Hindawi
Wireless Communications and Mobile Computing
Volume 2022, Article ID 1966607, 12 pages
https://doi.org/10.1155/2022/1966607

Research Article

Animation Education Innovation of Big Data in the New Media Environment

Lu Zhang and Zhuoran Zhang

School of Fine Art and Design, Heze University, Heze, 274000 Shandong, China

Correspondence should be addressed to Zhuoran Zhang; zhangzhuoran@hezeu.edu.cn

Received 13 January 2022; Revised 15 February 2022; Accepted 22 February 2022; Published 8 March 2022

Academic Editor: Shalli Rani

Animation education is an essential part of art education. Animation education in China started late, and its development was intermittent. After entering the 21st century, animation education has developed at an unreasonably high speed and has formed layers of animation education bubbles. There are many problems and drawbacks behind the rapid development of animation education, but it has been slowly improved and some results have been achieved. In today's multimedia age, the digital revolution has brought a brand new environment and space for contemporary animation, and a large cross-field animation industry is gradually taking shape. China's animation industry should actively respond to the overall innovation of the global animation industry and build a new animation industry development model that adapts to the era of big data. And it builds an animation education system that adapts to the big data environment and continuously supplies talents for the animation industry. This article will study the innovation of animation education based on big data. This article introduces innovative methods of animation education based on big data and designs an animation education platform based on big data. It also conducted a questionnaire survey of learners using the platform based on the Technology Acceptance Model (TAM) and concluded: among the four-dimensional options of TAM, the average proportion of people who choose to agree is 49.5%, and the proportion of people who choose to disagree is 1.81%. This proves that most learners think that the animation learning platform in this article is useful and satisfied with the platform, and only a very small number of people have a poor experience of using the platform.

1. Introduction

Animation education in China began in the 1950s. In nearly half a century, there was only one university in China with dozens of students, and its development was slow. The real development of Chinese animation education began in 2004, and the development of animation education has shown an extremely rapid momentum from the beginning. In just a few years, it has blossomed all over the country, with animation schools, animation majors, and animation education institutions constantly appearing. However, the animation education of universities is still relatively weak for cultivating students' innovative ability. Therefore, how to cultivate college students' creative thinking in animation has become a central topic of college animation education. Affected by the new media revolution, the traditional animation industry has begun to change. It covers many fields, for example, clothing, toys, video games, advertising, and other industries. These industries include animation, derivatives, and industries that use animation to convey information.

Animation art education is an education implemented through animation art work, and its comprehensive knowledge contains more information than any single art form. In addition to the following the general laws of art education, animation art has its own laws. That is the unity of science and art, thought and technology, production, and market. Different from ordinary art work, animation is a market-oriented commercial industry, and its derivative products include comics, movies, TV, music, and even theme parks and website resources. As animation education continues to be hot today, animation educators must clearly understand the current situation of animation education,

and creators must have sufficient artistic accomplishment. Therefore, the focus of modern animation education should still be on technical education and art education. In today's Internet age, the use of big data technology to assist animation education is of great significance to the improvement of the effect of animation education.

The animation industry is a fast-growing industry, and the development of the industry has driven the development of animation education. Therefore so far, many scholars have also conducted research on animation education. Jian et al. showed that the lecturer's gestures can help capture, maintain, and guide students' attention in the classroom and enhance learning and retention capabilities. He proposed that the system allows users to effectively create accurate and effective stimuli for complex gesture research without the need for computer animation expertise or artist talent [1]. Shreesha and Tyagi use field experiments to evaluate the effectiveness of animation in education and try to eliminate the influence of external factors such as psychological factors and students' socioeconomic background. The research results show that animation can be used as an effective communication tool in pedagogy. If used properly, it can improve students' academic performance in elementary education, but this conclusion lacks data support [2]. Pinto et al. have created three storyboards and verified by 22 experts. The results show that the matching rate for care is above 80%. Storyboards enable people to understand the changes in scenes and dialogue more clearly and in more detail. Animation is an innovative educational technology that supports the teaching and learning of parents and families [3]. Suki and Suki aim to use the unified theory of acceptance and use of technical models as the guiding principle to examine the determinants of students' behavioral intentions in animation and storytelling. The research results show that university management and business school scholars should recognize that animation and storytelling are an effective educational method. And it actively integrates this strategy into the curriculum to cultivate business school students who are more creative in story communication. The lack of this research is the lack of detailed design [4]. The purpose of Farrokhnia et al. is to give an overview of the research in the field of stop motion animation (SMA) and to synthesize the research results. The results of the study show that if the appropriate scaffold is provided, SMA can facilitate deep learning. In addition, the scientific concepts proposed as SMA should be self-contained, dynamic, and not too difficult to express. The disadvantage of this research is that the research is not deep enough [5]. Earnest and Amador assign prospective teachers ($N = 33$) to one of two widely used courses to generate lesson plans and corresponding animations. And it analyzes the homework data called "curriculum planning" to reveal how future teachers will use the curriculum to formulate the curriculum. He discussed the impact on theory, curriculum, and teaching, but the dimensions of analysis are somewhat less [6]. Yim focuses on discussing the social value of animation in the context of community culture and art education and exploring the policy direction of community animation art education. The analysis results show that the community's understanding of the value of animation art education is low, and the educational needs are uncertain. However, it can be confirmed that the community can carry out animation art education for the elderly and young people. It would be better if the study can propose specific animation education measures [7].

The innovations of this article are (1) combining big data with animation education expounding the innovative methods of animation education based on big data. This is an innovation in method. (2) An animation education platform was designed based on big data, and the platform's functions, overall framework, and key technologies were all designed in detail. And after investigation, it is found that learners feel better about using this platform. This is an experimental innovation.

2. Innovative Research Methods of Animation Education Based on Big Data

2.1. Big Data

2.1.1. Definition and Characteristics of Big Data. From a technical point of view, big data is a large-scale, diverse, extremely fast-growing, and potentially valuable complex data spawned by the integration of the information technology, revolution, and human social activities; from a social point of view, big data is a new type of driving force that enhances interactivity, relevance, and personalization, creates social value, and changes human behavior [8]. In terms of data categories alone, big data refers to information that cannot be collected, stored, managed, and processed by traditional means. The scale of the data set exceeds the processing capacity of traditional methods, and more powerful methods are usually needed to process.

2.1.2. Big Data Analysis Algorithm. The related algorithms of big data analysis are essentially an application of collective intelligence. It collects answers from a large number of personnel information recorded in the information database to help obtain statistical conclusions. And these conclusions cannot be obtained with a small amount of data. Collaborative filtering algorithm is a recommendation algorithm that uses collective wisdom. It is an algorithm that generates corresponding recommendations to target users based on the rating data of similar neighbors. It can help people dig out related information from a large amount of information to generate the recommended content.

The implementation steps of the collaborative filtering algorithm are to collect user preference data, find similar users or similar items, and finally calculate the recommendation.

First, we use the Sqoop-based big data collection module to distribute mobile phone user preferences from various systems such as the education system and convert these historical records into a simple triple:

$$<\text{UserID, ItemID, Preference}>. \quad (1)$$

Then, several similarity measures are used to calculate

the similarity between users, such as Euclidean distance and cosine similarity [9]. Euclidean distance represents the true distance between two points in a multidimensional space, and its calculation formula is as follows:

$$d(x, y) = \sqrt{\sum (x_i - y_i)^2}. \tag{2}$$

The similarity expressed by Euclidean distance is

$$\text{sim}(x, y) = \frac{1}{1 + \sqrt{\sum (x_i - y_i)^2}}. \tag{3}$$

The cosine similarity represents the cosine value of the angle formed by the vector values of two triples in the vector space. The formula is as follows:

$$\cos \omega = \frac{\sum x_i y_i}{\sqrt{\sum x_i^2} \sqrt{\sum y_i^2}}. \tag{4}$$

In the formula, x and y represent triples.

According to the similarity measurement value calculated by the abovementioned similarity calculation method, two types of methods can be used to obtain adjacent users or items [10]. That is, neighbors are based on the similarity threshold and a fixed number of neighbors, as shown in Figure 1.

2.1.3. Big Data Storage Method

(1) Data Access Mode of the Storage System. The basic form of recency-friendly data access mode is

$$(a_1, a_2, \cdots, a_k, \cdots a_2, a_1)^n. \tag{5}$$

In the formula, k represents the number of data blocks, and n represents the number of cyclic visits. This data access mode has good data locality, that is, the currently accessed data has a high probability of being accessed again in the near future.

The basic form of Loop data access mode is

$$(a_1, a_2, \cdots, a_k)^n. \tag{6}$$

The basic form of Frequency-friendly data access mode is

$$[(a_1, a_2, \cdots, a_k)^m] P(b_1, b_2, \cdots, b_i)^n. \tag{7}$$

In the formula, k represents the number of data blocks that have been accessed, and m represents the number of cycles to access k data blocks. m represents the number of data blocks that are accessed only once in a round of access. P represents the probability of accessing data blocks. n represents the number of cycles of the entire access process.

(2) Cache Scheduling Strategy. CRF (combined recency and frequency) is an attribute value associated with each data block. It represents the probability that the data block will be accessed in the near future. CRF is calculated by the following formula:

$$\text{CRF}_{t_0}(b) = \sum_{i=1}^{k} F(t_0 - t_b). \tag{8}$$

CRF integrates the contribution value of each access to a data block [11]. Let $F(t)$ denote the contribution value brought by a data block access, and the contribution value gradually decreases with the passage of time, then

$$F(t) = \left(\frac{1}{\text{attenuation}}\right)^{w \times t}. \tag{9}$$

W is the weight adjustment parameter. Update the size of the CRF in two cases. In one case, when the data block is accessed or submitted, the latest CRF can be updated according to the original CRF size. The calculation formula is

$$\text{CRF} = \text{CRF}_l \times (F - t_l). \tag{10}$$

In the formula, CRF_l represents the size of the last updated CRF, and t_l represents the time of the last update.

The second case is when a replacement operation occurs, the CRF values of all data blocks will be updated at this time. Because all data blocks must be sorted according to the latest CRF, the new CRF calculation formula is

$$\text{CRF} = \text{CRF}_l \times (t - t_l) \bullet F. \tag{11}$$

2.2. Educational Methods Based on Big Data

2.2.1. Construction of the Evaluation Model of University Online Education Based on Big Data. The application of big data technology in college network education is still in the stage of practical exploration. In order to better and objectively evaluate the achievements of college and universities, online education, and reflect the existing problems. This thesis is in the process of constructing a dynamic evaluation model of college online education based on big data, and it tries the combination of big data technology and traditional analysis methods and strives to increase the massive data advantage of big data on the basis of traditional methods [12]. The basic design of the evaluation model for college network education is shown in Figure 2.

Data processing is required before evaluation to eliminate the incomparability caused by directions and units. Generally speaking, there are two main forms for determining evaluation indicators, namely, subjective empowerment and objective empowerment. Subjective weighting is less likely to differ from actual common sense in the interpretation of the results, but it may affect the accuracy of the evaluation results; objective weighting has a rigorous

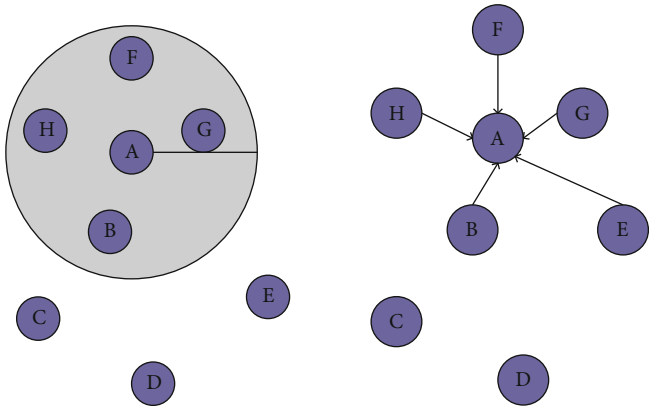

Figure 1: Diagram of the neighbor selection method.

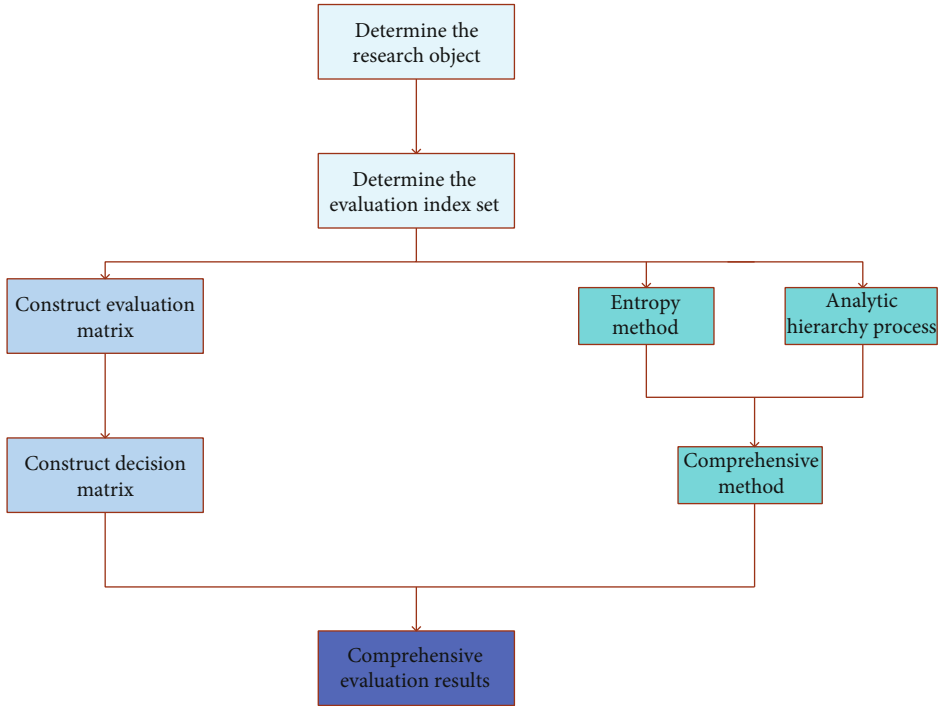

Figure 2: Basic design of evaluation model.

mathematical theoretical interpretation, but it may make the weight distribution unrealistic. Combining the advantages and disadvantages of the two methods, this chapter uses the analytic hierarchy process as the subjective weighting method, and the entropy method as the objective analysis method. The two weighting methods are integrated to get the reasonable weight value.

(1) Analytic Hierarchy Process. In the construction of the judgment matrix, relevant leaders, experts, scholars, and grassroots executives in the construction of campus network culture in China are invited to score relevant indicators and construct a corresponding judgment matrix. The weight value of each indicator is calculated from the judgment matrix of each person, and the average value of the weight value of each indicator is taken as the final weight of the corresponding indicator [13]. The subjective weight vector obtained by the analytic hierarchy process is

$$L = (l_1, l_2, \cdots, l_n). \tag{12}$$

(2) Entropy Method. According to the characteristics of entropy, we can judge the randomness and disorder degree of an event by calculating the entropy value, or use the entropy value to judge the degree of dispersion of an indicator, the greater the degree of dispersion of the index, and the greater the impact of the index on the comprehensive evaluation. As an objective weighting method, the entropy method determines the weight based on the amount of information reflected by the confusion degree of each indicator. The entropy method calculates the proportion p of the index value of the j-th item under the i-th index. The

formula is

$$p = \frac{r_{ij}}{\sum_{i=1}^{m} r_{ij}}. \tag{13}$$

(3) Comprehensive Approach. The index weight vector obtained by the combination of analytic hierarchy process and entropy method:

$$W = (w_1, w_2, \cdots, w_n). \tag{14}$$

According to the weighted calculation index value, the final evaluation result can be obtained.

2.2.2. Knowledge Level Diagnosis Method Based on Big Data

(1) Project Reflection Theory IRT Mathematical Model. IRT is a mathematical model used to analyze test scores or survey data. The goal of these models is to determine whether the underlying psychological characteristics can be reflected through the test questions, and the interactive relationship between the test questions and the testee. IRT uses a nonlinear probability model, and the most commonly used model is the logistic model. The model is divided into three-parameter model, two-parameter model, and single-parameter model. The three-parameter model is as follows:

$$P_i(\theta) = c_i + \frac{1 - c_i}{1 + e^{-1.7a_i(\theta - b_i)}}. \tag{15}$$

In the formula, $P_i(\theta)$ represents the probability of a student with the ability level θ of answering the question correctly. a_i, b_i, and c_i, respectively, represent the degree of discrimination, difficulty, and guessing coefficient, and e is an irrational number, the base of natural logarithm [14].

The guess coefficient of some question types is quite small, that is, the value of c_i can be regarded as 0. At this time, the two-parameter model can be used, that is, there are

$$P_i(\theta) = c_i + \frac{1}{1 + e^{-1.7a_i(\theta - b_i)}}. \tag{16}$$

There are also some tests. Not only all project guesses may be 0, but the discrimination is very close to each other. That is to say, a is equal, and it can be set to a_i at this time, so a single parameter model is obtained, that is, there are

$$P_i(\theta) = c_i + \frac{1}{1 + e^{-1.7(\theta - b_i)}}. \tag{17}$$

2.2.3. Intelligent Learning Path Recommendation Algorithm Based on Ant Colony Algorithm. The structure of the smart learning engine includes a storage layer and a control layer. The storage layer is responsible for providing the databases needed for engine operation, including learner information database, group feature database, knowledge model and resource database, teacher guidance strategy database, and learning process database; the control layer is the operation execution center of the engine. With the support of the storage layer, the control layer provides personalized services such as learning path recommendation, learning resource recommendation, adaptive presentation of learning resources, knowledge level diagnosis, and teacher guidance. Among them, the learning path recommendation is to use the smart learning path recommendation algorithm [15]. Support the smart learning of students and the smart guidance of teachers, dynamically track the learning process, and evaluate the learning effect. It dynamically adjusts its own rules and data according to the service effect to realize the continuous evolution of the engine. Its structure is shown in Figure 3.

(1) Construction of Learning Object Network Graph. After the learner selects the knowledge points to be learned, it is necessary to determine the population according to the mastery of all learners for the target knowledge points. Let $L = \{l_1, l_2, \cdots, l_n\}$ denote the set of knowledge levels of all learners who have completed the learning task (the population size is n). l_i represents the knowledge level of the i-th learner. Let $d(0 < d < 1)$ represent the degree of difference in knowledge level, then the population can be defined as

$$L_0 = L_1 + L_2, \tag{18}$$

$$L_1 = \{l_i || l_o - l_i| \le d\}, l_i \in L. \tag{19}$$

(2) Evaluation of Learning Path. The overall evaluation method of this chapter is that if the learner takes an evaluation after learning and his knowledge level improves, then the evaluation is adopted, otherwise, it is not adopted [16]. The reason for the decline in level is that the learning object may not be very effective, but the possibility of error and misleading is extremely low, so it can be ignored. After the learning of the learning object, the main reason for the decline in level is the learner's personal reasons. The global path evaluation is specifically expressed as suppose that user k completes the learning task, and A represents the learning path, then the evaluation update formula for each road section on path J is

$$\sigma_{ij}(t+1) = \begin{cases} \sigma_{ij}(t) * (1 - \rho) + \Delta\sigma_A^k \left(m_i \longrightarrow m_j\right) \in A, \\ \sigma_{ij}(t) * (1 - \rho) \left(m_i \longrightarrow m_j\right) \notin A. \end{cases} \tag{20}$$

Among them, $\Delta\sigma_A^k$ is the evaluation of user k on the learning path.

2.3. Animation Education Based on Big Data. As early as the 1940s and 1950s, China began to open an animation department and carried out the earliest exploration of animation. Although there are no specific works left, the talents cultivated played an essential role after the founding of New China [17]. From the 1950s to the 1980s, Chinese animation creation entered a prosperous stage. It has created many excellent animated film and television works with strong oriental colors and Chinese characteristics, such as Snow Child,

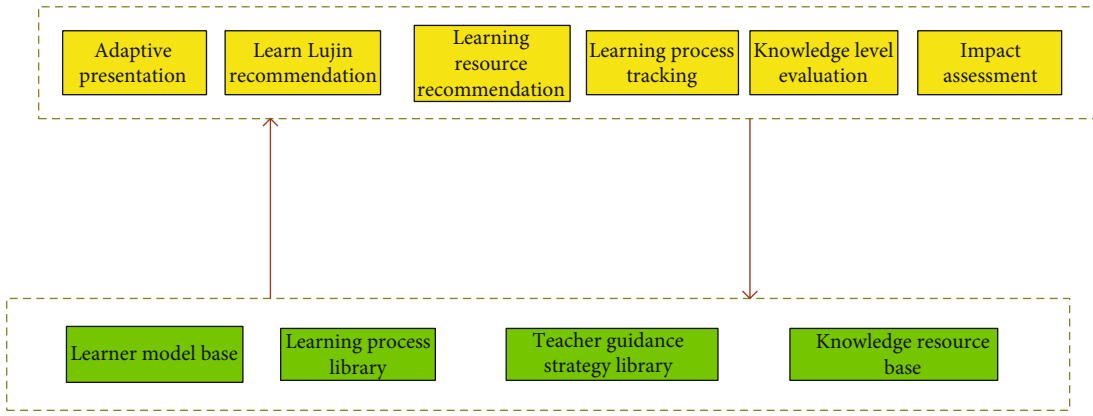

Figure 3: Basic structure of smart learning engine.

Magic Pen Ma Liang, Nezha Naohai, and Calabash Baby. As shown in Figure 4, it can be called a classic in the heart of a generation.

2.3.1. Conventional Animation Course Setting. In the animation production process, traditional animation courses are roughly divided into production preparation phase, midproduction phase, and postproduction phase. It mainly offers courses in ethics and law, college English, sketching, color, script writing, animation segmentation design, animation, motion law, and various software courses required for various animations. This includes two-dimensional animation production software courses and three-dimensional animation production software courses. And the curriculum setting is based on this production process [18]. The details are shown in Figure 5.

At present, the animation major is based on the basic process of the early stage of the animation production stage, the middle stage of the production stage, and the later stage of the production stage. This cannot meet the needs of all abilities that students need when creating short films, let alone the professional needs of a certain professional skill.

2.3.2. The Problem of Animation Education in Chinese Universities

(1) Lack of Animation Talent. According to statistics from the Animation Art Committee of the Chinese Artists Association, the national animation industry's demand for professional talent is about 150,000. However, at present, there are only 10,000 people in the domestic animation industry. The lack of talent can be said to be an important reason for the insufficient development of China's animation industry, which has caused deep anxiety to people. The lack of talent is not only a lack of numbers but also a lack of high-quality talent. That is to say, there are very few people who meet the high-quality requirements of domestic animation practitioners, and those who have the organic combination of art and technology [19].

(2) Backward Teaching Methods. As far as the teaching methods of animation in domestic colleges and universities are concerned, whether it is an art course or a technical course, it basically still stays in the traditional mode of teachers talking and students listening. Moreover, with the continuous expansion of enrollment and the shortage of teachers, a teacher often has to face dozens or even hundreds of students to give lectures. This kind of large-class and indoctrinating teaching can improve efficiency relatively, but it is difficult to create an atmosphere that stimulates imagination and inspiration. There is a lack of communication and collision between teachers and students and between students and students. This one-way indoctrination method not only affects the cultivation of students' creative thinking and unique personality but is also incompatible with the laws of art education. As far as the status quo of art majors in Chinese colleges and universities is concerned, it is almost impossible to achieve "one-on-one" or small class teaching [20]. However, if the course content permits, the interaction between teachers and students, students and students can be realized in groups by grouping.

(3) Insufficient Teachers. In animation-related education, there are very few animation teachers with professional titles. If teachers have rich practical experience but lack theoretical ability, it is difficult to cultivate high-quality animation talents. Some schools will blindly recruit students when there is no animation professional teacher at all. If they have students, they will hire relevant teachers outside to teach completely, keeping the quality of teaching aside. Teachers are the core of education. To train professional students, a high-level teacher team must be established. This is the key to a good school animation education [21].

2.3.3. Animation Education Suggestions Based on Big Data. The rapid development of new media technologies represented by mobile phones, the Internet, and digital television has provided new channels for the dissemination of animation. Therefore, colleges and universities should seize the opportunity to use new media as the engine of artistic innovation, develop new forms of animation art, and meet people's new needs. The innovation of science and technology is changing with each passing day. Theoretical research not only needs to respond in time to the latest industrial

Figure 4: Excellent Chinese animation works.

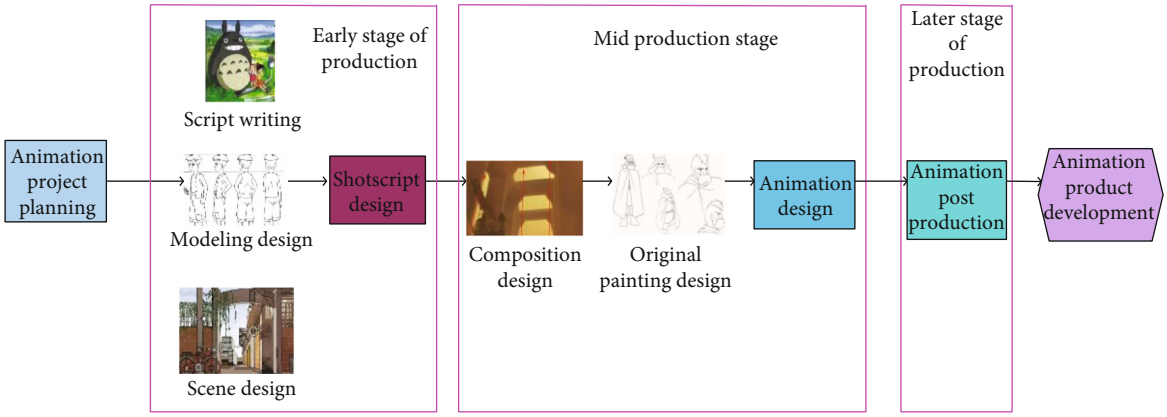

Figure 5: Traditional animation production process.

changes, technological innovations, artistic expressions, and media methods but also needs to be prepared for new things that may be about to emerge. For example, the merger of the three networks is in progress, if the design expectations can be realized, it will undoubtedly be another revolutionary leap for the new media. It will inevitably have a new impact on the current animation form, spawning new art forms, communication and aesthetic methods, and theoretical construction should be correctly guided for this [22].

With the advent of the digital age, the Chinese advertising market is bound to usher in a revolution in animation technology. Colleges and universities need to seize this opportunity to improve the current curriculum settings, accurately set up courses, and cultivate talents based on the pyramid distribution map of the demand for animation talent. Introduce real projects as much as possible, use real projects to create a working atmosphere for the enterprise, and realize the seamless connection between the school and the enterprise. Only in this way can we cultivate technical animation talents that are more suitable for the digital age. The talent structure diagram is shown in Figure 6.

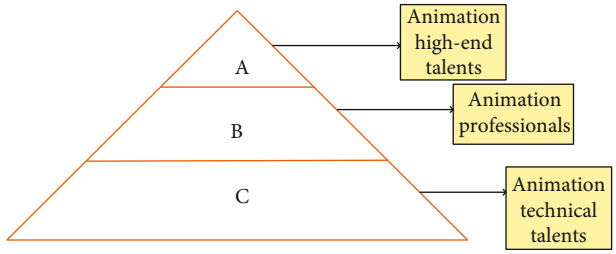

Figure 6: Animation talent demand distribution.

3. Animation Learning Platform Based on Big Data

3.1. Learning System Design

3.1.1. The Overall Framework of the System. This research integrates the five aspects of individual characteristics, interaction, technology, motivation and emotion, and learning content in all aspects of learning system development. The development of an adaptive learning system for online animation education is to realize a customized learning plan based on the learner's individual characteristic data. And it pushes personalized learning content and services, to achieve a multiplier learning effect. The overall framework of the system is shown in Figure 7.

The animation learning system records, stores, mines, and analyzes learners' online learning data, such as individual characteristic data, learning interaction data, and motivational emotion data, and generates personalized learning monitoring and evaluation reports. Finally, according to the characteristics of the learners, the matching learning content is pushed.

3.1.2. Function Design of Learning System

(1) Learner Section. The learner section is the most critical part of the learning system design. The quality of the learner

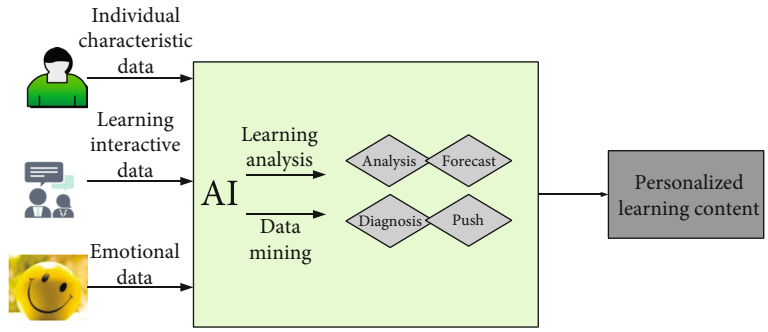

Figure 7: Platform framework.

module design will directly affect the learner's experience and satisfaction with the learning system. Therefore, to provide learners with a richer learning experience facing learner users, the learning system is mainly designed from three aspects: personal center, academic analysis, and personal settings. "Personal Center" mainly includes four aspects of my study, my wrong question book, my Q&A, and my exam; the analysis of academic situation is mainly based on big data, learning, analysis, and other technologies. Obtain, store, mine, and analyze the learning data of learners throughout the process, and provide learners with real-time learning, quality testing, and personalized guidance and services. The personal setting module mainly includes three contents: basic information setting, avatar setting, and password setting.

(2) Teacher Section. Teachers are supporters, guides, and facilitators of student learning. Aimed at teacher users, the research has carried out functional design from three aspects: curriculum management, examination management, and academic situation analysis. The course management module mainly includes six aspects: course list, chapter management, knowledge point management, learning object management, question management, question bank management, etc.; the examination management module is mainly composed of two parts: the "examination center" and the "marking center." It can help learners carry out targeted training on high-frequency knowledge points and weak knowledge points, enhance learning effects, and improve learning efficiency; learning situation analysis can help teachers grasp the learning process of learners, understand the learning situation of students' knowledge, and then improve teaching strategies.

3.1.3. Key Technologies of the Platform

(1) Technical Support for the Overall System Architecture. The system is mainly composed of five parts: database access layer, cache service layer, service layer, web layer, and session layer. The database access layer is mainly used to provide data persistence; the cache service layer is mainly responsible for providing a unified distributed cache service and improving the response speed of the entire system; the service layer is used to process the business logic of the system and is responsible for the transaction management of the entire system; the web layer is mainly composed of web resource files; the session layer stores the session information after the user logs in in a cookie store, so that each web server node in the web cluster can recognize the session normally.

(2) Learning Style Calculation. The learning system uses data mining technology to mine the learning data of learners in the online learning process. If the learning style of a learner A is $S(A)$, let N denote the number of behavior patterns in each group of learning styles, then

$$S(A) = \frac{\left(\sum_{i=1}^{n} P_{iA}\right)}{N}. \tag{21}$$

(3) Personalized Recommendation Based on Collaborative Filtering. This system uses collaborative filtering to make personalized recommendations to learners. This algorithm has been introduced in the method.

3.2. The Survey Design of the Experience of Using the Learning System

3.2.1. Survey Object. The subjects of this questionnaire are animation-related students from four universities in a provincial capital city. These students have all studied in the animation learning system designed in this article for more than one month, and the total number of students surveyed is 200. The questionnaire was sent to the students via QQ or WeChat, so that they could fill it out carefully.

3.2.2. Questionnaire Design. This survey mainly starts from the perspective of learners, through the questionnaire survey, we can understand the overall evaluation of the animation learners on the online education system, to provide a basis for subsequent revision and improvement of the system. The questionnaire is adapted from the Technology Acceptance Model (TAM), which is mainly used to study the survey respondents' the acceptance and use tendency of emerging technologies. It mainly includes four research dimensions: perceived ease of use (PEU), perceived usefulness (PU), user attitude (AT), and behavior intention (BI). Perceived ease of use refers to the degree of ease the user feels when operating a new technology; perceived usefulness is the degree to which the emerging technology used by the user helps improve daily life and academic performance;

user attitude is the subjective feeling that users have after using the new technology; behavioral willingness is the urgency of users to actually use new technology.

The questionnaire mainly contains two parts: one is a survey of basic information of students, which separately counts the gender and educational level of students; the other part is a survey of learners' use feelings adapted from the TAM model.

3.2.3. User Experience Problem Design. The problems in this part are designed based on the TAM model. The TAM model is divided into four dimensions. Then, there are 8 questions in this part of the questionnaire, with 2 questions in each dimension. The specific questions are designed as follows:

Perceived ease of use (PEU): (1) when using the system, you will not encounter situations where you do not know how to operate. (2) When using this system, I can easily enter the page, and I want to enter or get the learning resources I want.

Perceived usefulness (PU): (1) the learning content or resources recommended by the system are what I need. (2) The system can help me understand my own learning situation and help me to check for omissions.

User attitude (AT): (1) using this system for learning will make me feel satisfied and comfortable. (2) Overall, I like the design of the system.

Behavioral willingness (BI): (1) I am willing to continue to use this system for animation learning in the future. (2) I am willing to recommend this system to my friends. The options for these eight questions are all agreed, generally agreed, somewhat agreed, and disagree with these four options. We replace these four options with serial numbers 3, 2, 1, and 0, respectively.

3.3. Experimental Results and Analysis

3.3.1. Experimental Reliability Analysis. Import the data from the questionnaire of the mobile phone into the spss, and analyze the reliability of the questionnaire using the Kelbach coefficient, and the results are shown in Table 1. It is generally believed that when the Kelbach coefficient is greater than 0.9, the reliability of the questionnaire is very high; when the Kelbach coefficient is between 0.7 and 0.9, it indicates that the reliability is relatively ideal; when the Kelbach coefficient is between 0.6 and 0.7, it indicates that the reliability is acceptable; when the Kelbach coefficient is less than 0.6, it indicates that the reliability is very poor.

It can be seen from the table that the Kelbach coefficient of each dimension is greater than 0.8, and the comprehensive Kelbach coefficient of each dimension is 0.913. Therefore, the reliability of the questionnaire is relatively high and suitable for surveys.

3.3.2. Statistics on the Basic Situation of Students. As mentioned above, the first part of the questionnaire is the basic information survey of students. This part separately counts the gender and educational level of the students. The results are shown in Table 2.

Table 1: Questionnaire reliability.

Dimension	Number of topics	Kelbach coefficient
PEU	2	0.857
PU	2	0.891
AT	2	0.821
BI	2	0.836
Comprehensive evaluation	8	0.913

Table 2: Basic information of students.

Type	Option	Proportion
Gender	Male	47.31%
	Female	52.69%
Educational level	Specialty	18.73%
	Undergraduate	69.14%
	Graduate student	12.12%

According to Table 2, we can know the basic situation of students' gender and educational level. In the gender dimension, the proportion of men is 47.31% and the proportion of women is 52.69%. It can be seen that there are slightly more women than men in animation majors in these universities. In terms of academic level, undergraduates accounted for the largest proportion, accounting for 69.14%; graduate students, including masters and doctoral graduates, accounted for 12.12%.

3.3.3. Analysis of the Experience of Using the TAM-Based Learning Platform

(1) Perceived Ease of Use. First of all, this experiment counts the results of the questionnaire survey of two questions in the perceptual ease of use (PEU) dimension, and the results are shown in Figure 8.

It can be seen from Figure 8 that in terms of perceived ease of use, whether it is question 1 or question 2, the number of people who choose to agree very much is the largest. Those who chose this option accounted for 48.7% and 47.1% of the two questions, respectively. Regarding these two questions, the proportions of those who chose little agree were 12.1% and 13.7, respectively, and the proportions that chose not to agree were 3.7% and 2.3%, respectively. This proves that there are still some learners who are not satisfied with the perceived ease of use of the learning platform.

(2) Perceived Usefulness (PU). The statistics in this part are the results of a survey of learners' satisfaction with the perceived usefulness of the learning platform. The results are shown in Figure 9.

It can be seen from the figure that in terms of perceived usefulness, whether it is question 1 or question 2, the

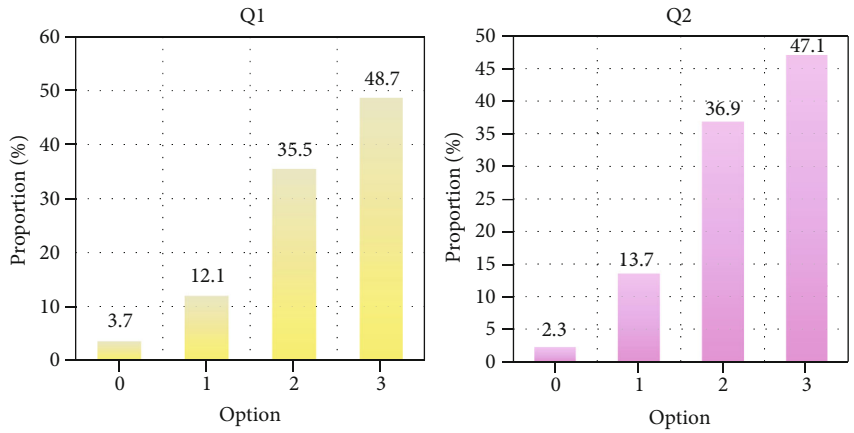

Figure 8: Perceived ease of use survey results.

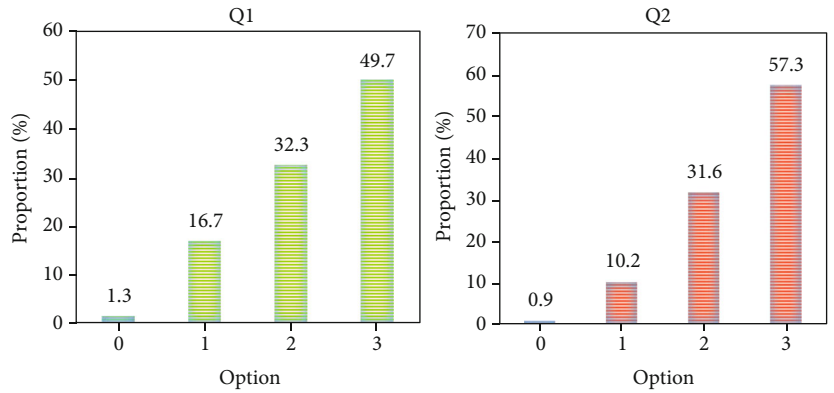

Figure 9: Perceived usefulness survey results.

number of people who choose to agree with each other is also the largest. Especially for question 2, the proportion of people who chose to agree very much was 57.3%. It is proved that the system can help most learners understand their own learning situation. Only 1.3% and 0.9% of the people who chose to disagree with these two questions proved that only a very small number of people believed that the system was not helpful for their own learning.

(3) User Attitude and Behavior Willingness. In this experiment, the survey results of the two dimensions of user attitudes and behavior intentions were analyzed together, and the results are shown in Figure 10.

It can be seen from Figure 10 that whether it is the dimension of user attitude or behavior willingness, the number of choices increases with the increase of option satisfaction. It proves that from an overall point of view, learners have relatively high user attitudes and behavioral willingness toward learn platforms. Among them, in the dimension of behavioral willingness, the people who strongly agree with the choice of question 1 are the most, accounting for 54.1%. It proves that many students are willing to continue to use this system for animation learning in the future, which is a very good phenomenon. Among the four questions in these two dimensions, question 2 on user attitudes has the largest number of people who choose to disagree, accounting for 2.7%. It shows that 2.7% of learners do not like the design of the system.

(4) Comprehensive Analysis of Usage Experience. In this experiment, the evaluation of the above four dimensions is comprehensively summarized, and the proportion of the number of people who choose each option for the two questions in each dimension is averaged, and Table 3 is obtained.

From Table 3, we can know the average number of people who choose each option in each dimension, and we can also know the average number of people who choose each option in the four dimensions. Among the four dimensions, the average proportion of people who choose to agree is 49.5%, and the proportion of people who choose to disagree is 1.81%. It can be seen that most learners are generally satisfied with the experience of using the system, and only a small number of people are dissatisfied. It proves that the animation learning platform designed in this article is quite helpful for learners.

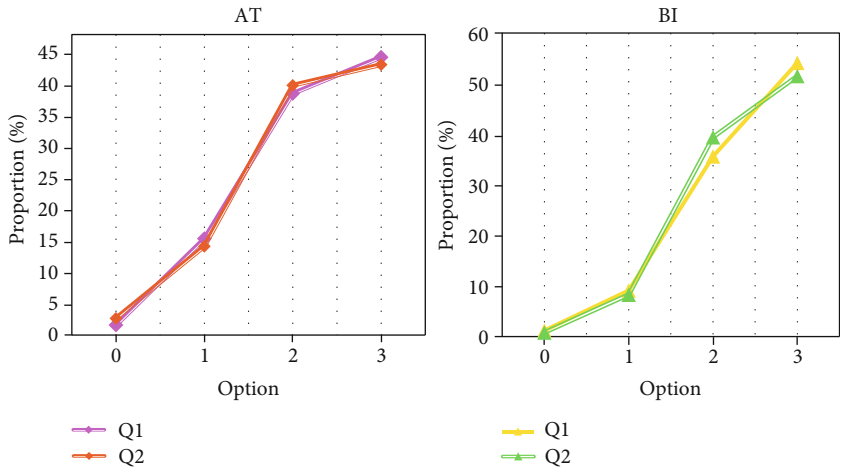

Figure 10: Survey results of user attitudes and behavior intentions.

Table 3: Comprehensive analysis table.

	Disagree	A little agree	General agreement	Quite agree
PEU	3%	12.9%	36.2%	47.9%
PU	1.1%	13.45%	31.95%	53.5%
AT	2.15%	14.8%	39.25%	43.8%
BI	1%	8.7%	37.5%	52.8%
Comprehensive	1.81%	12.46%	36.23%	49.5%

4. Discussion

With the innovation and development of information and communication technology, human society has begun to enter the era of big data. It is possible to identify and record more types of data on a larger scale. Through the analysis and processing of the sent data, it is possible to dig deeper into the inherent information and core values. The education field is regarded as an important application field of big data. The close integration of big data application and education field is the actual demand and future trend of my country's education development. Animation education is a product of the development of the animation industry to a certain extent. Animation education supports the development of the animation industry and provides talents for the animation industry. Combining big data technology with animation education technology is believed to help cultivate more outstanding talents in the field of animation education.

5. Conclusion

Big data is a product of the Internet era and is of great significance to many fields. And animation education is an important part of the development of the animation industry, and it transports talents to the animation industry. This article studies the animation education innovation based on big data. This article introduces the background, research significance, and related methods of big data and animation education. And the combined two expound the innovative method of animation education based on big data. Finally, an animation education platform was designed based on big data, and a questionnaire was made using the Technology Acceptance Model (TAM). It investigates the use of the learning platform of this article by learners of animation majors in four universities in a certain area. Finally, I found that among the four dimensions of TAM's options, the people who strongly agree with them are the most. This proves that most learners have a good use of the learning platform, and the learning platform is very helpful to most learners. The next job is to investigate learners' suggestions for improvement of the animation learning platform and further improve the functions and design of the platform and then promote the animation learning platform to more animation learners.

Data Availability

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] C. Jian, V. Popescu, N. Adamo-Villani, S. W. Cook, K. A. Duggan, and H. S. Friedman, "Animation stimuli system for research on instructor gestures in education," *IEEE Computer Graphics & Applications*, vol. 37, no. 4, pp. 72–83, 2017.

[2] M. Shreesha and S. K. Tyagi, "Effectiveness of animation as a tool for communication in primary education: an experimental study in India," *International Journal of Educational Management*, vol. 32, no. 7, pp. 1202–1214, 2018.

[3] T. Pinto, D. Castro, M. Bringuente, H. C. Sant'Anna, T. V. Souza, and C. C. Primo, "Educational animation about home care with premature newborn infants," *Revista Brasileira de Enfermagem*, vol. 71, Supplement 4, pp. 1604–1610, 2018.

[4] N. M. Suki and N. M. Suki, "Determining students' behavioural intention to use animation and storytelling applying

the UTAUT model: the moderating roles of gender and experience level," *The International Journal of Management Education*, vol. 15, no. 3, pp. 528–538, 2017.

[5] M. Farrokhnia, R. Meulenbroeks, and W. Joolingen, "Student-generated stop-motion animation in science classes: a systematic literature review," *Journal of Science Education and Technology*, vol. 29, no. 6, pp. 797–812, 2020.

[6] D. Earnest and J. M. Amador, "Lesson planimation: prospective elementary teachers' interactions with mathematics curricula," *Journal of Mathematics Teacher Education*, vol. 22, no. 1, pp. 37–68, 2019.

[7] H. Yim, "Promoting the comic arts education in the context of community engagement," *The Korean Journal of Animation*, vol. 13, no. 3, pp. 116–140, 2017.

[8] Kim Jeeyoun, Choi Yoomi, Yoomi et al., "A study on the educational effect of smoking prevention education animation for preschoolers by 1 week delayed recall," *The Korean Journal of animation*, vol. 13, no. 2, pp. 62–74, 2017.

[9] Y. H. Kim, H. Lee, M. J. Jung, and H. Jung, "The effects of flash animation facilitated oral self care education on the incidence of oral mucositis and performance of self-care in pediatric cancer patients undergoing chemotherapy," *Journal of the Korean Society of Maternal & Child Health*, vol. 21, no. 2, pp. 130–138, 2017.

[10] K. Upasana, V. Elizabeth, B. Sivakumar, and N. Prince, "Red cell indexes made easy using an interactive animation: do students and their scores concur?," *Advances in Physiology Education*, vol. 42, no. 1, pp. 50–55, 2018.

[11] Y. Mi, "Haptic VR contents of art education for children : focused on "Hephys" VR," *The Korean Journal of Animation*, vol. 13, no. 3, pp. 62–79, 2017.

[12] C. S. Ripoll, R. Oparka, A. Campbell, and C. Erolin, "The cell cycle: development of an eLearning animation," *Journal of Audiovisual Media in Medicine*, vol. 40, no. 1, pp. 13–20, 2017.

[13] L. Xu, C. Jiang, J. Wang, J. Yuan, and Y. Ren, "Information security in big data: privacy and data mining," *IEEE Access*, vol. 2, no. 2, pp. 1149–1176, 2017.

[14] S. Rajendran, O. I. Khalaf, Y. Alotaibi, and S. Alghamdi, "MapReduce-based big data classification model using feature subset selection and hyperparameter tuned deep belief network," *Scientific Reports*, vol. 11, article 24138, 2021.

[15] L. Kuang, F. Hao, L. T. Yang, M. Lin, C. Luo, and G. Min, "A tensor-based approach for big data representation and dimensionality reduction," *IEEE Transactions on Emerging Topics in Computing*, vol. 2, no. 3, pp. 280–291, 2014.

[16] Z. Yaoxue, "A survey on emerging computing paradigms for big data," *Chinese Journal of Electronics*, vol. 26, no. 1, pp. 1–12, 2017.

[17] A. Kusiak, "Smart manufacturing must embrace big data," *Nature*, vol. 544, no. 7648, pp. 23–25, 2017.

[18] R. Sahal, S. H. Alsamhi, K. N. Brown, D. O'Shea, and B. Alouffi, "Blockchain-based digital twins collaboration for smart pandemic alerting: decentralized COVID-19 pandemic alerting use case," *Computational Intelligence and Neuroscience*, vol. 2022, Article ID 7786441, 2022.

[19] O. I. Khalaf and G. M. Abdulsahib, "Optimized dynamic storage of data (ODSD) in IoT based on blockchain for wireless sensor networks," *Peer-to-Peer Networking and Applications*, vol. 14, no. 5, pp. 2858–2873, 2021.

[20] H. Xing, A. Qian, R. C. Qiu et al., "A big data architecture design for smart grids based on random matrix theory," *IEEE Transactions on Smart Grid*, vol. 8, no. 2, pp. 674–686, 2017.

[21] Y. Wang, L. A. Kung, and T. A. Byrd, "Big data analytics: understanding its capabilities and potential benefits for healthcare organizations," *Technological Forecasting & Social Change*, vol. 126, pp. 3–13, 2018.

[22] J. Liu, Q. Chen, and X. Tian, "3D virtual animation instant network communication system design," *Wireless Communications and Mobile Computing*, vol. 2021, Article ID 9999113, 2021.