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PAPER

Evaluation and Research on the Classification Training Mode of Animation Talents Based on Teaching Dynamics from the Perspective of New Liberal Arts

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ABSTRACT

The creation of new artistic forms is an important aspect of the classification of artistic construction. The training of animation talents should be based on the market demand for professionals in the animation industry. While emphasizing the training of professional characteristics, it is important to consider the cross-complementation of related disciplines. The animation major at the Zhongnan University of Economics and Law has taken the initiative to investigate the market. They started by addressing the challenges faced in the development of the animation major and focused on the classification training of animation talents within the newly established new art department. As a result, they have developed a new professional curriculum system, a system for cross-integration of different disciplines, and a practical training system. These initiatives have facilitated the classification of platforms, the integration of multiple disciplines, and the development and training of practical skills within the animation major. We are actively exploring and practicing a new training method for animation talents in the art department. Our goal is to train high-quality applied animation talents who can contribute to local economic and social development. By doing so, we aim to promote the coordinated development of the art department and the field of animation. In order to quantify the teaching effect, we introduced a dynamic method to model the teaching system. This model was mathematically established as a dynamic system. Through modeling and analysis, the data reflected the positive impact of educational innovation and reform on teaching, thereby demonstrating the effectiveness of our innovation and reform.

KEYWORDS

new arts, animation talent, classification culture, teaching dynamics

1 INTRODUCTION

Since 2011, when China made the artistic creative industry the leading industrial policy decision of the national economy, there has been widespread concern and

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discussion about the education and development of the art discipline and its social value [1] [2]. The proposal for new liberal arts and arts education aims to address significant practical issues, enhance innovation capabilities, and bridge the gap between disciplines. Since 2020, the global economy has been impacted to varying degrees due to the epidemic. However, the animation industry has defied the trend by flourishing in new fields of application, thanks to the development of new technologies such as artificial intelligence and virtual reality. Because it possesses all the characteristics of a modern knowledge economy and boasts a comprehensive industrial chain, the cultural industry has steadily risen to a prominent position in the international arena. It has emerged as a vital pillar industry in countries and regions such as the United States, Japan, South Korea, and Europe. In China, animation art has long been widely accepted and loved by the public due to its multi-level narrative techniques, diverse visual styles, and varied forms of auditory expression.

The rapid development of the industry will inevitably lead to an increased demand for professional talent. According to a report released by the McKinsey Global Institute, job demand in China for creatives, artists, designers, entertainment industry practitioners, and media workers is projected to increase by 85%, the highest growth rate among the countries surveyed [4]. Animation graduates can find employment opportunities in various industries. However, there is actually a high turnover rate among animation professionals. Many scholars have recognized the severity of this issue and have conducted research from different perspectives to address it. As of September 2023, based on the literature data collected from academic platforms such as CNKI, there is still potential for improvement in the research conducted on the talent requirements of enterprises in first-line animation-related industries. Taking Zhongnan University of Economics and Law as an example, this paper analyzes how applied disciplines of art can better adapt to the construction of new liberal arts and new arts in order to better serve the needs of talent for the development of related industries.

2 CURRENT SITUATION AND EXPLORATION OF ANIMATION TALENT TRAINING MODE

According to the annual report of China's animation industry, the scale of China's animation market continues to expand, the industrial chain continues to improve, and the demand for animation talent is also growing. Since 2005, the proportion of the cultural industry in the GDP has been increasing year by year, and the animation industry has emerged as a significant component of the cultural industry. However, with the rapid development of the animation industry, the employment and research status of its talent are deteriorating. From 2010 to 2014, the employment rate for animation majors was classified as a high-risk major (a major with a high risk of unemployment) in the "Employment Report of Chinese College Students" published by Mycos. In terms of academic research, there has been a significant decline in the inclusion of animation-related research on the China National Knowledge Network platform. The reasons are summarized as follows: (1) There is a gap between what students learn and the needs of the industry. Most animation companies observe that students lack practical experience and creative ability during their studies in school. Even if graduates find a job in their field of study, they still need to bear the high cost of talent training once they start working. (2) Talent ability is related to the development and iterative update of industry technology. With the continuous emergence of new technologies, such as generative artificial intelligence (AIGC), virtual engines (UE), virtual production (VP), virtual reality (VR), augmented reality (AR), and other technologies, higher requirements are being put forward for the skills of animation professionals.

In light of these issues, colleges and universities offering animation majors should make adjustments and reforms to their personnel training programs. They should also enhance collaboration with the industry. By closely working with the industry, they can stay informed about the latest technological trends and developments in the field. This will help promote the integration of industry and education. Additionally, they should introduce new technologies and tools, regularly update teaching equipment and practice platforms, and foster students' innovation mindset and practical technical skills. According to industry demands, the teaching content is regularly adjusted to ensure that students acquire knowledge and skills that align with current needs. Classification training is also implemented to further enhance the relevance of what students learn.

In order to explore the path and method of classifying and training new art animation talents. Zhongnan University of Economics and Law is guided by the industry's ability needs and follows the overall idea of "people-oriented and all-round development." The university leverages its relatively complete disciplines and specialties to improve and transform the traditional training mode for animation professionals through multiple dimensions and paths. The focus is on creating innovative training modes such as the XR digital film and television laboratory, motion capture laboratory, virtual reality laboratory, and other cutting-edge professional laboratories. It has developed a new professional curriculum system, a professional cross-integration system, and a practical training system. These systems promote platform-based classification training, interdisciplinary integration, and "skill-based" practice and training for animation majors. As a result, the ability, quality, and social adaptability of animation students are comprehensively enhanced.

The main contradiction inherent in the teaching process is the conflict between students' need to acquire and develop specific knowledge and skills through the guidance of teachers and the actual feasibility of meeting these needs. This conflict serves as the driving force behind the promotion and maintenance of effective teaching. The teaching process forms a closed loop, with teachers and students comprising the main body of this loop. Closed-loop control requires real-time measurement of the output, comparison with the expected value, and adjustment in the direction of reducing the deviation. The teaching process can be modeled using cybernetics. First, the process state can be identified, then the incentive function can be adjusted, and finally, the process can be modified based on the response to the incentive effect. After the teaching process is modeled using the cybernetic method, a quantitative analysis can be conducted. Then, we can utilize optimization methods to analyze the teaching process and provide guidance for its improvement.

3 ESTABLISH THE DYNAMIC MODEL OF ANIMATION TALENT TRAINING TEACHING

The cultivation of practical ability is of great importance in the training of animation professionals. To achieve this, it is essential to establish a talent classification training mode that aligns with the actors in the Chinese animation industry ecosystem. At the micro level, animation enterprises serve as the core of the industrial ecosystem. The lineup includes the main body: the creator of the animation content, the creator of the animated content, and the creator of the moving picture content. In it, animation content creators provide intelligent creation, animation content producers provide production skills, and animation content developers provide operational capabilities [5].

An automatic control dynamic system is defined as a dynamic system with a feedback mechanism. The system can automatically and continuously measure the controlled quantity, calculate the deviation, and then control it based on the magnitude and polarity of the deviation. The goal of control is to minimize or eliminate the existing deviation [6] [7]. This is consistent with the characteristics of teacher-student interaction and student learning. Therefore, the teaching process can be modeled using the method of self-control dynamics. According to the relationship between teachers, students, and teaching outcomes (including practical ability, test scores, etc.), a dynamic block diagram can be established to represent the inherent relationship of teaching characteristics (see Figure 1). After modeling the teaching process, we can quantitatively analyze the impact of animation teaching reform.

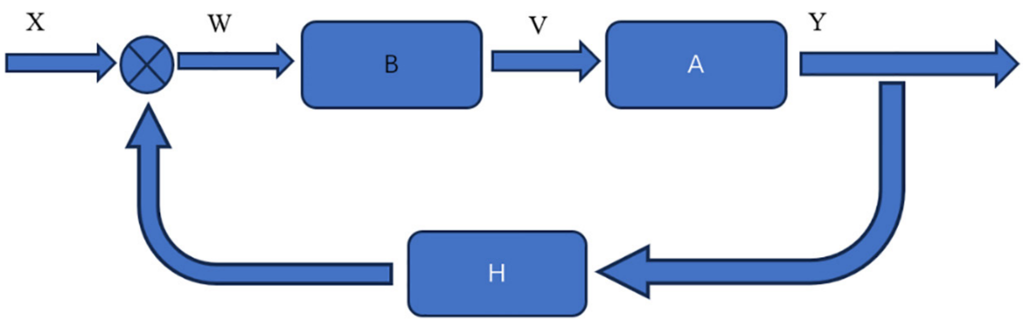

Fig. 1. Shows the internal linkage diagram of teaching characteristics

Y represents the teaching effect, including test scores and practical ability; X represents the teacher's expected effect. A represents the target students of the teaching, and B represents the teacher's regulating effect. H stands for teaching feedback, which allows for adjustments in teaching.

In order to form a closed-loop teaching process, the following three conditions must be met: 1. The teaching effect can be measured through various methods, such as asking questions or conducting examinations in real time. The teaching effect can be measured by comparing it with the expected indicators of teachers, and the deviation can be calculated. Competent teachers will take measures to reduce deviations and make adjustments in order to achieve better results. In this way, the teaching process will form a closed-loop negative feedback system.

In order to facilitate modeling and simplify the problem, it is first assumed that the external incentive for learning is a step function. This function can be used to observe how students respond to the incentive [8] [9] [10]. Under the excitation of the step function, the step response can be described as either x $1-e^{-\frac{t}{\tau}}$ or $1+ae^{-\frac{t}{\tau_1}}+be^{-\frac{t}{\tau_2}}$.

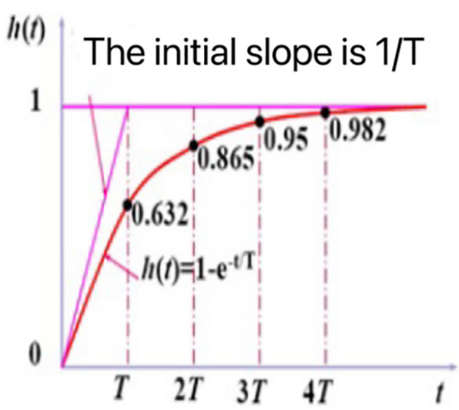

Fig. 2. Step function excitation response

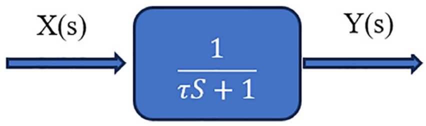

Fig. 3. Transfer function of learning process

With the assistance of the transfer function of cybernetics [10], it is possible to model students' learning and cognition processes (see Figure 3). The time constant, which reflects the student's learning ability and is defined as the constant of learning ability, is missing. The higher the constant of a student's learning ability, the slower he or she absorbs knowledge. Here, various methods can be adopted to constantly improve students' learning ability and enhance the teaching effect. Due to the change in teaching methods and the accumulation of knowledge, students' ability to accept new information has improved, resulting in an accelerated learning pace. Consequently, the learning curve will decrease. At this time, if the teacher's regulating effect B is K, the closed-loop transfer function of the teaching process system is:

$$F(s)=\frac{Y(s)}{X(s)}=\frac{\frac{K}{\tau S+1}}{1+\frac{K}{\tau S+1}}=\frac{\frac{K}{K+1}}{1+\frac{T}{K+1}\cdot S} \tag{1}$$

Let the input function be a unit step function whose image function is, multiplied by the closed-loop transfer function, the image function of the output:

$$F(s)=\frac{Y(s)}{X(s)}=\frac{\frac{K}{\tau S+1}}{1+\frac{K}{\tau S+1}}=\frac{\frac{K}{K+1}}{1+\frac{T}{K+1}\cdot S}\cdot\frac{1}{S} \tag{2}$$

Its original function is

$$Y(t)=\mathcal{L}^{-1}Y\left(s\right)=\mathcal{L}^{-1}\left[\frac{\frac{K}{K+1}}{1+\frac{T}{K+1}\cdot S}\right]=\frac{K}{K+1}\left(1-e^{\frac{\frac{-1}{\tau}}{1+K}}\right) \tag{3}$$

The impact of the teacher can be quantified by the proportional constant K. The final effect of the teacher is not necessarily reaching 1, but rather a value is $\frac{K}{K+1}$, that represents their effectiveness. The value of K corresponds to the reduction in the equivalent intelligence constant of students by (1+K) times. In other words, the learning process is significantly shortened to 1/(1+K) compared to before. The proportional constant K can be used as an indicator to measure the teaching ability of teachers have a good K big teachers, teaching effect, while K small teachers have a poor teaching effect.

Corresponding to the linear time-invariant system, the transfer function and the state equation are two different ways of describing the same thing, and there is a certain relationship between them. The transfer function is part of the frequency-domain method, while the equation of state is applicable with the time-domain method. The transfer function can only be used to describe linear time-invariant systems, whereas the equation of state is application to both linear time-invariant and linear time-varying systems. The transfer function can be applied to a single input and a single output, while the equation of state can be applied to multiple inputs and multiple outputs. In order to obtain an offline numerical solution, it needs to be transformed into an equation of state [11] [12] [13].

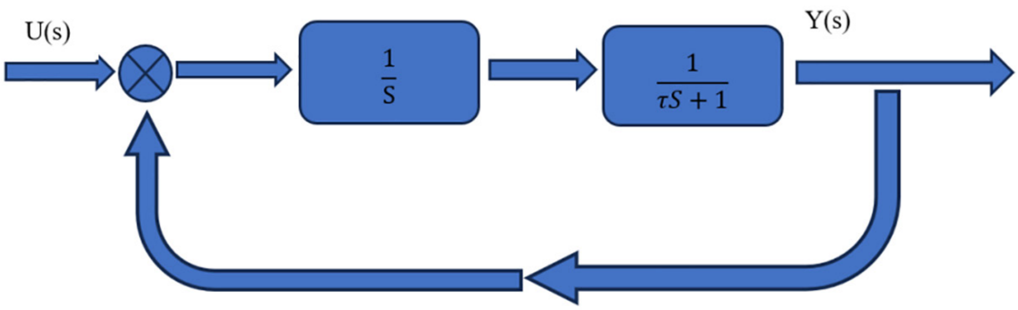

Fig. 4. Control closed-loop diagram of teaching system

Turn it into a state variable graph (see Figure 5).

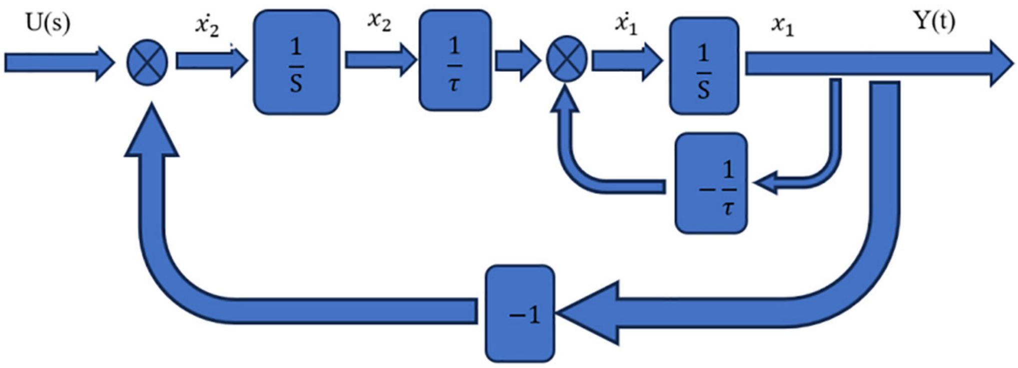

Fig. 5. State variable diagram of teaching system

Write the equation of state according to the diagram of state variables as follows:

$$\begin{matrix} \dot{x}_1 \\ \dot{x}_2 \end{matrix} = \begin{bmatrix} -\frac{1}{\tau} & \frac{1}{\tau} \\ -1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} \mu(t) \tag{4}$$

$$y(t) = [1 \quad 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + [0]\mu(t) \tag{5}$$

Whether it is traditional teaching or modern teaching, there are two essential elements: teachers and students, and the interaction between them. The above differential equation represents the teaching process, reflecting the learning state of students and the teaching state of teachers. In order to achieve effective teaching, teachers and students should collaborate to align with the teaching system. This involves enhancing the teacher's teaching effectiveness (represented by the proportionality constant K) and reducing the student's learning resistance.

4 EXPERIMENTAL COMPARISON

In order to explore the path and method of training animation talents in the new art department, we have reconstructed the "three platforms" (content creators, content producers, and content developers). We have also implemented the "three integration" approach (integrating multiple disciplines and opening up three majors in law and management at the school). Additionally, we have optimized the "three practices" (improving practical teaching content and methods). It has developed a new system for integrating different disciplines, a professional cross-integration system, and a practical training system. These initiatives have facilitated the classification training of animation majors, the integration of various disciplines, and the practical and skill-based training of students. As a result, the overall ability, quality, and social adaptability of animation students have been significantly enhanced.

We selected an undergraduate class and compared the effectiveness of the reform teaching method. We found that, after the reform, K has been significantly improved to achieve the same teaching effect. This reflects that the teaching reform has indeed yielded positive results.

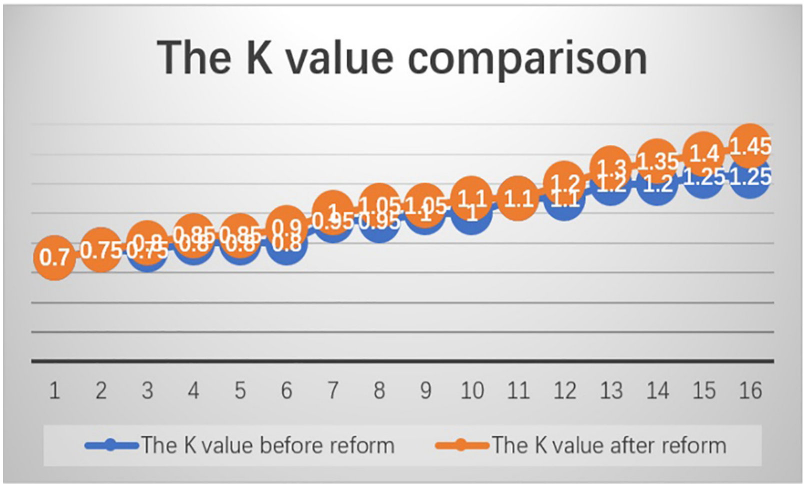

Fig. 6. Comparison of K value before and after teaching reform

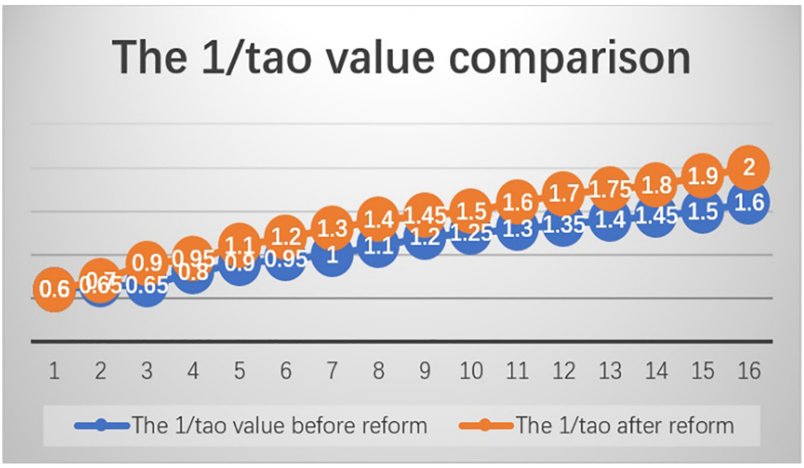

Fig. 7. Value comparison before and after teaching reform

With the implementation of the new curriculum, both the teacher's teaching constant K and the student's learning constant K showed varying degrees of growth. However, it is evident that the two constants increased at a faster rate after the reform (see Figures 6 and 7). Therefore, practice has proven that the reform measures we adopted were effective.

5 CONCLUSION

The school adopts a "student-oriented" approach, prioritizing students' success and development. It actively explores a classified training mode for animation talents, taking into account the school's actual situation and leveraging the advantages of the discipline. First of all, it is important to further enhance the depth of talent classification training, with a focus on top-level design. Secondly, the establishment and improvement of talent classification training categories and a curriculum platform. Here, it reflects teaching students according to their aptitude, respecting individual differences, and providing targeted guidance to different students. At the same time, it also emphasizes the significance of teacher training and supports the enhancement of teachers' professional skills through various means. In this way, by enhancing teachers' abilities, refining the teaching platform, and reforming the teaching methods, subject development in colleges and universities is continuously advanced to meet the demands of social progress. We quantify the teaching system, model the teaching process, and reflect the improvement of teaching quality through the teacher's teaching constant K and the student's learning constant $1/\tau$. This approach makes the teaching more scientific.

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