieve the teaching purpose. During the period, students can try to use different

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equipment, create different experimental schemes, and discover the influence of different lighting on character shaping and the atmosphere of the scene, so as to achieve the learning effect of analogy and stimulate students' learning potential.

Experimental Teaching Assessment

(1) Assessment samples

This experimental project is not only aimed at professional photographers, but also non-professional people can participate in this project to learn related knowledge and skills. Due to the wide coverage of experimental projects, the assessment samples are composed of compulsory professionals and elective professionals. Among them, compulsory majors include animation, digital media art, advertising, and other majors that require high photography and camera technology, while other majors are classified as elective majors. Implement different evaluation standards for different samples.

(2) Assessment method

This experimental project focuses on comprehensive and design experiments, emphasizes teacher-student interaction and student interaction, advocates teaching students in accordance with their aptitude, and encourages innovation. The main features include compatibility of basic experimental techniques with cutting-edge technologies, difficult assessment content, and subjective assessment methods.

In view of the above characteristics, we divide the experimental evaluation into objective evaluation and subjective evaluation, and further refine it into three aspects: experimental achievement evaluation (objective), practical achievement evaluation (objective) and innovation achievement evaluation (subjective). Among them, the evaluation of experimental results is a direct evaluation of students' specific experimental items, mainly to test the students' understanding of experimental knowledge and procedures. Indirect assessment includes students' operation and proficiency of actual equipment, and students' ability to use existing equipment in combination with actual scenes to create creation. It mainly examines students' knowledge and practical application and innovation ability. Fully consider the internal connection between the experimental items, combined with the teaching objectives of the "Photography and Video" course and the "circular knowledge development chain", the results of experimental teaching, practical teaching, and innovation phases can all become the evaluation standards of this experimental teaching, thus forming a direct assessment method. In addition, through the practice of this program, we can combine "replace examinations with exhibitions, promote learning with competitions" and "project-driven", and fully consider professional characteristics, the relationship between subjective and objective assessments, and finally form a comprehensive set of The assessment method.

(3) Assessment and evaluation method

According to the different assessment samples, the compulsory class mainly assesses the experimental results, practical results and innovation results, accounting for 40%, 30% and 30%. The percentile scoring method was used for evaluation, and the results were included in the examination and evaluation of the "Photography

and Video" course. The elective class mainly examines the experimental results. According to the professional needs, they can independently choose the assessment of practical achievements and innovative achievements, and use the five-level scoring system for evaluation, and the results are relatively independent.

Extension and Expansion of Traditional Teaching

In order to change students' learning style from passive receptive learning to active inquiry learning, this project extends and expands the traditional teaching to guide students to carry out autonomous learning, cooperative learning and inquiry learning.

(1) Extension of course teaching

In the course of the "Photography and Video" course experiment, teachers often need to provide one-to-one guidance based on the characteristics of the students. The time cost is relatively high. Traditional experimental teaching is limited by time, venue and other factors. The amount of experimental class hours cannot meet the guidance needs, resulting in Learning efficiency is low. Introduce virtual simulation experiment teaching into the pre-class, in-class, and after-class phases of traditional teaching, so that students can repeatedly experience the experiment process, find problems and communicate in time, realize the flexible deployment of thinking, learning, and use, thereby greatly improving students' learning efficiency .

(2) Expansion of teaching facilities and equipment

The professional technology of photography is closely combined with art. As an important part of photography technology teaching, professional equipment practice closely affects the technical training of professionals. With the progress of science and technology, the renewal of photography professional equipment is accelerated, and the teaching cost is increased. Such as "Photography and Video" course, the use of cameras, cameras, lights, tracks, rocker arms, and so on. New equipment emerges one after another, the elimination rate of old equipment is high, and the price of film-level professional equipment remains high. As a result, traditional teaching can only use civilian-grade and quasi-consumer-grade equipment for teaching, and the development of experimental courses is limited. The virtual simulation technology is used to virtualize the equipment to expand the multi-types of traditional teaching equipment (camera, camera, lighting, track, rocker, etc.) and professionalism (civilian level, consumption level, professional level). Let students experience the professional experimental process in the virtual environment to achieve low-cost update and maintenance, so as to make up for the lack of traditional teaching equipment resources.

Project Content

Experimental Purpose

The "virtual studio" experimental teaching project consists of four parts: basic stage, advanced stage, task stage, and summary stage. The overall purpose of the experiment is to support the professional talent training program, as follows:

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Experimental stage	Purpose	Supporting points of talent training program
Basic stage	(1) Understand the importance of camera equipment in the industry application	Knowledge structure: master the necessary theoretical knowledge and technology of photography and video, and have strong professional production, creation and promotion capabilities.
	(2) Understand the theoretical knowledge of camera equipment	
	(3) Master the basic operation of camera equipment	
Advanced stage	(4) Master the studio shooting steps	Ability structure: have the ability to analyze and solve technical problems in the production of photographic and video projects.
Mission phase	(5) Master the actual operation of studio shooting	
Summary stage	(6) Summary method of task plan	

Knowledge Points Corresponding to the Experiment

(1) Stepping on the set (basic stage)
(2) Equipment identification (advanced stage)
(3) Plan formulation (task phase)
(4) Shooting (mission phase)
(5) Experience sharing and summary (summary stage)

Laboratory Equipment, Devices or Software

(1) Computer with network function or VR wearable device with interactive function
(2) Virtual simulation experiment teaching platform that can run EXE files

Experimental Teaching Methods

Based on modern information technology, this experimental project is organically integrated with traditional teaching methods through software interactive functions, as follows:

Course stage	Teaching method	Purpose of use	Implementation process	Implementation effect
Basic stage	Lecture method, situational teaching method	Improve students' inquiry ability, corresponding to the purpose of the experiment (1) (2) (3)	Place the photographic and video experiment project in a simulated, specific situation. Through the organization of simulation programs, students' drills.	It not only meets the needs of students to improve the training of practical ability, but also reflects the convenience, effectiveness and economy of virtual simulation experiment teaching, which can fully meet the needs of teaching.

Advanced stage	Experience method	Improve students' practical ability, corresponding to the purpose of the experiment (4)	Students experience the process and experience knowledge and emotion in the process. Students comprehend knowledge in "research", "thinking" and "imagination", and form personal understanding in "inquiry knowledge".	Stimulate students' enthusiasm and initiative in learning, arouse students'"enthusiasm for knowledge", and make students actively seek knowledge with the support of "interest".
Mission phase	Task-driven method, experience method, discussion method	Improve students' collaboration ability, corresponding to the purpose of the experiment (5)	Guide teaching with specific photographic experimental tasks, let students study in groups or groups, so that all people can participate in clear collective tasks.	Team members depend on each other, communicate with each other, cooperate with each other and share responsibility, so as to achieve common goals.
Summary stage	Role swap	Improve students' ability to summarize and express knowledge, corresponding to the purpose of the experiment (6)	The roles of teachers and students are exchanged, and students are allowed to share their experimental experiences on the web-based learning platform.	Get rid of the shackles of traditional classrooms and achieve teaching goals in an open network environment.

Experimental Steps

(1) Basic stage

① Familiar with the interface of virtual simulation platform
② Familiar with the basic operations of the first-person perspective
③ Familiar with the scene from the first-person perspective

(2) Advanced stage

④ Check the name and appearance of each equipment in the scene
⑤ Check the instructions to understand how to use each equipment
⑥ Familiar with the operation method of each equipment and self-test

(3) Mission stage

⑦ View the experimental task, understand the content and objectives of the task, and formulate a shooting plan
⑧ Complete mission objectives through virtual operations
⑨ Check the experimental results and feedback, optimize the experimental operation

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(4) Summary stage

⑩ Experience sharing and summary
⑪ Complete experiment log/report

Experimental Assessment and Scoring Standards

(1) Assessment items

① Assessment of experimental results (compulsory majors, optional majors, objective assessment)

Assessment content: According to the "Rembrandt lighting" and "Butterfly lighting" methods, correctly place the lights and collect 3 photos. According to the "two-person dialogue" scene, 3 segments of video were collected, with a total duration of no less than 15 seconds.

Assessment requirements: correct exposure and proper composition.

② Assessment of practical results (compulsory majors, objective assessment)

According to the existing equipment, in reality, the results of virtual simulation experiments are restored, and the assessment content and requirements are the same as above.

③ Assessment of innovation achievements (compulsory majors, subjective assessment)

According to different professions, freely choose the scene, comprehensively consider the lighting plan, create 1 photo and 1 segment of the shooting (the total time is not less than 15 seconds), and the assessment requirements are the same as above.

(2) Scoring criteria

Assessment project	Compulsory crowd (percentile system)	Electives (five level scoring system)	Percentage of points
Examination of experimental results	Compulsory exam	Compulsory examination	40%
Assessment of practical achievements	Compulsory exam	Selective examination	30%
Evaluation of innovative achievements	Compulsory exam	Selective examination	30%

3.7 For Student Requirements

Compulsory / Elective	Major	Grade	Basic knowledge and ability requirements

Compulsory	Animation, digital media art, visual communication design, clothing and clothing design, environmental design, product design, etc.	Grade 2 and above	Basic sketch, color, composition ability
Elective	Other majors	Grade 2 and above	Nothing

Application of Experimental Items

The "virtual studio" experimental teaching project was started in April 2019. At present, the experimental content and software foundation have been basically completed, which can meet some experimental teaching needs. Due to the impact of the epidemic, Guilin University of Technology actively responded to the call of the state to carry out online teaching activities. In April 2020, the "Photography and Video" course of animation major of the school officially opened, and the "virtual studio" experimental teaching project was tested online at the same time. Through online teaching, the teacher demonstrated the operation of all kinds of camera equipment by using virtual simulation technology, and completed the experimental teaching task of camera lighting method, which provided great help for the smooth development of the course.



Figure 4. "Virtual studio" experimental teaching software

Conclusion

The "virtual studio" experimental teaching project builds a new mode of experimental teaching of the "Photography and Video" course through the practice of experimental teaching ideas, experimental design ideas, teaching methods, assessment methods, and the expansion of traditional experimental teaching. At the same time, it also makes up for the lack of contemporary, systematic and operability in the current experimental teaching projects of the "Photography and Videography" course, enriches the teaching research results of virtual simulation experimental teaching, and provides for the construction of virtual simulation experimental teaching projects in universities. A set of systematic and feasible solutions was established.

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