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Article

Using Big Data Visualization Technology to Study the Connotation, Logical Mechanism and Path of the Integration of Red Culture into Civic-Political Construction in Colleges and Universities

Yunbin Ma *

School of Marxism, Shenyang Pharmaceutical University, Shenyang, Liaoning 110016, China;
bisheng2025@126.com

Abstract: Big data visualization technology provides a new research perspective and practice path for the integration of red culture into the construction of college ideology. In this paper, the existing red cultural resources are firstly digitally collected and processed, combined with computer and AI technology to realize the repair and reproduction of damaged resources, and then equipped with a digital resource library to complete resource integration and sharing. Then the virtual reality teaching scene modeling of red culture into the construction of college ideology, realize the visualization teaching of red cultural resources, and carry out the teaching design of related knowledge points and start the teaching practice. The average grades of the experimental class and the control class before teaching were 72.80 and 72.91 respectively, with a small gap, and the grades of the experimental class after teaching were 8.8 points higher than those of the control class. The students' recognition of this paper's teaching method in terms of nurturing function, value objective, theoretical interpretation and teaching innovation is between 4.40 and 4.80, with a high degree of overall recognition. Through the fuzzy hierarchical analysis method, the communication effect of red culture in the Civics classroom under the virtual reality visualization technology was obtained as 84.77 points, with better evaluation results. The results of the study, fully proved the effectiveness of the red culture based on visualization technology into the path of Civics construction in colleges and universities.

Keywords: visualization technology; virtual reality; scene modeling; fuzzy hierarchy analysis; civic politics construction

1. Introduction

Red culture is the fine spiritual heritage formed by the Chinese people of all ethnic groups through various wars, including memorial halls, conference sites, and other such places. Red culture is a precious historical and cultural resource that holds significant educational value for people, accelerates the rapid development of socialist spiritual civilization, and serves as a powerful spiritual pillar supporting the Chinese people [1-4]. As an important course in higher education, ideological and political education plays an increasingly prominent role in the cultivation of university students. Strengthening ideological and political education in universities is of great significance for cultivating well-rounded socialist builders and successors who are morally, intellectually, physically, aesthetically, and labor-wise developed [5-7]. Sound ideological and political concepts form the foundation for all work. College students are the important successors of the socialist modernization cause and the future of the nation. Therefore, it is particularly important for universities to conduct ideological and political education for college students, especially when combined with local red cultural education [8-11].

At the same time, in the process of conducting red culture education, universities should pay attention to the high degree of unity between patriotism and the socialist modernization process, the relationship

between patriotism and collectivism, and the close integration of patriotism and professional education [12-15]. Incorporating local red culture into ideological and political education not only promotes the active inheritance of local red culture but also facilitates the emergence of new trends in university ideological and political work, thereby continuously enhancing students' comprehensive qualities [16-18].

Combined with the own characteristics of red cultural resources, the study divides the digital transformation of red cultural resources into three stages: digital collection and processing, virtual restoration and reproduction, and resource integration and sharing. Using virtual reality visualization technology, the digital red cultural resources are integrated into the teaching of Civics construction in colleges and universities, and in this way, the Civics virtual reality teaching practice program is designed. Clear learning objectives are established by knowing the course content and VR learning materials in advance. At different stages of the course, teachers issued different classroom instructions based on virtual reality technology to deepen students' impression of red culture. After the teaching, the connotation, logical mechanism, and integration path of integrating red culture into the construction of Civics are explored from three aspects: teaching effect, recognition, and cultural dissemination effect.

2. Digitally Enabled "Digital Construction" of Red Cultural Resources

The digital construction of red cultural resources is a process of continuous coding and abstraction, a visual display of all from environment, resources to activities with the help of digital technology, and a knowledge transformation process that protects, develops and makes secondary use of the real red cultural resources in digital form.

2.1. Digital Acquisition and Processing

The existing quantity, spatial distribution, morphological characteristics, degree of integrity and other content information of red cultural resources are comprehensively collected and extracted to provide support for the scientific construction of the resource database.

(1) For red literature, red writings and other information-form cultural resources, through digital photography, OCR text recognition, three-dimensional scanning and other technologies, text recognition and picture shooting are carried out, and the scanned data information is preserved in real time.

(2) For red buildings, revolutionary sites and other material cultural resources, through GPS, 3D laser image scanning, aerial photography and other technologies, supplemented by photography, hand-drawing, data query and other methods, to collect their spatial 3D information, color and texture information, and build up a digital model of the overall real-life 3D architectural space.

(3) For the living cultural resources such as red music, dance, drama, etc., which are constantly innovated and inherited, through 2D and 3D digital animation, holographic shooting, knowledge modeling and other technologies, they are recorded in an all-round, three-dimensional and high-definition way and preserved on digital disks, CD-ROMs and other material media.

(4) For the red spirit, red characters and other spiritual cultural resources, adopt the dual approach of oral narratives of the inheritors combined with historical archival materials to collect and record textual information, and supplement it with recordings and explanations.

2.2. Virtual Restoration and Reproduction

The existence of digital restoration technology can help partially destroyed or completely annihilated red cultural resources to realize restoration and reproduction.

(1) For the red literature, red research and other documentary information resources, the existing computer technology and AI, PS and other restoration technologies are integrated to build virtual data information, which can be used to complete the extraction and restoration of existing pictures, thus realizing visual recovery.

(2) For the old red sites, red buildings and other physical cultural resources, use laser 3D scanning, CT scanning technology to collect image data information, and build a physical 3D or model database with the help of VR virtual reality technology, virtual space technology, artificial intelligence technology.

(3) For red music, dance and other living cultural resources, through field research, interviews with inheritors, etc., integrate 5G+AR, holographic projection, virtual simulation and other technological means to launch musicals, dance dramas, situational dramas and so on.

(4) For spiritual cultural resources such as the red spirit and red characters, adopt VR, AR, holographic projection and other technologies, identity lending, space-time transplantation, perspective guidance and other means to digitally restore relevant texts, images, audio and video, and present the red spirit in the form of virtual characters, live performances, stage plays, film and television works,

publications and other forms.

2.3. Resource integration and sharing

In the era of networking, the digital construction of red cultural resources is no longer purely the protection of resources, but lies more in the co-construction and sharing of data resources.

(1) Build a digital resource base of local red culture. Based on the unified metadata standard and audio/video format, the text, image, audio, video and other resource information collected in the early stage will be extracted, labeled, entered, integrated, organized and classified, and stored in the network database to ensure that future users can obtain comprehensive, systematic and accurate digital resources.

(2) Build a national unified red cultural resources platform. On the basis of analysis and screening, processing and categorization, and logical integration, based on data association technology. The red cultural resources dispersed in different resource databases are organically related by time, location, characters and attractions, and supplemented with semantic analysis and data mining technologies to build a national unified red cultural resource platform.

3. Modeling of Visual Teaching Scenarios of Red Culture

3.1. Three-Dimensional Modeling

This study involves the integration of red culture in the teaching model of the Civic and Political construction covering the perspective characters, multimedia blackboard, display table, venue room structure, all of which can be drawn as a 3D model using 3ds Max. After that, it is exported to FBX format, and then this file is imported into Unity3D for function integration, during which it is necessary to write logic scripts and attribute settings in Unity3D, write scripts for development, and finally export the functionally complete model as an apk format file.

3.1.1. Modeling Scenarios and Learning Tools

The 3D learning scene is the core of this system modeling. It mainly includes the venue room, multimedia blackboard, display table and so on. First use 3ds Max software for all objects object three-dimensional modeling, the process can be used to edit some of the existing model examples, such as rectangular, sphere, etc., and then need to render the surface of the model processing or mapping. One of the multimedia blackboard needs to reduce its surface reflection effect, reflection is too strong screen display will be white, the subsequent video rendering texture will be added to further enhance its visual effect.

In the learning process, the Visualizer is mainly to provide users with the 3D process of algorithmic program derivation demonstration, the multimedia blackboard for auxiliary animation video explanation, and the core is the formal development steps of the algorithmic program of the PAR method. Model building and optimization process needs to be corrected on the axis of the model (i.e., are rotated around the Y-axis), more conducive to the unified combination of all models, each large model in the construction process there is also a parent-child model of the relationship between the father and the child model, which is the need to fix the parent-child relationship.

3.1.2. Perspective Character Modeling

Characters are created to give users a more realistic experience, to be able to carry out free perspective activities in the 3D Civics learning scene, to observe the derivation of the algorithm from a close distance, and to act as a third-person perspective in the system. In this paper, the character model is customized through Ready Player Me automatic modeling platform, which supports automatic modeling by taking pictures and manual modeling and exporting models, which is also more convenient and efficient.

After the character modeling, the character control is also needed. Character control covers character movement, rotation, jumping, accelerated running and camera control, which is realized by Player controller. In the Unity Resource Center, you can use the official Player Controller, which is convenient and quick to use. There are two core scripts in the Player Controller, PlayerController: controls the character and detects collisions, and Input System: calls back functions and gets the keyboard and mouse input. These two parts can be combined to achieve the effect of controlling the character.

3.2. Optimization and Integration of Teaching Scenarios

3.2.1. Model Rendering

The rendering process is a treatment of the materials and colors of the model itself, as well as the

reflective effects of lighting on the model. Take the multimedia blackboard as an example, the rendering process has the following points:

(1) Material Edit: In the Unity 3D project window, choose to create a material sphere, because the surface of the blackboard is diffusely reflective to the light, so you need to do the following: set the reflectivity to the lowest, the metal attribute to 0, and the smoothness to 0.5, in order to achieve a frosted effect.

(2) Renderer Texture: First, under the project window, select Create Renderer Texture, the dimension is set to 2D (planar), the size of the resolution is calculated according to the size of the video animation, and other defaults. After that, you need to paste the texture to the 3D blackboard object, in the Mesh Renderer in the Materials select "video playback renderer texture" material can be completed to put the video animation into the 3D environment.

3.2.2. Lighting Arrangements

Since the scenario is primarily instructional with the presence of a display table, this paper will use spotlighting and parallel lighting for the setup.

Parallel light: commonly used light in development, similar to the sunlight in the real world. But the direction of the light source is fixed, will not be affected by the movement of the object, the shadow of all objects objects are in one direction.

Spotlight: similar to flashlight and stage light in life, emits a beam of light from a single point in a certain direction. Adjust the direction, distance, range, etc. by setting parameters.

3.2.3. Scene Integration

Unity3D has a specific folder Prefabs for storing models, copy all the required models into this folder. Place the 3D house model in the virtual coordinate space, use the model to be parallel to the virtual space, and then place other models, such as multimedia blackboards, displays, and characters, into the house. The scale attribute of the models in the space is set so that they can be scaled to a similar size as the real world objects, so that the sense of consistency, and the relative spatial coordinates between the models are adjusted to establish the prototype of the whole scene.

The model is fixed in the center of the Visualizer, the character is fixed in front of the Visualizer, and the multimedia blackboard is located in the object of the character. When the algorithm is deduced, the Visualizer demonstrates the process of 3D code derivation, the multimedia blackboard is used for auxiliary explanations, and intelligent voice interaction provides auxiliary questions and answers.

4. Path Construction of the Integration of Red Culture into the Construction of Ideology and Politics in Colleges and Universities

After reading a lot of literature on the application of multimedia learning principles, combining the cognitive theory of multimedia learning and the cognitive load theory, based on the teaching goal of integrating the red culture of Civic and political construction, the author conducts the teaching design for the three phases of the VR environment before the course, during the course, and after the end of the course.

4.1. Teaching Objectives

This experiment will be centered on the teaching of the Long March of the Red Army in the construction of Civics and Politics, and the teaching objectives will be designed from three aspects: knowledge mastery, knowledge transfer and emotion cultivation:

(1) Knowledge mastery: mainly study the revolutionary situation at home and abroad during the Red Army's Long March, as well as the causes and consequences of the flight over the Luding Bridge, which mainly contains knowledge of history, geography and politics.

(2) Knowledge transfer: to understand the revolutionary behavior of the Red Army to seize the time and attack the heavenly dangers has what practical significance for us.

(3) Learning the Red Army soldiers in the Long March showed extraordinary revolutionary spirit and courageous fighting spirit.

4.2. Teaching Content

The main teaching content of this Civics and Political Science course is: the causes and consequences of the Flying over Luding Bridge incident, and the Red Army's specific process of "snatching time and capturing the heavenly dangers" in this process. The whole course is divided into two parts, the first part

is carried out in the traditional classroom, mainly according to the sequence of events to learn, emphasizing and the enemy to seize the time, the Luding Bridge, closely linked to the word “fly”, “seize”, focusing on learning the difficulties of seizing the bridge and how to seize the bridge in two parts of the content.

After completing the traditional teaching, learners will have another VR practice class to “experience” the battle scene in the virtual environment. During the experience, the teacher will ask questions about the current stage of learning. After the teaching is completed, the teacher will guide the students to summarize in the form of questions.

4.3. Teaching Methods

In the virtual teaching scene of VR technology designed above, through technical means without the limitation of time and space, “personal” experience of historical scenes. Make students immersed, easy to grasp the content of learning, and experience the different connotations of red culture into the ideological education.

As a useful supplement to traditional classroom teaching, VR teaching mainly relies on the “Civic and political VR practice training room”. After the theoretical teaching of the Civic and Political Science course in the traditional classroom, the teacher will organize the students to carry out the VR practical teaching, which aims to strengthen the classroom knowledge and stimulate the emotions. Therefore, the study designed a combination of interactive and immersive teaching based on VR practice.

Interactive VR teaching: The classic battle of Flying over Luding Bridge in the Red Army's Long March is truly reproduced, and learners use HTC VIVE VR helmets and joystick controllers to play the role of Red Army warriors, fight with the enemy in the midst of gunfire, advance along the firewalls densely covered with iron cables, and lay the bridge boards to ensure that their comrades in the rear pass through smoothly.

Immersive VR Teaching: Teachers use PICO all-in-one machine to play VR resources, students get a roaming experience of the historical scene through VR helmets, operate the buttons on the helmets to interact with the things in the virtual scene, and strengthen their learning by cognitively processing the information conveyed by the words and sounds in the virtual scene.

5. Study Design and Analysis of Results

5.1. Study Design

5.1.1. Objects of Study

The objects selected for this study are students in two classes, Class 1 and Class 2, in a major in the freshman year of L University in Y City. Class 1 is the experimental class, which adopts the teaching design of Civics construction based on virtual reality technology, and Class 2 is the control class, which adopts the traditional teaching design of Civics construction. The experiment began in September 2024 and ended in December 2024, and before the experiment began, the experimental and control classes were tested on the basis of Civic and Political construction incorporating red culture.

5.1.2. Research Variables

(1) Independent variables

X1=Teaching using the teaching design of Civic and political construction incorporating red culture based on virtual reality technology (i.e., teaching in the experimental class).

X2=Teaching using traditional teaching design (i.e., traditional teaching in the control class).

(2) Dependent Variables

Y1=The effect of teaching

(3) Control of irrelevant variables

In order to ensure that the irrelevant variables can be well controlled, this study takes the natural arrangement of the school curriculum as the premise, and a variety of factors, such as the equipment already available in the school and the teaching time of the teachers, have a certain impact on the teaching effect, and in this study, the following aspects were mainly controlled:

1) Subject aspect: two classes of the same grade and same level were selected for the study, and the two classes' performance in learning ancient poems was equal to each other, thus ensuring that there was no significant difference in terms of the individual abilities of the students in the two classes before the experiment.

2) Teacher aspect: the same teacher was selected to teach the two classes, using the same textbook to explain the same content, thus ensuring that there was no difference in the teacher's teaching level.

5.2. Discussion on the Connotation and Logical Mechanism of the Construction of Red Culture and IDEOLOGY

5.2.1. Evaluation of the Teaching Effect of Red Culture Civic and Political Construction

This section analyzes the pre-test and post-test scores of the knowledge points related to the Civic and Political Red Culture of the Red Army's Long March for the teaching content above. The difficulty of the pre-test questions and post-test questions is the same, and the questions are designed with multiple-choice and multiple-option questions as the main parts. There are 30 multiple-choice questions with a total score of 60 points, which are mainly for the examination of teaching knowledge points and belong to memory test questions, focusing on the examination of students' memory of knowledge points. Multiple choice questions are set 10, total score 40 points, this part is mainly on the analysis and application of related knowledge, focusing on the application of knowledge to test students. Through spss24.0 using independent samples t-test to the two classes of students' performance and in the students in the memory of knowledge, the application of knowledge in the performance of the difference analysis, to further explore the effect of the difference between the college civics class virtual reality teaching and conventional teaching.

(1) Differential analysis of the pre-test scores of students in the experimental class and the control class

The purpose of the pre-test is to ensure that the basic knowledge of the two groups of students is maintained at the same level and thus comparative, and to analyze the difference in the scores of the two groups of students after the experiment through the difference in scores of the post-test minus the pre-test, and also in order to further examine the effectiveness of the experimental teaching after. Figure 1 shows the Q-Q plot of normal expectation of the performance of the experimental class and the control class. The pre-test scores of the experimental and control classes are shown in Figure 2. From the Q-Q plot, the normal expectation of the scores of the two classes is distributed between the upper and lower percentile and basically coincides with the reference line. It indicates that the scores of both the experimental class and the control class conform to the normal distribution, and there are students with higher and lower scores in both classes. In addition, the average scores of the control class and the experimental class are 72.80 and 72.91, respectively, the difference is small, and p=0.893, there is no significant difference between the pre-test scores of the two classes, which can be used for the teaching of the red culture and political construction based on the VR scene.

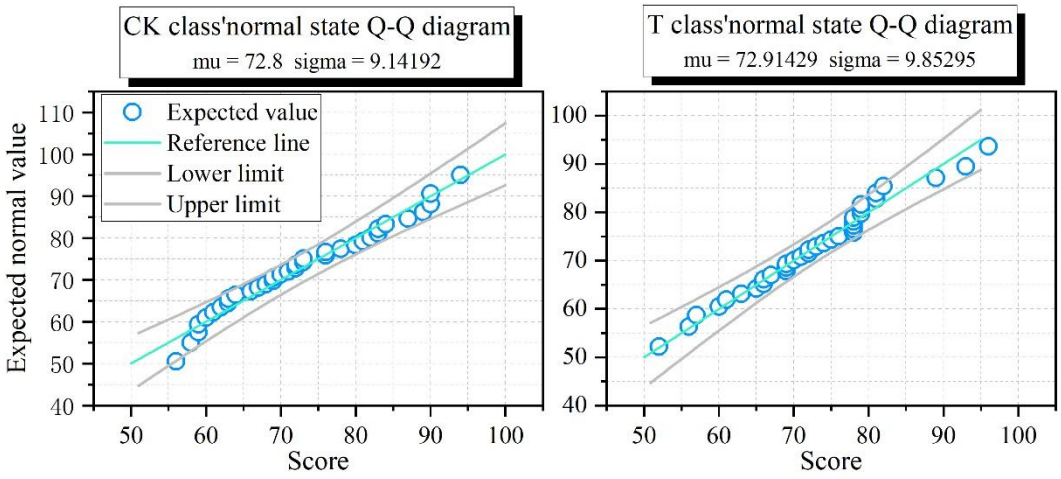

Figure 1. Two class pre-test score in the normal expectation of the Q-Q diagram.

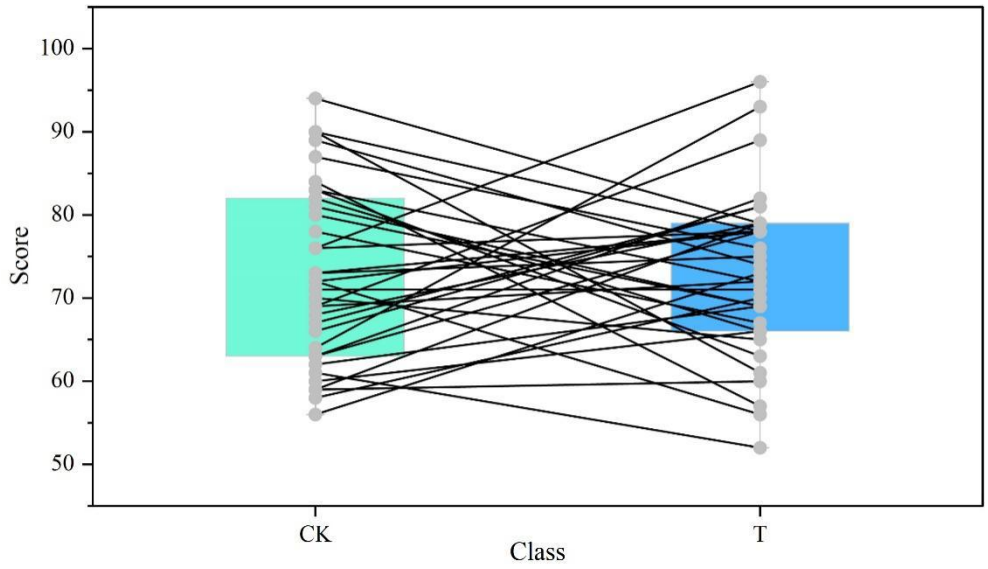

Figure 2. Pre-test score results of the distribution of the two classes.

(2) Differential analysis of the posttest scores of students in the experimental and control classes

The posttest scores of the experimental and control classes were statistically analyzed, and Figures 3 and 4 show the Q-Q chart of normal expectation and the achievement distribution of the posttest scores of the experimental and control classes, respectively. The method is to subtract the pretest scores from the posttest scores of each student, to find the mean of the value-added scores of the two groups respectively, and to conduct independent samples t-test on the value-added scores of the two groups. Combining the two plots, it was found that the posttest scores of the two classes also conformed to a normal distribution, and the experimental class improved by 11.12 points compared to the pretest, while the control class only improved by 2.43 points, p=0.013 indicating that there was a significant difference between the experimental class's scores and the control class's posttest scores.

In summary, the results of the experiment show that the teaching of red culture Civics construction by integrating visualization technology can improve students' academic performance, and compared with the conventional teaching methods, the virtual reality teaching of Civics is more significant in improving students' course performance.

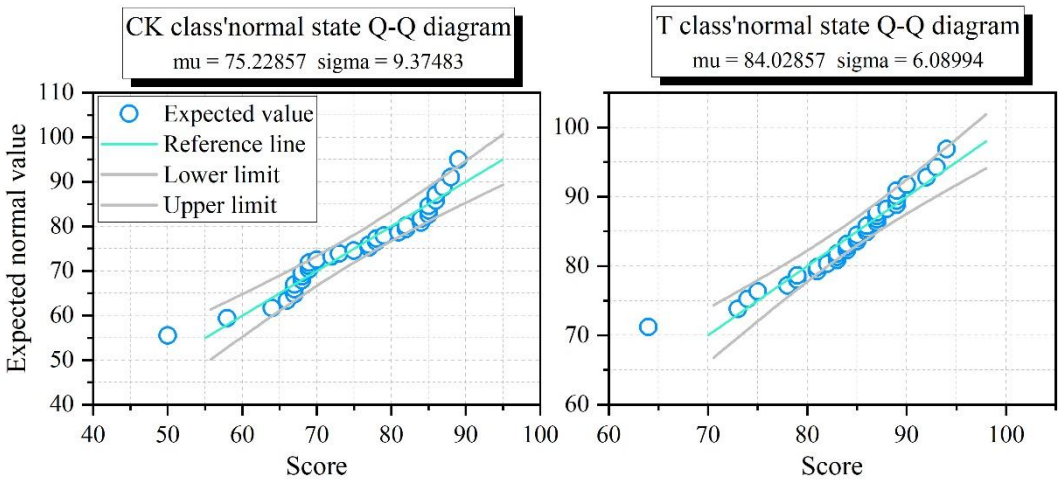

Figure 3. Two class p-test score in the normal expectation of the Q-Q diagram.

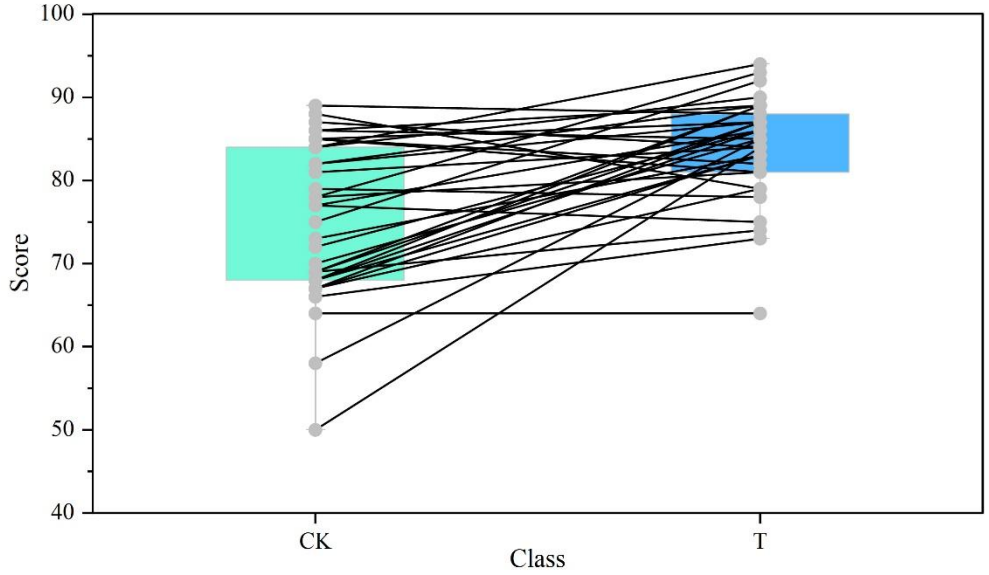

Figure 4. Post-test score results of the distribution of the two classes.

5.2.2. Virtual Reality Instructional Classroom Acceptance Survey

This section investigates the recognition degree of students in the experimental group to the teaching of red culture ideological construction based on virtual reality visualization technology, and evaluates the four aspects of nurturing function, value goal, theoretical interpretation and teaching innovation. The results of the recognition survey are used to further analyze the logical mechanism of integrating red culture into the construction of ideology and politics in colleges and universities based on visualization technology. The survey used a 5-point Richter scale, with ratings of 1 to 5 representing students' increasing recognition from very disapproving to very approving. The survey is only for the experimental class students, 35 questionnaires were retrieved, the results of the questionnaires were summarized and counted, and the statistical results of the survey on the degree of recognition of the teaching of red culture in the construction of ideology and politics under the visualization technology were obtained as shown in Figure 5.

From the figure, it can be seen that the average ratings of students on the four aspects of nurturing function, value goal, theoretical interpretation and teaching innovation are 4.63, 4.73, 4.46, 4.80, respectively, showing a high degree of recognition. Through the evaluation of students' recognition, the study concludes that there is the following relationship between the logical mechanism of red culture and the construction of college civics:

(1) The red culture is compatible with the educating function of the teaching of college civic politics courses.

The red culture can play a role in promoting the value of the ideology and political science courses in colleges and universities, which can effectively integrate the conceptual education and moral cultivation and help students establish correct values. Red culture can help students correctly recognize themselves, form innovative thinking, develop higher moral cultivation, promote physical and mental development, and form a sound personality. Red culture can provide students with good political resources, historical and cultural resources and art resources, help students form noble moral character and good comprehensive quality in continuous learning, so that they can become more capable talents.

(2) The red culture is compatible with the value goal of teaching Civic and Political Education in colleges and universities

Red culture, as a valuable resource for the Civic and Political Education in colleges and universities, not only enriches the teaching content, but also injects vitality into the innovation of education methods. In the current diversified and complex social environment, red culture, with its distinctive contemporary characteristics, has become an indispensable cornerstone of the Civic and Political Education, and is closely connected with the values of red culture. Colleges and universities have the responsibility to guide students to establish correct values, let them deeply feel the pulse of the times, fully understand the historical achievements of the Party and the people, and then cultivate the love and cherish of life, and contribute to the construction of a harmonious society.

(3) The red culture is compatible with the theoretical interpretation of the teaching of Civic and

Political Science in colleges and universities.

The dissemination of red culture and the teaching of Civics are both carried out on the basis of Marxist theory, and both use the same theoretical resources, so the direction of theoretical elaboration is basically the same. It provides rich materials and diversified perspectives for Civics teaching. And the core goal of integrating red culture into Civics teaching is to guide students to establish firm Marxist beliefs, consolidate loyalty to the ideals of socialism and communism, and lay a solid ideological foundation for the cultivation of new-age youth with firm ideals and beliefs.

(4) Virtual Reality Visualization Technology Provides Innovative Teaching Methods for Red Culture Civics Construction

Big data technology can effectively preserve and restore the digital resources of red culture, and then use virtual reality technology to further realize the visualization of the digital resources of red culture, providing students with immersive interactive masters. Moreover, with the development of deep learning and other technologies, the use of intelligent algorithms can accurately analyze the cognitive preferences of students and provide students with personalized red culture learning resources.

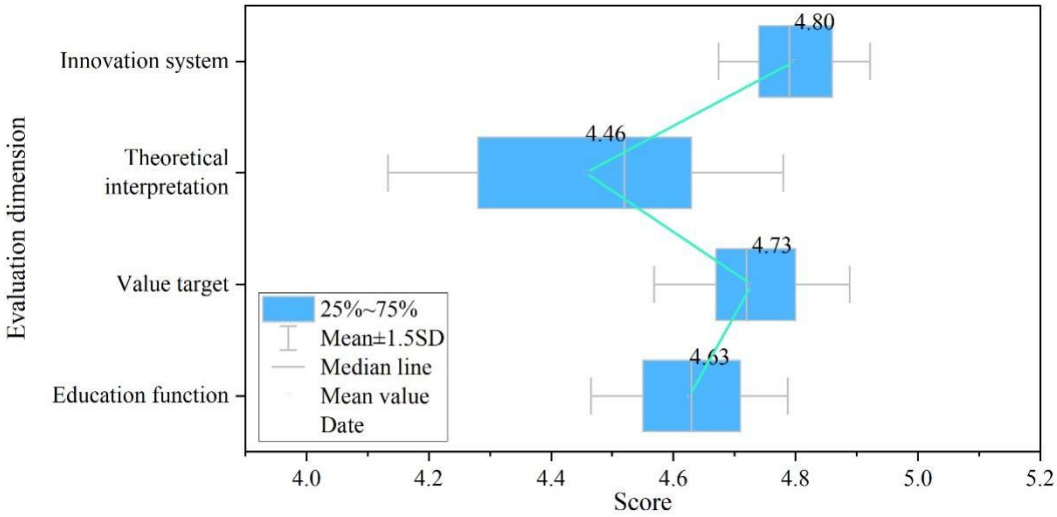

Figure 5. The degree of acceptance of the education of red culture.

5.2.3. Evaluation of the Effectiveness of Red Culture Communication under Visualization Technology

The design of the assessment system of cultural communication effect by previous scholars also provides a reference for the specific design of assessment indicators. The author deeply analyzed the connotation and logical mechanism of red culture in the construction of ideology and politics in colleges and universities, and constructed an assessment system for the effect of red culture dissemination, evaluating the cognitive effect, attitudinal effect and behavioral effect from the three first-level indicators. The results of normal distribution test on cognitive effect, attitude effect and behavioral effect are shown in Table 1. From the table, it can be seen that the skewness and kurtosis of each dimension are in line with the normal distribution, which meets the requirements of the subsequent reliability and validity test and model fitting. Using SPSS 26.0 software Cronbach′s α reliability coefficient for reliability analysis, it was found that the overall Cronbach′s α coefficient for each variable was 0.951, indicating that the questionnaire had good internal consistency.

Table 1. Descriptive statistics of each dimension.

	Min	Max	Mean	SD	Variance	Skewness	Kurtosis
Cognitive effect	1.787	4.743	3.786	0.675	0.433	-0.681	0.198
Attitude effect	1.855	4.850	3.805	0.834	0.645	-0.625	-0.156
Behavior effect	1.460	4.650	3.657	0.851	0.689	-0.473	-0.483
Cultural cognition	1.070	4.700	3.611	0.987	0.786	-0.470	-0.376

Experience cognition	1.100	4.900	3.817	0.773	0.708	-0.604	0.094
Affective bias	2.160	4.500	4.126	0.638	0.471	-0.654	-0.084
Intent	1.100	4.950	3.717	0.952	0.778	-0.582	-0.193
Instantaneous behavior	1.620	4.550	4.016	0.888	0.710	-0.866	-0.091
Follow-up behavior	1.560	4.550	3.838	0.837	0.815	-0.633	-0.331

The structural validity of the model was examined and showed good performance, with a chi-square degrees of freedom ratio CMIN/DF of 1.018, a root mean square of error of approximation RMSEA of 0.018, and excellent levels of IFI, TLI, and CFI of 0.9 or more. It indicates that the assessment model has good fitness. In conclusion, the reliability and validity of the assessment and measurement model are good, which verifies the scientificity of the framework system for assessing the communication effect of red culture constructed in this paper.

According to the validated assessment system, an expert consultation questionnaire on indicator weights is prepared. Twenty experts were invited to score the importance of the three primary indicators and six secondary indicators of the assessment system at the same level and affiliation of the two-two indicators according to the fuzzy complementary judgment matrix. Finally, the weights of the indicators in the red culture communication effect system of this paper are determined as shown in Table 2. The results showed that the weights of cognitive, attitudinal, and behavioral effects were 0.374, 0.325, and 0.301, respectively. The weights of the secondary dimensions under it: cultural and experiential perceptions, affective biases and intentional tendencies, transient and subsequent behaviors were 0.443 and 0.557, 0.582 and 0.418, 0.463 and 0.537, respectively. The weights of the tertiary indicators under the secondary dimension are distributed between 0.190 and 0.400.

Table 2. The weight of each index in the red culture propagation effect system.

Primary dimension	Weight	Secondary dimension	Weight	Tertiary dimension	Weight
Cognitive effect	0.374	Cultural cognition	0.443	Social life cognition	0.387
				Red culture cognition	0.352
				Cognitive development	0.261
		Experience cognition	0.557	Participate in experience	0.326
				Impressive	0.322
				Learning atmosphere	0.352
Attitude effect	0.325	Affective bias	0.582	Material preference	0.341
				Staff preference	0.252
				Organizational preference	0.407
		Intent	0.418	Expectation	0.326
				Participation will	0.345
				Interest promotion	0.329
Behavior effect	0.301	Instantaneous behavior	0.463	Interactive participation	0.388
				Degree of investment	0.349
				Data retention	0.263
		Follow-up behavior	0.537	Consolidation exploration	0.235
				Depth experience	0.338

				Sharing promotion	0.237
				Impact diffusion	0.190

In this study, the evaluation system constructed above was adopted, and the fuzzy analytic hierarchy process [19-20] was used to comprehensively evaluate the effect of red culture propagation. The evaluation of this empirical study is graded on a 5-scale scale, i.e., {Very Good, Better, Fair, Poor, Very Poor}. The evaluation of the rank membership degree of a single factor is composed into the corresponding comment set, and the fuzzy membership matrix composed of the evaluation set of the above factors is obtained, and then the fuzzy membership matrix composed of the evaluation set of all factors is obtained. In summary, SPSS26.0 was used to analyze the data, and the cultural communication evaluation matrix of integrating red culture into the ideological and political construction of colleges and universities was constructed, as shown in Table 3. In this study, this operator was used for fuzzy comprehensive evaluation, and the membership degrees of cultural cognition and experiential cognition, affective bias and intention tendency, transient behavior and subsequent behavior were obtained from {0.234, 0.497, 0.143, 0.092, 0.034} and {0.383, 0.390, 0.208, 0.035, 0.020}, {0.473, 0.345, 0.139, 0.029, 0.014} and {0.513, 0.319, 0.131, 0.017, 0.020}, {0.567, 0.448, 0.175, 0.023, 0.021}, and {0.214, 0.335, 0.169, 0.034, 0.015}. According to the principle of maximum affiliation, the evaluation results of the second-level dimensions of the red culture communication audience are as follows: "cultural cognition" is better, "experience cognition" is better, "emotional bias" is very good, "intention tendency" is very good, "instantaneous behavior" is very good, and "follow-up behavior" is better. In the same way, the membership degrees of cognitive effect, attitude effect and behavior effect were {0.317, 0.438, 0.179, 0.060, 0.026}, {0.490, 0.334, 0.136, 0.024, 0.016}, {0.377, 0.387, 0.172, 0.029, 0.017}, respectively, and the evaluation results were good, very good, and good. The membership degree to obtain the final propagation effect is {0.391, 0.389, 0.163, 0.039, 0.020}.

In order to visualize the dissemination effect, the study assigns an effectiveness value to each level. First, according to the evaluation results of five levels, respectively assigned 100 points, 80 points, 70 points, 60 points and 40 points. Secondly, the corresponding score interval of the final result is determined, and the evaluation results of the communication effect of red culture are five grades, and the corresponding score intervals are 90-100 points, 80-89 points, 70-79 points, 60-69 points, and 60 points or less. Therefore, the evaluation result of the communication effect of red culture is calculated as 0.391*100+0.389*80+0.163*70+0.039*60+0.020*40=84.77. It belongs to the interval of 80~89 points, i.e., the evaluation result of the communication of the red culture in the construction of college ideology and politics based on the VR visualization technology is better.

In general, red culture is a manifestation of spiritual power that can guide the continuous development of society. Red culture is not only the embodiment of the country's political form, but also the pillar of national beliefs, which contains rich connotations and has extremely important value for social construction. Accelerating the realization of the deep integration of ideological and political education and red culture in colleges and universities is an effective way to improve the ideological and moral quality of college students and inherit the red gene.

Table 3. Red culture propagation evaluation matrix.

	Very good	better	general	worse	Very bad
Social life cognition	0.224	0.47	0.152	0.113	0.041
Red culture cognition	0.269	0.518	0.121	0.066	0.026
Cognitive development	0.202	0.509	0.158	0.096	0.035
Participate in experience	0.472	0.294	0.176	0.041	0.017
Impressive	0.314	0.413	0.213	0.035	0.025
Learning atmosphere	0.314	0.429	0.215	0.025	0.017
Material preference	0.530	0.325	0.120	0.017	0.008
Staff preference	0.430	0.379	0.166	0.008	0.017
Organizational preference	0.453	0.341	0.139	0.051	0.016
Expectation	0.379	0.399	0.188	0.026	0.008

Participation will	0.604	0.252	0.111	0.008	0.025
Interest promotion	0.549	0.310	0.097	0.018	0.026
Interactive participation	0.454	0.357	0.147	0.033	0.009
Degree of investment	0.434	0.419	0.105	0.017	0.025
Data retention	0.476	0.382	0.115	0.009	0.018
Consolidation exploration	0.487	0.269	0.218	0.009	0.017
Depth experience	0.265	0.472	0.219	0.027	0.017
Sharing promotion	0.340	0.434	0.192	0.017	0.017
Impact diffusion	0.229	0.380	0.258	0.108	0.025

6. Conclusion

Based on big data visualization technology, the article explores the connotation characteristics, logical mechanism and integration path of red culture in the construction of college civic politics. The digital conversion of red cultural resources is realized through digital collection, virtual restoration and resource integration of red cultural resources, and combined with the designed virtual reality Civics teaching program, the digital resources are visualized in the constructed virtual reality teaching scene. After the teaching, the teaching effect, recognition and red culture dissemination effect were analyzed for the students to evaluate the practical effect of the red culture ideology and politics construction path based on visualization technology.

The post-test scores of the experimental class and the control class were 11.12 points and 2.43 points higher than the pre-test scores respectively, and the post-test scores showed significant differences. The red culture is highly compatible with the educating function, value goal and theoretical interpretation of the teaching of college civic politics class, and the visualization technology provides a brand new teaching method. According to the principle of maximum affiliation, the evaluation indexes of the communication effect of red culture are all in the range of good to very good, and the overall communication effect score reaches 84.77, which is in a good grade.

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