Article

Reform and Practice of 3D Animation Course in Digital Media Technology Major from the Perspective of Competition-Education Integration

Hong Juan [1,*] and Chen Yu [1]

[1] Guangdong University of Science and Technology, Dongguan, Guangdong, China
[*] Correspondence: Hong Juan, Guangdong University of Science and Technology, Dongguan, Guangdong, China

Abstract: With the rapid development of the digital creative industry, there is an increasingly urgent demand for high-quality and highly practical 3D animation talents. Traditional 3D animation courses in digital media technology programs often suffer from a disconnection between theory and practice, insufficient innovative practical abilities among students, and a significant gap from cutting-edge industrial technologies and standards. To better integrate competitions with professional courses, using competitions to promote learning and teaching, and merging competition with education, is an effective way to enhance the quality of professional courses in higher education. Under this model, an integrated teaching practice path is proposed for 3D animation courses, which leverages skill competitions as a driving force, bases itself on course teaching, employs precise training as a means, centers on students, and relies on practical training platforms.

Keywords: digital media technology; skill competitions; competition-education integration; 3D animation

Published: 04 September 2025

1. Introduction

As an important component of the national strategic emerging industries, the digital creative industry is experiencing robust growth, creating a substantial demand for 3D animation talents with solid professional skills, exceptional innovation capabilities, and high professional ethics. As the primary platform for talent cultivation, the teaching quality of 3D animation courses in the digital media technology major at universities directly impacts the caliber of talent output. However, traditional teaching models often focus solely on imparting software operation skills, leading to issues such as a disconnect between course content and industry project workflows, outdated teaching cases, and a simplistic evaluation mechanism. These shortcomings result in insufficient practical abilities, innovative thinking, and teamwork spirit among students, making it difficult for them to meet the actual needs of industry development [1].

To address these challenges and bridge the gap between professional talent training and industry requirements, the "competition-education integration" model is regarded as an effective reform pathway [2]. This model aims to incorporate high-level academic skill competitions into the teaching system, using the industry's cutting-edge standards, authentic project processes, and innovation requirements embedded in these competitions to drive the innovation of teaching content and the upgrading of teaching methods. This paper explores how to deeply integrate skill competitions into the entire teaching process of 3D animation courses in the digital media technology major, constructing a closed-loop teaching system that uses competitions as a lever, is course-based, student-centered, and practice-platform supported. Through the practice of "using competitions to promote learning and teaching," it seeks to comprehensively enhance students' comprehensive professional abilities and teaching quality, while providing a reference for teaching reforms in similar disciplines.

2. Current Teaching Status of Digital Media Technology Courses

Digital media technology plays a significant role in fields such as advertising, animation, gaming, and film and television. The development and reform of related courses in higher education institutions are crucial for cultivating qualified media professionals. To explore teaching reform paths for online digital media technology courses, it is essential to clarify the teaching characteristics of such courses and analyze their current teaching status.

2.1. Characteristics of Digital Media Technology Courses

First, digital media technology courses are highly practical. Through course learning, students are required to master and utilize various media design, development, and production software to create multimedia works. While theoretical knowledge provides certain guidance, the emphasis is on students engaging in extensive practical exercises to proficiently grasp relevant skills and develop their own understanding through hands-on operation. Most digital media technology courses in higher education institutions follow this principle, with practical courses often accounting for half or even more of the curriculum [3]. This reflects the integration of theory and practice in such courses, with a stronger inclination toward practical operation.

Second, the cultivation of artistic aesthetics permeates the entire learning process of these courses. Although technical courses are practice-oriented, technical training must also be integrated with aesthetic refinement. The ultimate goal of teaching is not merely to familiarize students with procedural technical operations but to achieve an organic integration of personal aesthetic experience and creative works. This requires students to learn art theory while cultivating an eye for beauty in daily life, continuously enhancing their aesthetic sensibilities and artistic literacy. Through the accumulation of artistic cultivation, students can improve their comprehensive creative abilities.

Third, digital media technology evolves rapidly, with frequent software iterations, posing both challenges and opportunities for teachers and students. For teachers, it is necessary to dynamically update teaching content and adopt a combination of various teaching methods to ensure the course remains up-to-date. This places high demands on teachers' learning abilities, sensitivity to new technologies, and comprehensive teaching management skills. For students, learning a specific technical course or software is only a stepping stone into the field. More importantly, they must develop problem awareness and critical thinking. Through course learning and reflection, students can genuinely learn by analogy, enabling them to quickly master new technologies and software in the field in subsequent studies, thereby laying a solid foundation for improving comprehensive application abilities.

2.2. Current Teaching Status of Digital Media Technology Courses

Traditional teaching is primarily based on offline classroom instruction, supplemented by practical training sessions of a certain duration, with teachers providing guidance and answering questions for students within limited classroom time. However, constrained by large class sizes and limited classroom time, the efficiency of single, traditional classroom teaching is not high. Facing the rapid development of intelligent technology in the new media era, offline classroom teaching alone can no longer meet the requirements for cultivating students' comprehensive application abilities. Consequently, various forms of online courses and teaching methods such as MOOCs, micro-lectures, live streaming, and short videos have emerged, effectively compensating for the shortcomings of traditional classroom teaching and enabling students to engage in targeted learning and training during their spare time [4].

In recent years, online course education systems in universities both domestically and internationally have been continuously developing. Among these, MOOC platforms as massive open online course platforms have gained considerable popularity. Besides comprehensive online course platforms such as China University MOOC, Coursera, Guokr MOOC Academy, XuetangX, and Stanford Lagunita, specialized online course platforms focusing on specific fields have also emerged [5]. However, media technology courses are relatively rare on online course platforms. For example, regarding 3D animation-related courses, very few relevant contents can be found on platforms like XuetangX and Guokr MOOC. Although China University MOOC offers nearly forty related courses, most course content is outdated and does not align with the updating and iteration trends of digital media technology. Some domestic commercial course websites offer 3D animation-related courses, such as ZBrush and Maya courses on imooc.com and technical courses on ABOUTCG website. While these courses are related to 3D animation, they are not primarily taught by university professors, lack systematic content structure, cannot match the theoretical depth of university professional courses, and most are not free.

Some international online course websites like Coursera, edX, and Udacity only offer computer graphics content aimed at science students, while some commercial course websites like Pluralsight and Udemy, although offering extensive 3D animation theory and technical courses, charge high fees.

Based on this situation, diversified online video formats and integrated teaching methods have become the ideal pathway for teaching reform in media technology courses such as 3D animation. Teachers can plan instruction according to the characteristics of knowledge itself and the patterns of knowledge representation, creating different types of video teaching resources. Among these, specialized online courses of longer duration with substantial knowledge content, micro-lecture videos of approximately ten minutes, and short, concise videos with strong dissemination power can be combined with various teaching methods to address students' knowledge gaps and meet their diverse learning needs.

3. Necessity and Connotations of the “Competition-Teaching Integration” Teaching Model in 3D Animation Courses

3.1. Current Status of 3D Animation Professional Courses

With the rise and development of China's animation industry, animation programs in China are facing unprecedented development opportunities. However, due to the rapid development of industry technology, the complexity of industry-related knowledge content, and the detailed division of labor within the industry, traditional courses are prone to the following problems: students show low interest in courses with weak initiative; inadequate explanation and connection of course content from beginning to end, making it impossible to master the complete workflow; students demonstrate poor operational skills when encountering practical cases, with technical abilities falling short of industry requirements, resulting in low learning enthusiasm.

The introduction of skills competitions can effectively address these problems, as they possess special educational functions that regular teaching cannot achieve: enhancing students' learning interest and initiative in researching problems, stimulating learning potential and teamwork spirit; guiding students to prepare for and complete training projects while mastering production workflows; improving students' ability to serve society and industry development [6].

3.2. Connotations of the "Competition-Teaching Integration" Teaching Model

The "competition-teaching integration" teaching model, as its name suggests, organically integrates skills competition resources with daily teaching to achieve mutual integration, communication, and promotion. This model can not only improve the popularization of various majors in universities and optimize talent cultivation programs and curriculum systems, but also actively promote the construction of faculty teams, laboratories, and practical training bases.

However, many institutions currently participate in competitions for honor alone, transforming mass education into "elite" education for select students. How to change the phenomenon of competition training being disconnected from daily professional courses and solve the incomplete and unsystematic transformation of competition resources has become an important issue facing schools.

4. Specific Teaching Practice Exploration under the "Competition-Teaching Integration" Teaching Model

4.1. Overall Design Approach for Teaching Practice

To implement the competition-teaching integration teaching model, construction has been undertaken from the aspects of methods, processes, and teaching, forming an integrated teaching-practice pathway that uses skills competitions as the driving force, is grounded in course instruction, employs targeted training as the means, centers on students as the main body, and relies on practical training platforms as support.

4.2. Using Skills Competitions as the Driving Force

First, the selected skills competition projects must be able to match students' professional curriculum systems and career development. In higher education institutions, professional education often involves multiple disciplines and targets a broad range of employment positions, representing relatively popularized educational and teaching activities. Skills competitions, however, tend to be more focused in terms of employment positioning, targeting specific professional skills and competencies for particular job positions. They are designed to select high-quality skilled talents and represent elite educational activities. Therefore, in higher education, the introduction of skills competitions should follow the principle of deepening and enhancing certain professional courses within the curriculum system, using competitions as strategies and tools to improve teaching quality, rather than disrupting the original curriculum system to cater to competitions, which would be putting the cart before the horse.

Second, the selected skills competitions need high social recognition and industry recognition, with broad participation from schools, capable of reflecting regional economic, social, and industrial development needs, while having competition project settings closely related to actual job capability requirements. Taking the "Blue Bridge Cup" National Software and Information Technology Professional Talent Competition as an example, since its inception, competition winners have consistently been sought after by employers, with employment rates exceeding 99%. A large number of competition winners have grown to become elites in various industries as software testing engineers, data analysts, network security engineers, multimedia designers, and more. This type of academic competition not only more easily enhances students' participation enthusiasm and benefits their future career development, but also facilitates schools in initiating industry-university cooperation and deepening exploration of models such as teaching factories and modern apprenticeships, improving the precision of alignment between university professional teaching and industry requirements.

4.3. Grounded in Course Instruction

In the selection and training process for some skills competitions, to ensure sufficient training duration and intensity for teachers and students, the common practice is to have teachers and students suspend their original course studies and dedicate 2-3 months entirely to competition preparation. Typically, these interrupted courses do not require make-up classes, disrupting the integrity and systematicity of the original curriculum system, which is unfair to students who are ultimately not selected. Therefore, to avoid neglecting the sustainable development education of professional foundational abilities and vocational capabilities due to intensive competition skill learning, and to truly achieve a competition-teaching integration teaching model, it is necessary to connect competition goals, themes, and content with professional courses from the source of talent cultivation program development. Courses must be adjusted in terms of teaching content, teaching objectives, and teaching evaluation to conduct educational and teaching activities that are competency-based, centered on vocational practice, and primarily project-based.

Taking this course as an example, we organized and extracted key points from competition rules, operational standards, and evaluation criteria related to the "3D Animation Production" competition, decomposed the knowledge and skill points of the competition, and refined and designed them into teaching projects or tasks based on educational patterns, cognitive patterns, and our institution's actual conditions. We constructed corresponding teaching resources and reasonably embedded them according to the curriculum system and course characteristics, forming two course stages—foundational courses and targeted courses—plus one after-class extension stage of intensive training.

In the foundational course stage, course content uses prop creation from previous competition projects as case studies, focusing primarily on software familiarization and basic operations. Combined with operational standards from competitions, students can develop awareness of workplace standards from the moment they first encounter the course and software, becoming familiar with enterprise standards in specific corporate environments, strengthening students' awareness as working professionals and standardized industry competency.

In the targeted course stage, we analyze and research the knowledge and skill points of competition projects (Table 1), forming corresponding teaching tasks subdivided into multiple teaching units. Each teaching unit includes teaching content, training focuses, skill difficulties, and scoring criteria. On one hand, for most students, we set popularized evaluation standards with stratified and categorized assessment to match skills competition training difficulty with professional teaching difficulty. On the other hand, we combine dynamic assessment scores with contestant selection, considering learning attitude and other evaluation factors while emphasizing result evaluation—students' completion efficiency and final work effectiveness—to stimulate students' competitive awareness and discover suitable competition candidates during the teaching process.

Table 1. Competition Project Knowledge and Skills Analysis Table.

Core modules	**Skills competition evaluation criteria**	**Knowledge Points**	**Technical Competencies**
Animation creation module	Story & storyboarding	Storyboard rules	Storyboard language and expression
	Rigging and skinning	Relationship between controls and joints	Setting up joints and controllers for characters based on animation needs
	Character animation	Principles of Character Animation	Creating character animation based on story requirements
	Non-character animation	Principles of non-character animation	Creating non-character animation based on story requirements

Rendering and compositing	Shot-Based Render Settings	Scene lighting setup and animation render settings
Specifications and requirements	Operational Standards and Industry Requirements	Self-inspection and correction of scene files
Visual effects	Methods for integrating 2D and 3D	Using non-linear editing software - After Effects and Premiere Pro

In the intensive training stage, we use after-class time to conduct targeted pre-competition intensive training for competition candidates selected from the previous two course stages. By observing students' operational processes and analyzing their individualized operational habits, characteristics, and personal strengths, we develop unique training programs and personalized competition strategies for each competing student, achieving "one person, one strategy" with refined guidance. For example, if some students' operations are standardized but involve too many redundant steps, teachers point out where the student can "combine like terms" in their operations to improve production efficiency. Different students excel at different production projects, so we appropriately guide students to leverage their advantages in areas where they excel while avoiding mistakes in weaker areas.

4.4. Targeted Precision Training

In animation production competitions, what is assessed is the operator's comprehensive job competency across the entire animation production process. This involves numerous detailed checkpoints for industry knowledge, skills, qualities, and abilities, and coupled with individual differences among students, places higher demands on precision teaching. Therefore, to raise competition performance and strengthen animation production ability, precision training methods are indispensable. In this course, the training methods combine micro-lecture videos with a custom-built instructional resource retrieval system.

In information-based teaching, fine-grained resources that leverage information technology are the foundation of a resource library. Smaller learning units facilitate modular storage, students' self-directed retrieval and study outside class, and instructors' flexible lesson assembly. In this course, instructors in the teaching and research office repeatedly discussed and divided the 6-hour competition project into several units, then further subdivided each unit into fine-grained segments while ensuring scientific validity and effectiveness. These micro-units not only teach animation production methods and workflows but also standardize and streamline individual operation steps and techniques. The related micro-lecture resources amount to over 150% of the required course hours. Through meticulous, precision operation guidance, students' operational efficiency is significantly improved.

The instructional resource retrieval system consists of two parts: micro-lecture and other fine-grained resource searches keyed to the competition's production workflow, and a self-check and error-correction system developed in-house. Through resource retrieval, students can engage in pre- and post-class self-study to reinforce their weaker areas; combined with guided self-check and error-correction, they can standardize workflows, quickly identify operational issues, locate the corresponding resource units to resolve problems, and thus increase training efficiency. Wider student use continually enriches the self-check and error-correction system, feeding back into the course itself and extending across the entire curriculum to enhance students' overall professional rigor and standards.

For example, in the module on rigging and skinning, students can, before class, use the Learning Platform to study joint and skinning concepts and repeatedly watch instructors' demonstration videos. During and after class, students can follow the self-check and error-correction system's step-by-step guidance to verify the correctness of their rigging results. If errors occur, they can diagnose the issue in the system's correction module and then watch the specific micro-lecture designed to address that operational problem, greatly improving classroom efficiency for both instructors and students.

4.5. Student-Centered Focus

Skills competitions, as elite selection events for the industry, ultimately involve only a small fraction of students. However, by appropriately embedding competition projects into specialized courses, a wide range of students can increase their learning interest and initiative in research; instructors can guide students to identify and solve problems by completing competition tasks, stimulating their learning potential and creativity. To benefit more students, two approaches are needed. First, strengthen publicity and reward mechanisms for competitions to boost student enthusiasm for participation. Link campus selection, on-campus extracurricular training, off-campus competition participation, and competition awards with students' second-classroom activities, publicize the achievements of past award winners, and implement reward policies. According to national regulations, increase commendations and awards for university students who excel in relevant skills competitions. Organize Education Week and World Youth Skills Day events; conduct "Great Craftsmen Enter Campus" and "Outstanding Students Share on Campus" activities to showcase the stories and images of master craftsmen, skilled artisans, and high-quality workers, fostering and passing on the spirit of craftsmanship. Second, develop a broad base of students at multiple levels around competitions—general student body, competition reserve teams, and competing students—training them by grade and skill level to reinforce competition as a motivating force and cultivate students' innovative thinking, teamwork spirit, practical problem-solving, and hands-on abilities.

4.6. Relying on Practical Training Platforms

Constrained by teaching resources and actual operability, professional instruction often differs from "productive" real-world workflows. A practical training platform equipped with authentic industry equipment and a real-world teaching environment can effectively bridge this gap. By integrating enterprise production processes into instruction to simulate real production scenarios, students not only learn job skills in context but also absorb corporate culture, industry culture, and professional culture. This cultivates their professionalism, productivity, and adaptability, ensuring that skills competitions align with specialized instruction and employment orientation, competition content matches professional teaching content, and the competition training environment merges with the practical training environment—both evolving in step with changes in job requirements and economic development needs.

5. Conclusions

After several years of continuous teaching practice, this study has improved classroom teaching methods and approaches. The "combining competitions with teaching—using competitions to enhance teaching and learning" model has established a sustained mechanism for driving instruction, strengthened students' learning ability, innovation capacity, and comprehensive practical skills, and achieved excellent teaching outcomes, promoting an overall improvement in course quality. Guided by this practice pathway, the 3D animation courses have yielded remarkable results: students and instructors participating in related competitions have won more than ten national and provincial awards. In the future, we will continue to summarize our experience on this basis, explore additional practice pathways and methods, further enhance students' professional skills and vocational qualities, and cultivate more high-level 3D animation talents.

Acknowledgments: This paper presents the research outcomes of the 2024 University-Level Teaching Quality and Teaching Reform Project at Guangdong University of Science and Technology, "Research on Practice Teaching Reform in Digital Media Technology Based on the Integration of Competitions and Education" (code: GKZLGC2024172), and the 2024 University-Level Research Project at Guangdong University of Science and Technology, "Research on Intelligent Recognition and Analysis of Student Behavior Based on Classroom Video" (code: GKY-2024KYQNK-24).

References

1. M. Manuja, "Industry academia collaboration model: The design challenges," in *Proc. 2011 24th IEEE-CS Conf. Softw. Eng. Educ. Train. (CSEE&T)*, May 2011, pp. 111–120, doi: 10.1109/CSEET.2011.5876077.
2. Z. Liu, M. Chen, Y. Xu, and W. Zhang, "Modeling and analysis of the practical teaching system combined with curriculum, competition and innovation in higher education," in *Int. Conf. Intell. Technol. Educ. Appl.*, Singapore: Springer Nature Singapore, Jul. 2024, pp. 1–11, doi: 10.1007/978-981-96-4090-4_1.
3. S. Xin, Y. Zhang, and X. Zhu, "Research on the model of undergraduate innovation and entrepreneurship education oriented by academic competition," Adult Higher Educ., vol. 4, no. 8, 2022.
4. J. Wang, "Exploration of the introduction of the 'promoting learning through competition' model into higher vocational classrooms under the background of integration of industry and education—Taking the 'public space design' course as an example," *Educ. Rev., USA*, vol. 8, no. 3, 2024, doi: 10.26855/er.2024.03.029.
5. D. R. Langford and S. Hardin, "Distance learning: issues emerging as the paradigm shifts," *Nurs. Sci. Q.*, vol. 12, no. 3, pp. 191–196, 1999, doi: 10.1177/089431849901200304.
6. C. Chi, Y. Yue, K. Zhong, Y. Zhang, and V. N. L. Leid, "Research on cultivation model of innovative and entrepreneurial talents with new technology applications in higher education institutions," *J. Educ. Technol. Innov.*, vol. 4, no. 1, 2022, doi: 10.61414/jeti.v4i1.83.