

Teaching Model Innovation and Practice in University 3D Animation Creation Courses Driven by AIGC Technology

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Abstract

Generative AI (AIGC) Tools are Changing the Way 3D Animation is Taught in Higher Education, According to the TPACK framework, activity theory and constructivism, this paper has carried out case studies and a quasi-experiment to investigate the problems of integrating AIGC in 3D animation courses, and then developed and tested a "dual-loop creative teaching model" based on AIGC, The model has raised the efficiency and expression of creation, but there are also problems of excessive dependence on artificial intelligence and a lack of originality. Four stages of teaching and the corresponding evaluation indicators have been proposed.

Keywords

AIGC, 3D animation creation course, teaching model, human-AI collaboration.

1. Introduction

Now, tools such as Midjourney, Stable Diffusion, Luma AI and Sora can create images, 3D models and animations based on text prompts to change the 3D animation industry [7], University courses in 3D animation, which are generally required for animation and digital media majors, have long followed a linear workflow of modelling, texturing, rigging, animation, rendering, This old way of doing things is no longer in line with the demands of the industry today, and it has long production cycles and limited new ideas [3, 2]. At present, there are three main problems in applying AIGC in schools: students' ideas are limited by teachers' examples; production speed cannot meet the demands of the industry [7]; and assessment criteria for skills in human-AI collaboration have not been established [1,9], One should not merely add AIGC tools; the entire teaching system needs to be reformed.

The following are the key terms, AIGC in 3D animation refers to tools that can generate images, models, textures, motion and storyboards from text [2][7]. "University 3D animation creation courses" refer to the main courses in the majors of animation, digital media and game design [1][8]. "Teaching model innovation" means systematic changes in objectives, content, process, teacher-student relationships and assessment methods [5], The two stages of the study are as follows: first, qualitative case studies will be used to identify the current problems, and second, a quasi-experiment will be conducted to test the proposed model.

2. Literature Review

Research on AIGC in art and design education has been developing rapidly, Lin and Pan [1] have used AIGC in a course for 3D technology and put forward reforms to the theory, content, mode and evaluation, Cao [6] believed that learning should be about creating freely rather than mastering techniques. Zhou [7] and Guo [9] have explored many multimodal ways to teach 3D animation with AIGC, Wan [4] has studied the Design of Digital Textbooks with AIGC, These

works offer some references, but most are only at the level of strategy suggestions and do not build or test a complete teaching model.

In the beginning, there were limited new ideas for teaching 3D animation, so only old methods like skill drilling were used, Luo [8] proposed the model of "cognition-practice-creation", Gu [10] used virtual reality for ideological education. Qi and others [5] have applied the BOPPPS model and a "frame-by-frame loop" to intangible cultural heritage, However, none of the above studies have fully considered the basic changes in the production pipeline and course logic brought about by AIGC [1][9], In brief, there is no systemisation of the current work or empirical evidence [1][6][7]. To address the above problem, this paper will build and verify an AIGC-driven teaching model based on TPACK, activity theory and constructivism [1,5].

3. Theoretical Framework

There are three such theories, TPACK is the knowledge required to integrate technology effectively in teaching and in learning content [1], Content knowledge is the expertise of 3D animation; pedagogical knowledge is project-based teaching and process assessment; technological knowledge is the operation and prompt design of AIGC tools. TPACK can help teachers select appropriate AIGC tools for all kinds of creative activities and avoid using technology in areas where it is not necessary [5][9], Activity theory considers a course to be a system comprising subjects, objects, tools, communities, rules and division of labour [1], AIGC is a new tool, so students need to change their role from operators to creators [6], and the division of labour will be shared between people and artificial intelligence [7,9]. Constructivism believes that people construct knowledge through interaction with the world and thinking [1], Based on the above, we will use AI to help generate ideas and then apply human creativity and critical thinking to create some animation works in this class [1, 5].

The three theories together have an "analysis - explanation - design" logic, TPACK shows what teachers need to learn; activity theory explains how to change the teaching system, and constructivism provides the direction for organising and carrying out learning, They are, respectively, the knowledge required, the changes that occur, and how to learn effectively.

4. Research Methods

The three questions of the mixed-methods design are as follows: (1) What are the current problems in applying AIGC to 3D animation courses? (2) How does AIGC affect teaching and learning [6, 9]? (3) How to build and test an effective integrated model [1]?

Three universities in the east, centre and west of China that had begun to use AIGC were chosen as the cases for the qualitative stage, Data include syllabi, lesson plans, student's works, interviews with nine teachers and observations of twelve classes, The theme was coded by induction [7]. Based on the above results, an experimental class (n=32, with AIGC) and a control class (n=30, traditional) were organised in the undergraduate animation program, Two 16-week teaching rounds were organised [1][8], The measuring instruments are: blind assessments by three industry experts and three university teachers, records of the creative process, pre- and post-questionnaires, and group interviews [6, 9].

The Evaluation Rubric was constructed through the Delphi technique, Twelve experts were consulted twice to obtain some anonymous comments on this paper [1], The four major areas of the final rubric were: creativity, technical skills, AIGC application ability and originality/ethics. Generally, Cronbach's alpha was greater than 0.85 [5][9], All participants gave their informed consent, and the ethics regulations were followed [1][4].

5. Empirical Analysis

The three kinds of cases studied are: offering assistance in concept design, producing mid-production materials and helping with post-production compositing [6, 7], Some problems did arise, Teachers did not have organised AIGC teaching materials and criteria for selecting tools. Many students were concerned that too much use of AI would hinder their own learning, Schools did not know how to assess the results of human-AI collaboration in work (interview data).

Based on the theory and results, a "dual-loop creative teaching model" was developed [1] and has four stages:

- 1) Creative Ideation: Based on the project introduction, students will carry out research and generate ideas independently under the guidance of teachers [5, 7].
- 2) AI Generation: Students provide the ideas, then write prompts to have pictures, models or previews generated, and teachers are also learning to construct prompts [2][6][4][9].
- 3) Human Selection and Refinement: Students use aesthetics to choose, combine and modify the results produced by AI [1]; most of the creative selections are still made by people [7], and a "hand-drawn first, AI-assisted" workflow has begun to emerge [2,9].
- 4) Reflection and Evaluation: Students present their works, receive feedback from classmates and teachers, and then think about how they worked with AI [1, 5].

The process uses an outer loop (whole project) and an inner loop (rapid iteration within one stage) [5]. The teacher's role changes from technical instructor to creative guide and guardian of value judgment [6][9].

The experimental group finished their projects in 10.3 weeks and the control group took 15.7 weeks, so there was a drop of 34.3 per cent, Concept Design was 2.1 weeks and Asset Production took 4.2 weeks, down from 6.5 weeks [2, 7], Blind expert ratings for creativity and visual expression were relatively high in the experimental group compared to the control group, and narrative richness was also stronger in the experimental group [1, 6]. Creative ideation ability increased by 28.6 per cent and aesthetic judgment rose by 24.3 per cent, but the scores for technical operation did not change significantly [6][9]; therefore, students' attention has shifted from the execution of technology to creative thinking, Satisfaction was 4.13 in the experimental group and 3.56 in the control group ($p < 0.01$) [8], On the negative side, 38% of the students said they had been overly reliant on AI at some time, and 29% were unsure about the originality of AI-generated works; therefore, human intervention and originality checks are necessary [4][9]. Overall reliability of the Delphi-based rubric was 0.92; dimension reliabilities were 0.89, 0.87, 0.91 and 0.85 [1, 5], With the addition of AIGC, four new indicators have been added: suitability of tool selection, accuracy of prompt, fluency of human-AI collaboration and originality declaration norms [4, 9].

6. Conclusion and Recommendations

This paper has four main conclusions, Although there are many applications of AIGC in 3D animation courses, teachers have not received sufficient training, there are no clear assessment standards, and uncertainty exists about originality, Secondly, the two-loop model can promote both efficiency and creativity; for example, the project duration was reduced by 34.3% and the level of newness in the works increased by 22.0%, and more students took the initiative to lead the creative work. Third, AIGC has different effects on students; low-performing students achieved better gains in terms of knowledge acquisition, and high-performing students showed more progress in creative expression, Fourth, there are actual risks of over-dependence on AI and ambiguity in originality, so human intervention, ethical review, and stronger copyright and ethics education are necessary.

The four stages of the study and the division of labour between people and AI for course reform are clear; it is a 4-dimension, 16-indicator evaluation tool, and it provides guidance for teachers transitioning from technical training to creative mentoring. Courses should also contain traditional Chinese culture to help students develop cultural literacy.

The above are the deficiencies: a small sample (3 universities, 62 students) is not generalisable; a 32-week intervention cannot show long-term effects; and with the rapid development of AIGC, model adjustments are required. The following sections will be more specific and cover various aspects of graduates' careers and how new AI tools have changed teaching methods.

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