



Research on the Application and Promotion of Virtual Simulation Systems in Ideological and Political Practice Teaching

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SUMMARY: *In recent years, with the advancement of emerging educational technologies, virtual simulation technology has begun to be applied in ideological and political practice teaching in higher education institutions. By leveraging programming languages and VR technology, a virtual simulation system was constructed. This further enabled the design of a blended teaching model integrating online and offline components based on the virtual simulation system. Mathematical and statistical methods were employed to conduct teaching validation experiments. Finally, the effectiveness of this study is validated from two aspects: the performance of the virtual simulation system and its application outcomes. When the number of concurrent users increased from 100 to 600, the response time of the virtual simulation system consistently remained within 1 second, indicating excellent system performance capable of meeting the daily needs of ideological and political practice teaching in higher education institutions. Furthermore, students exhibited significant differences ($P < 0.05$) under the two distinct ideological and political practice teaching models. Compared to traditional teaching methods, the proposed model demonstrated more pronounced effects on enhancing students' ideological and political qualities, literacy, and cognitive development. The study also supplemented promotion strategies for the virtual simulation system in ideological and political practice teaching through differentiated dissemination and academic promotion channels.*

KEYWORDS: *virtual simulation system; ideological and political practice teaching; mathematical statistics method; VR technology*

1 Introduction

In a set of teaching researches, there is a need for teachers to arrange systematically all the aspects concerning curriculum teaching. Based on the understanding of the characteristics of these aspects along with their interacting mechanisms, it is important for them to take care of students as the main concern. Combining the needs of the students with the demands of the market and employing digital multimedia as well as the information technology, teachers will be able to push ahead the digitalization of education. It ensures the constant improvement of the performance of the students, the quality of the teaching process, and educational reforms [1-5]. Over the past few years, efforts have been made by institutions and educators to innovate ideology and politics education, which is done through practical teaching, social practices, and volunteering. Ideology and politics education have unique features but continue to evolve with the use of educational technology [6, 7]. The development of new technologies, such as virtual simulation (VS), is increasingly utilized in teaching practice, contributing to pedagogical innovation and thus facilitating the improvement and perfection of education theories [8, 9]. At

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<https://doi.org/10.65102/is2026138>

present, VS mainly serves as an auxiliary tool in education and its potential benefits have not been fully utilized. In this regard, educational research should consider the development needs of VS in conjunction with basic teaching requirements in ideological and political classes. With the help of digital technology, innovative teaching practices that would promote the reform of ideological and political courses need to be created [10-12].

VS technology is a new and repeatable experience-based approach. With similar characteristics, VS accomplishes its goals through modeling research objects. It involves computer technology, 3D graphics technology, multimedia technology, simulation technology, and display technology. VS technology has numerous uses in training guidance, industrial production, urban management, and educational activities [13-15]. Within the domain of education, studies conducted by Yu and Chen (2021) found that VS technology is an effective strategy to enhance high school students' academic results, learning interests, and learning efficiency when used in the flipped classroom approach [16]. At present, VS technology is widely used in engineering and medical fields but finds its applications in arts, sports, and training sessions as well. Wang and Liu (2024) utilized internet technology to combine online and offline educational resources. They have developed a VS teaching and training system specific for intelligent manufacturing programs. The system includes modules for educational resources and experiments [17]. Wu et al. (2022) reviewed medical education literature using VS technology, where its applications include surgical procedures training, emergency departments training, nursing training, and medical cases experiences in basic and interdisciplinary medical educations [18]. The study of Yang (2021) incorporated VS into the art design process by incorporating 3D-VS technology and designing an educational system for online art design education with the consideration of engineering design requirements [19]. The study of Xiao (2023) transformed and innovated university physical education experimental teaching using a VS experimental teaching platform. In the process, he created a good teaching space and environment where the student could acquire the technical moves of any complex sports activity [20]. The studies conducted by Wang et al. (2024) innovated practical teaching methods by integrating VS into an "offline practice base + VS" framework where VS and practice bases complemented each other. This method applied theory into practice and helped improve the learning results of the students while cutting down on the cost of learning and minimizing risk to the learner [21]. Liu et al. (2024) used VS technology to create a VR intelligent education platform in which customized professional smart training equipment operated using the teaching resource integrated in the platform. The application of VS technology not only cut down the cost and risk involved in the practical teaching process but also offered the learner an opportunity to trace their practical experiences [22].

VS is able to maintain its immersive and interactive properties in ideological and political education. Using the technology of VR-VS, Zhang & Li (2024) proposed a VR-VS practical teaching mode in ideological and political theory courses in colleges by making use of three major features: virtuality, interactivity, and personalization [23]. In addition, combining VS technology with other technologies such as artificial intelligence and natural language processing is conducive to the development of ideological and political education. For instance, Zhu et al. (2025) used VS, artificial intelligence, natural language processing, and sentiment analysis to create immersive scenes and society phenomena in ideological and political classrooms, provide educational materials recommendations, conduct intelligent Q&A, and assess learners' performance [24].

The structure of the virtual simulation system, which was determined according to the concept of its creation and its goal, is defined by this paper. Taking into account that there are good expectations from virtual simulation systems for ideological and political practice teaching, it can be concluded that this study will propose a new teaching model combining

online and offline learning using virtual simulation systems. In order to test the efficacy of virtual simulation system for ideological and political practice teaching, subjects were divided into the experimental group and the control group. The control group used the conventional method of teaching ideological and political practices, while the experimental group used the proposed model. Based on this, independent samples t-tests were conducted using mathematical statistics to validate the priority of the virtual simulation system in ideological and political practice teaching and to explore strategies for its promotion in this field.

2 Research on Ideological and Political Practice Teaching Supported by Virtual Simulation Systems

2.1 Virtual Simulation System Design

2.1.1 System Design Approach and Objectives

The design of computer-based virtual simulation systems should prioritize the creation of a virtual component library. By leveraging virtual component models, computer science courses and related component technologies can be encapsulated, while dynamic component objects within the system undergo property configuration. This allows for effective communication methods to be developed between modules and thus offers critical assistance for the users' experimentations. During system design, virtual experimental equipment and instruments can be integrated to develop computer-based simulation models. Alternatively, updating computer hardware can facilitate a shift in design philosophy. By applying the method of an integral structure to the computer simulation system design, not only will equipment duplication be avoided, but it will also help to cut down on experimental cost and improve the efficiency of the system. The intention of the design of a computer virtual simulation system is to transcend time and space limitations imposed by conventional experiments and allow the students to carry out ideological and political practice teachings using intelligent terminals. Through the designed computer simulation system, the students will be able to perform self-learning of ideological and political practice, which can be done using the simulation system. The recording function will assist students to go back to their past lessons on ideological and political practice.

2.1.2 System Architecture

A Virtual Simulation system has been designed using concepts from programming languages of Computer Science along with virtual reality technology [25]. The designed virtual simulation uses a B/S model and consists of client-server modules. The client primarily manages the virtual experiment simulation environment—functioning as the virtual experiment platform—while the server handles system operations, database management, and other functionalities [26]. Consequently, this virtual simulation system integrates a database, virtual simulation operation platform, system management, login module, and comment information display module, as illustrated in Figure 1. The purpose of this VR-based virtual simulation system is to assess students' mastery of ideological and political knowledge within the virtual simulation environment through the virtual experiment platform. Therefore, during the design process, the system was divided into the following modules: login module, teaching module, equipment module, and comment information display module.

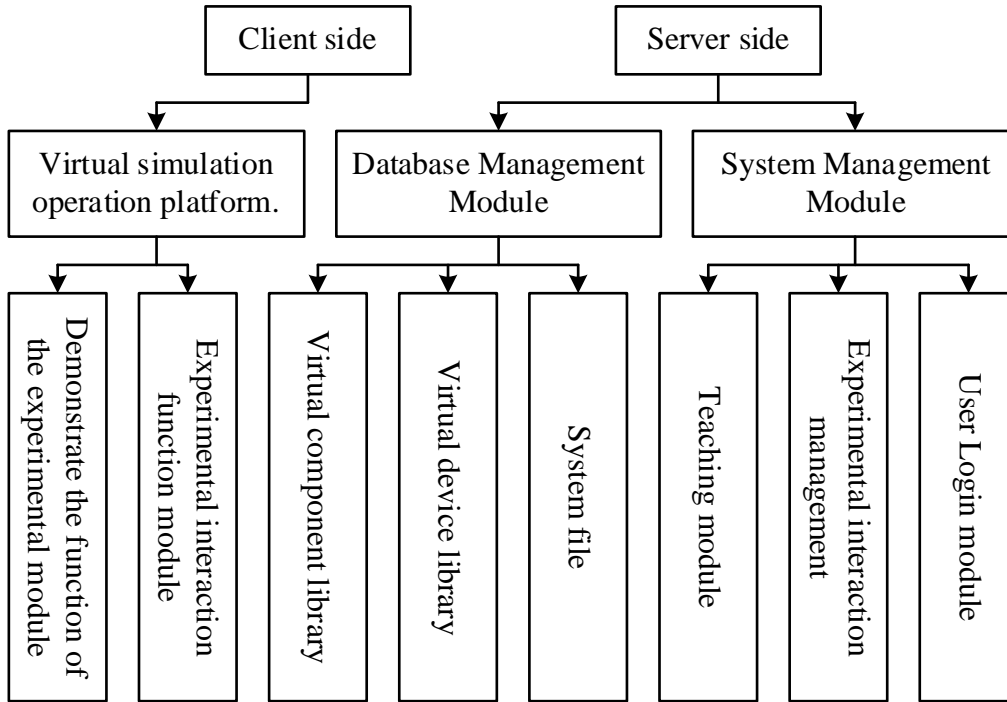


Figure 1: The structure of the virtual simulation system's functions

2.1.3 System Technical Framework

The design of virtual simulation systems relies heavily on communication technology. Therefore, during the system's development, high-bandwidth, low-latency, and large-scale connectivity 5G communication technology was selected to provide high-quality data transmission efficiency for VR virtual reality applications. Furthermore, by leveraging communication technology, the system design not only reduces the processing load on cloud-based virtual simulation experiment systems but also enables lightweight and user-friendly terminal devices for computer-based virtual simulation systems. The specific system technical framework is illustrated in Figure 2. The overall framework of this system is jointly formed by the B/S architecture and 5G communication technology.

Layer 1, the Content Layer, primarily consists of content providers and aggregators, such as those offering VR educational interactive courseware, VR educational live streaming, or other VR content.

Layer 2, the Platform Layer, provides corresponding functions for VR, including cloud platform rendering, transcoding, storage, and encoding.

Layer 3, the Network Layer, implements functions such as backbone networks, local area networks, and access networks within the computer virtual simulation system, providing high-bandwidth and low-latency stable transmission for VR service applications.

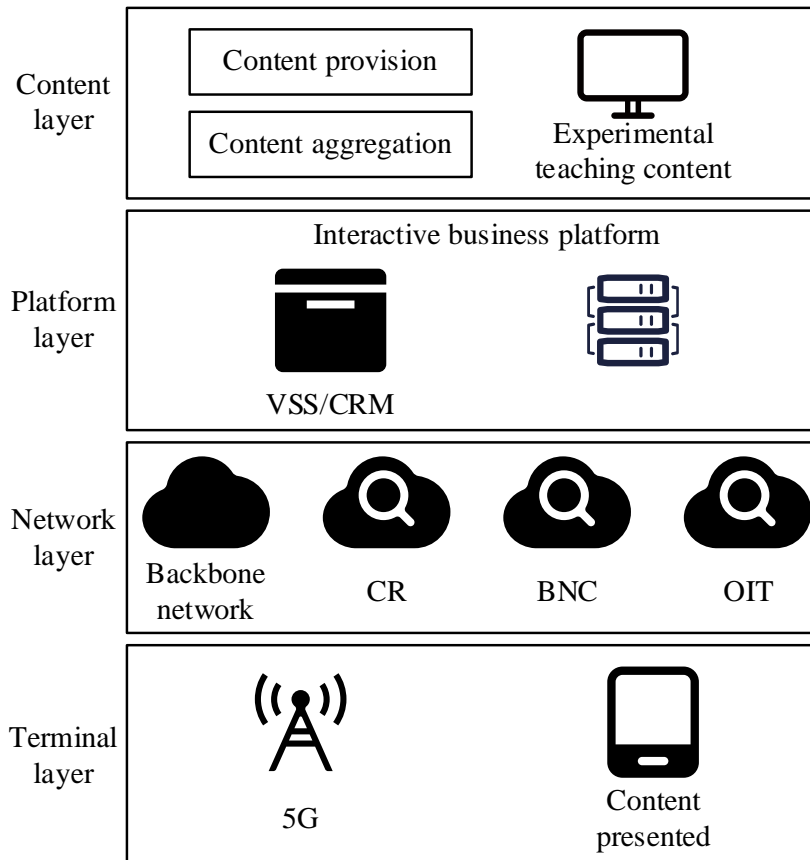


Figure 2: System technical framework diagram

2.2 Application of the System in Ideological and Political Practice Teaching

At its core, the practice of ideological and political education functions as a course aimed at transforming theoretical knowledge into the ideological and political qualities of students, with its fundamental purpose centered on educating individuals. In this sense, ideological and political practice teaching ought not to merely involve the one-sided indoctrination of abstract theories to students. Instead, it should adopt diverse teaching formats and pedagogical approaches to innovate the methods of ideological and political theory courses. This empowers students to be subtly educated and guided in their thinking, rendering ideological practice teaching into an approachable and student-favored discipline. Therefore, upon the design of virtual simulation systems, applying these systems to ideological and political practice teaching can achieve precisely this effect.

2.2.1 Facilitates the implementation of requirements for innovation and reform in ideological and political practice-oriented teaching

The use of virtual simulation systems in the teaching of ideology and politics practice at universities will contribute significantly to improving the structural aspects of the ideology and politics education system, enhancing the innovative approach used in teaching, and increasing the efficiency of overall classroom teaching. The use of virtual simulation systems in the teaching of ideology and politics practice at universities allows students to participate in direct interaction with historic figures while learning. This increases the enthusiasm for learning about ideologies and politics, providing a unique way of solving problems like “lack of emotional resonance” and “lack of retention.”

2.2.2 Contributes to Enhancing the Effectiveness of Ideological and Political Practice Teaching

Teaching ideologies and politics within higher educational institutions is predominantly under the influence of conventional teaching approaches, where most lessons are delivered through the use of lecture-based learning techniques. The repetitive presentation of theoretical concepts through long-winded lectures, along with the use of one teaching technique and high levels of theorizing, has contributed to the disinterest of students towards lessons on ideological and political practice. The integration of virtual simulation systems into ideology and politics lessons allows for greater compatibility with the interests of the learners, ensuring that their focus and attention are maintained throughout the lesson. This helps eliminate behaviors like looking at phones and daydreaming while in class, hence fostering classroom engagement and concentration among the students.

2.2.3 Helps strengthen the guidance of students' values

Value orientation education on ideology and politics through higher education institutions will play a role in guiding the value orientation of young people. The better utilization of virtual simulation systems in ideology and political practice education will enable students not to take a wrong decision upon encountering some temptations from outside. While university students have developed some world outlooks and values, they are still immature in their minds. Their outlooks and values still need to be improved. The significance of ideology and political practice education is therefore to make students establish good outlooks and values. The implementation of virtual simulation systems is thus valuable for guiding the formation of good outlooks and values through ideology and political practice education.

2.3 Blended Learning Model Integrating Online and Offline Instruction Based on Virtual Simulation Systems

In order to illustrate the effectiveness of the virtual simulation system in ideology and politics education, an online/offline combined teaching method using virtual simulation systems has been devised, which revolves around the following three aspects: “inspiration, deepening, and internalization.” Details are given below:

2.3.1 Inspiration

When commencing teaching, the teacher introduces the topic of the lesson—materialism versus idealism—to prompt students to prepare for the class by viewing online lectures. In doing so, they can learn the fundamental elements of materialism and idealism and appreciate the importance of both. Learning objectives have been included in the online materials to inform students about their learning targets. Students were guided to focus on ideological and political knowledge within the virtual simulation system, sparking their interest and laying the groundwork for subsequent practical ideological and political teaching activities. By having students submit mind maps of ideological and political knowledge points online, instructors assessed their understanding of practical ideological and political teaching, thereby identifying key challenges for in-person instruction.

2.3.2 Deepening

During ideological and political practice teaching, instructors lead students in learning relevant knowledge, with students taking the primary role. Through pre-class online quizzes on key points, teachers provide targeted explanations addressing common issues and weak areas

among students. Organizing classroom discussions on “Major Representatives of Materialism and Idealism” stimulates students' interest in learning and cultivates their ideological and political literacy. Teachers display conceptual diagrams of ideological knowledge on the blackboard and organize offline group discussions to refine students' understanding of theoretical concepts and develop critical thinking skills. Subsequently, the teacher showed students how to manipulate the virtual simulation system. In this virtual ideological and political practice platform, the students gained insights into basic theories such as materialism, idealism, the historical evolution of theories, and representative figures. The teacher provided constant feedback to the students on areas they were doing wrong and highlighting the important aspects they should focus on. The teacher paid keen attention to the classroom's performances.

2.3.3 Internalization

Reinforcing the knowledge learned during classroom sessions is a crucial method that helps the students come up with innovative ideas for learning contents and teaching materials. The strategy involves encouraging students to discover materialism and idealism concepts in everyday activities. This will allow the students to apply what they learn theoretically into practice. This not only makes ideological and political knowledge become part of students' minds but also translates them into action.

3 Study Design

Through the exposition in Chapter 2, we understand the value of virtual simulation systems in ideological and political practice teaching. To increase the persuasive power of this research, a research design that will highlight the efficacy of this system in ideological and political practice teaching is proposed here.

3.1 Research Objectives and Subjects

3.1.1 Research Objectives

Using ideological and political practice teaching experiments with virtual simulation systems, this paper explores whether such teaching approaches improve the ideological and political qualities, literacy, and cognitive capacity of students more effectively than those without using virtual simulation systems. Particularly, this paper aims to explore whether the use of virtual simulation in ideological and political practice teaching shows a higher degree of effectiveness than that of conventional ideological and political practice teaching.

3.1.2 Research Subjects

Forty sophomore Ideological and Political Education majors enrolled in the University A law school in the year 2023 were selected as the experimental subjects. In addition, they were classified into two groups, namely, experimental and control groups. Each group consisted of 20 people. The experimental group applied the innovative approach involving blended learning through online and offline approaches with the aid of the virtual simulation system while the other group was taught according to the traditional ideological and political practice teaching model.

3.2 Research Methods

3.2.1 Literature Review Method

Articles from journals were obtained by searches done through journals like university libraries and the CNKI doctoral/master thesis database via use of key words such as “virtual simulation system” and “ideological and political practice teaching.” The articles were then sorted out and analyzed. At the same time, numerous books that covered ideological and political practice teaching were examined and their contents analyzed for provision of theoretical knowledge to aid further research process.

3.2.2 Questionnaire Survey Method

According to the literature review and the features of ideological and political practice teaching, the questionnaire "Research Questionnaire on Ideological and Political Practice Teaching from the Perspective of Virtual Simulation Systems" was formed for the experimental sample. In addition, the questionnaire mainly studies the ideological and political cognition, literacy, and qualities of the students. The questionnaire uses a five-point Likert scale, which means that "1" is "strongly disagree," "2" is "partially disagree," "3" is "no opinion," "4" is "partially agree," and "5" is "strongly agree."

(1) Questionnaire Validity Testing

In order to guarantee the validity of the questionnaire, it was tested by 10 experts for validity testing. The results are shown in Table 1. The expert group assessed the design contents, design structures, and design overall of the questionnaire in five aspects: “Very Good,” “Good,” “Medium,” “Fair,” and “Poor.” According to their suggestions, the questionnaire was refined. Six to eight experts thought the questionnaire was very good.

Table 1: Questionnaire validity test

Type	Very effective	Effective	General	Not very effective	Invalid
Degree	(5 points)	(4 points)	(3 points)	(2 points)	(1 points)
Structural design validity	6	2	2	0	0
Content design validity	7	3	0		
Overall design validity	8	1	1	0	0

(2) Questionnaire Reliability Testing

The survey questionnaire's validity was ensured by performing the test-retest reliability. This involved distributing questionnaires to the subjects every 15 days. The data collected from both rounds were compiled and analyzed in SPSS 26 to determine the correlation coefficient. The result showed that the correlation coefficient of the questionnaire (r) was 0.835 with $P = 0.004$, which is lower than 0.05. Thus, there was consistency, stability, and reliability in the survey results.

(3) Questionnaire Distribution and Collection

Questionnaires on paper were distributed to the students prior to and after the experiment. Data about questionnaire distribution and collection are shown in Table 2 below. The total number of questionnaires given was 40 in number (20 each for the experimental and control groups). However, all the 40 questionnaires received were valid, making the total response rate equal to 100%.

Table 2: Statistics on the distribution and collection of questionnaires

Experimental stage	The number of questionnaires distributed	The number of questionnaires recovered	Recovery rate	The number of valid questionnaires	Efficient
Before the experiment	40	40	100%	40	100%
After the experiment	40	40	100%	40	100%

3.2.3 Mathematical Statistics Methods

Mathematics and statistics were used in order to analyze the gathered data in line with the research's needs. Data analysis was done via excel and SPSS 26.0. Cross-sectional comparison using independent samples t-test and longitudinal comparison using paired t-test were done in order to make comparisons between the control and experimental groups which laid a good foundation for the research.

3.2.4 Teaching Experiment Method

This experiment will be carried out from February 2024 until May 2024. It will last for 13 weeks. The control group will have their classes on Wednesday afternoons (7th - 8th period) and Thursdays morning (3rd-4th period). The experimental group will have classes on Wednesday mornings (1st-2nd periods) and Friday afternoons (7th-8th periods). Each week consists of 4 class periods, totaling 52 class periods. A pre-intervention comparison between the experimental and control groups will assess subject homogeneity. Homogeneity indicates that subjects meet the study requirements; otherwise, subjects must be re-selected until requirements are satisfied. Subsequently, independent samples t-tests and paired t-tests will be conducted for both cross-sectional and longitudinal comparisons between the experimental and control groups to demonstrate the application value of the virtual simulation system in ideological and political practice teaching.

4 Empirical Research Analysis

4.1 Virtual Simulation System Testing and Analysis

System testing is a crucial component of system design and serves as a vital safeguard for verifying system quality. Testing methods can be categorized into automated testing and manual testing. During testing, detailed test cases must be developed based on all user requirements. Extensive attempts are made to uncover bugs in the program, which are then resolved. In addition to testing system functionality, it is necessary to confirm whether abnormal or invalid data will make the system crash.

4.1.1 Test Tools and Environment

Testing tools have a direct effect on testing efficiency and coverage. At present, many testing tools are available on the market, including Monkey Runner, LoadRunner, JMeter, Web Bench, Load UI, and httpperf. The type of tool varies depending on the nature of the testing subject. In this list of available testing tools, those that specialize in ASP.NET tests are Siege, http_load, Web Polygraph, and Microsoft Web Application Stress. Furthermore, there are also load testing tools available in Microsoft development tools. Virtual simulation systems greatly affect system performance because they depend on database servers and server performance. Testing requires a complete environment. Given the constraint in hardware resources, the virtual simulation program operates on servers.

(1) Test Environment Hardware Configuration

Server specifications: IBM 3845 CPU E7580, 2.6GHz, DDR3 64GB RAM, 512GB HDD.
Network bandwidth: 16Mbps.

Client specifications: Intel Core i7, 2.6GHz clock speed, 8GB RAM, 1TB HDD.

(2) Test Environment Software Configuration

Server OS: Windows Server 2012.

Modern Distance Learning Server System: Windows Server 2012 R2. (Shared with the server)

Database Software: Microsoft SQL Server 2012 R

Client Configuration: Windows 10.

4.1.2 Performance Test Results

Based on the aforementioned design concept, architecture, and functional modules of the virtual simulation system, system performance testing can be categorized into login system testing, comment information display testing, and virtual simulation operation testing. This paper illustrates representative functional tests as examples. The results of the login system, comment information display, and virtual simulation operation tests are shown in Figures 3 to 5, respectively. Each line in the figures represents a test value for response time. 200 rows suggest that there have been 200 testings. These numbers show the mean response time, and at the same time, demonstrate the lowest and highest response times through the chart. From the test result, we find that the virtual simulation system has relatively fast reaction times for user data operations, mostly finished within 0.7 seconds. On the other hand, response times for loading ideological and political coursesware take longer than that of user data operations. But, in any case, the system provides feedback within 1 second for all operations. So, from the performance testing, the virtual simulation system performs excellently.

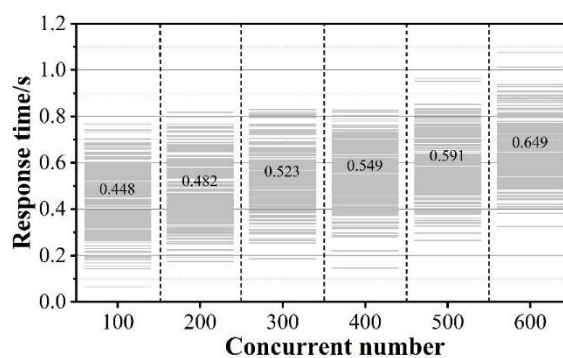


Figure 3: Log in to the system test results

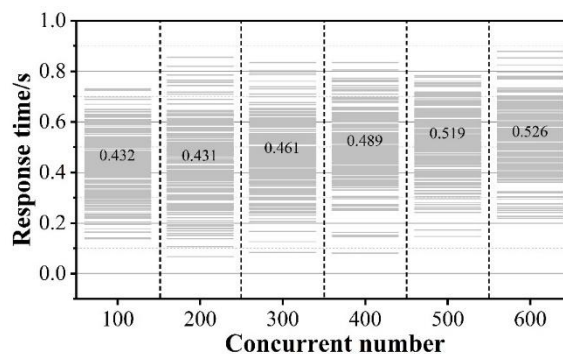


Figure 4: The comment information shows the test results

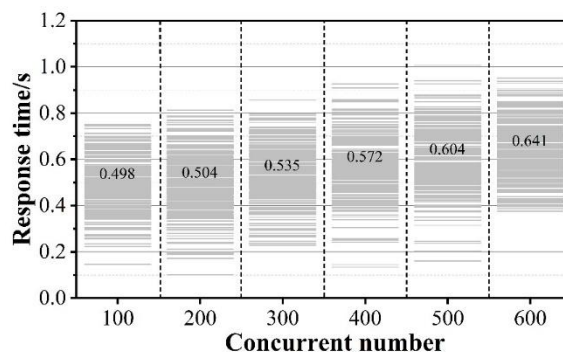


Figure 5: Virtual simulation operation test results

4.1.3 Usability Testing

Usability testing mainly concerns comprehensibility, learnability, and operability to test the functions of the system. It consists of two parts: firstly, whether the operation and maintenance of the virtual simulation system are convenient and practical and whether the system interface is easy to use—whether users are confused about the relevant operation buttons. Additionally, reliability plays an essential role in usability, which has a considerable effect on usability.

4.1.4 Compatibility Testing

In this section, the compatibility test mainly focused on the following aspects:

(1) Compatibility with different screen resolutions: The virtual simulation system mainly supports the minimum configuration screen resolution (1152×864), as well as common high-resolution screens (1680×1050). The system can work properly under these resolutions. The screen resolution settings for each computer may be very diverse and may affect the operation of the function.

(2) Operating system test: It was tested on Windows XP, Windows 7, Windows 8, Windows 10, and Windows 11 operating systems.

(3) Computer configuration test: The lowest configuration computer used is (CPU: PIII 600 MHz; Memory: 512 MB; Hard Disk: 32 GB).

4.2 Analysis of the System's Teaching Application Effectiveness

The above analysis of the system performance shows that the performance of the virtual simulation system developed in this paper is excellent. This part makes use of questionnaires, mathematical statistics, pedagogical experiments, and literature review to examine the effectiveness of using the virtual simulation system for teaching ideology and politics practice. The following are the details:

4.2.1 Pre-intervention Comparison Analysis Between Experimental and Control Groups

Following the direction of the teacher, the participants in the EG and CG were instructed to finish test papers and questionnaires. The questionnaires were collected, and then all the data were inputted into Excel by the author, resulting in 20 effective samples for each group. The collected data were subsequently subjected to detailed analysis. To ensure experimental validity, pre-tests assessing the ideological and political qualities, literacy, and cognition of both groups were conducted prior to the experiment. Upon completion of the assessments, independent samples t-tests were conducted on the pre-test data using SPSS software. The results are presented in Figure 6, where (a) to (c) represent the dimensions of ideological and political

qualities, ideological and political literacy, and ideological and political cognition, respectively, with 1–20 denoting students in the control group and experimental group, respectively. The width of each curve represents the magnitude of the quantified value. The pre-test data of the control and experimental groups can be distinguished by the starting and ending points of each curve (or by color: light gray representing the control group and dark gray representing the experimental group). Prior to the intervention, the recorded P-values for ideological and political quality, ideological and political literacy, and ideological and political cognition across the experimental and control groups were 0.237, 0.243, and 0.134, respectively. None of these values met the criterion of $P < 0.05$. Thus, no significant differences existed among research subjects before the experimental intervention, confirming that all student indicators were at comparable levels. This is an important step that satisfies the condition of homogeneity for the research subjects.

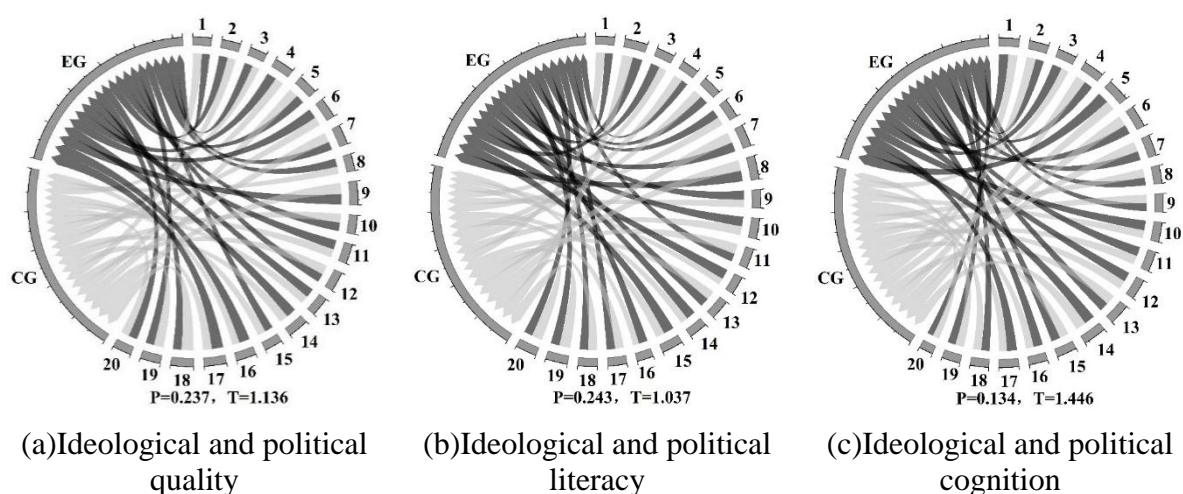


Figure 6: Comparative analysis before intervention

4.2.2 Comparative Analysis Between the Experimental and Control Groups After Intervention

After verifying the homogeneity of the research subjects, an independent samples t-test was conducted to assess students exposed to the two teaching intervention methods. The post-intervention comparison results for the experimental and control groups are depicted in Figure 7. The results indicate that under the influence of the two distinct teaching intervention approaches (the experimental group employed a blended online-offline teaching model based on a virtual simulation system, while the control group used a traditional ideological and political practice teaching model), substantial disparities were identified between the control group and the experimental group in ideological and political quality, ideological and political literacy, and ideological and political cognition. The corresponding statistical outputs showed P-values of 0.001, 0.018, and 0.009, respectively, all falling below the threshold of $P < 0.05$. These findings provide empirical support for the pedagogical utility of virtual simulation systems when integrated into ideological and political practice teaching.

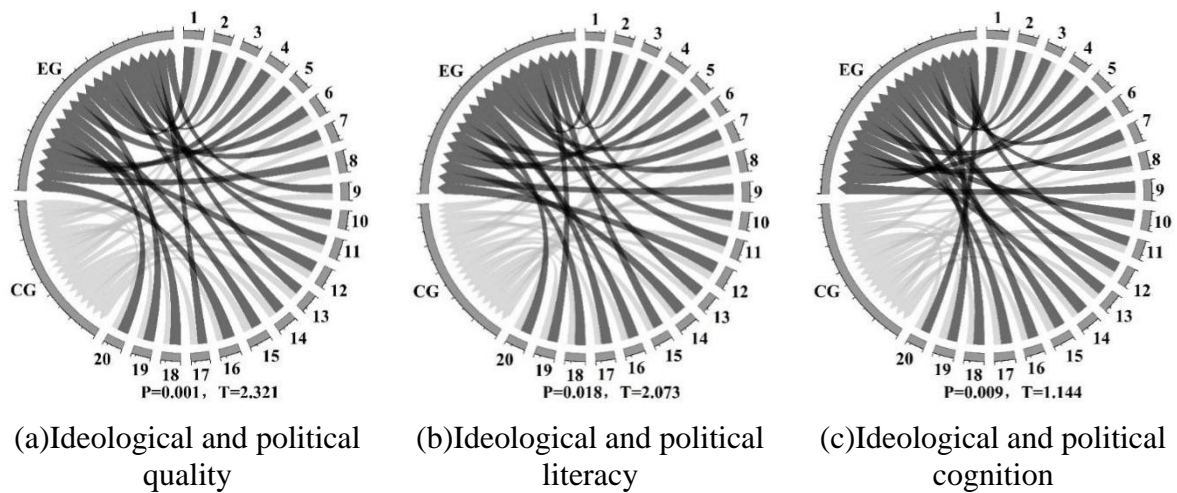


Figure 7: Comparative analysis after intervention

4.2.3 Pre- and Post-Intervention Comparison Analysis of the Control Group

Following the completion of the within-group comparative analysis, an intergroup comparative analysis was conducted using the same methodology to examine the pre- and post-intervention differences in the control group. The results of the independent samples t-test are presented in Figure 8. The data indicate that the traditional ideological and political practice teaching model did not yield significant improvements in students' ideological and political qualities, competencies, or cognitive development, with corresponding p-values of 0.688, 0.814, and 0.455.

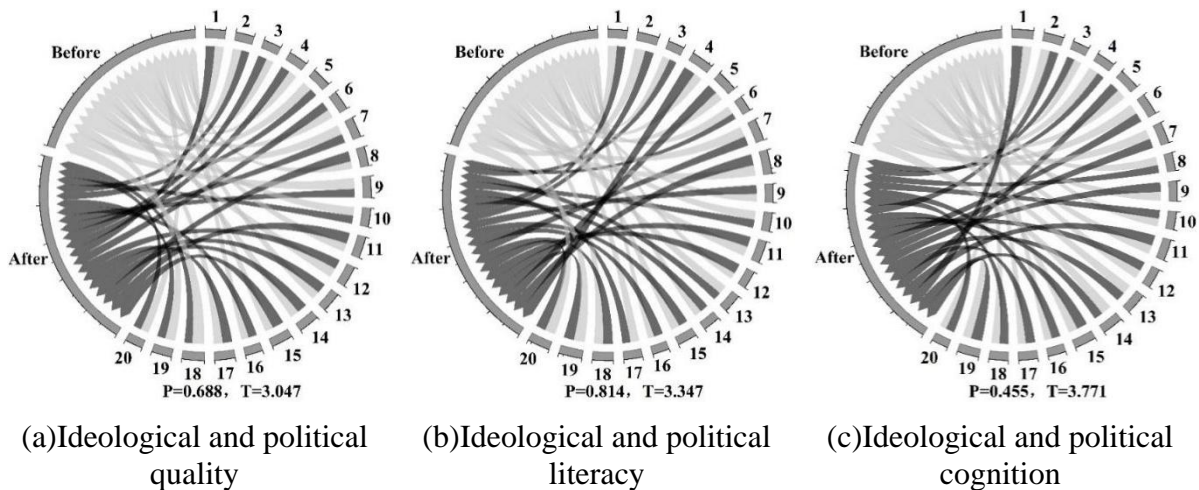


Figure 8: Independent sample t-test analysis results

4.2.4 Pre- and Post-Intervention Comparison Analysis in the Experimental Group

After evaluating the effectiveness of traditional ideological and political practice teaching models on improving students' ideological and political qualities, literacy, and cognitive development, we proceeded to examine the impact of a blended online-offline instructional approach grounded in virtual simulation systems on these dimensions. The pre- and post-intervention comparison results for the experimental group are shown in Figure 9. As shown in the figure, when implementing teaching intervention through the blended online-offline teaching model based on the virtual simulation system, significant differences were found in

students' ideological and political quality ($P=0.004<0.05$), literacy ($P=0.003<0.05$), and cognitive development ($P=0.006<0.05$). This not only confirms the practical efficacy of the blended teaching model but also substantiates the effectiveness of virtual simulation systems in ideological and political practice teaching.

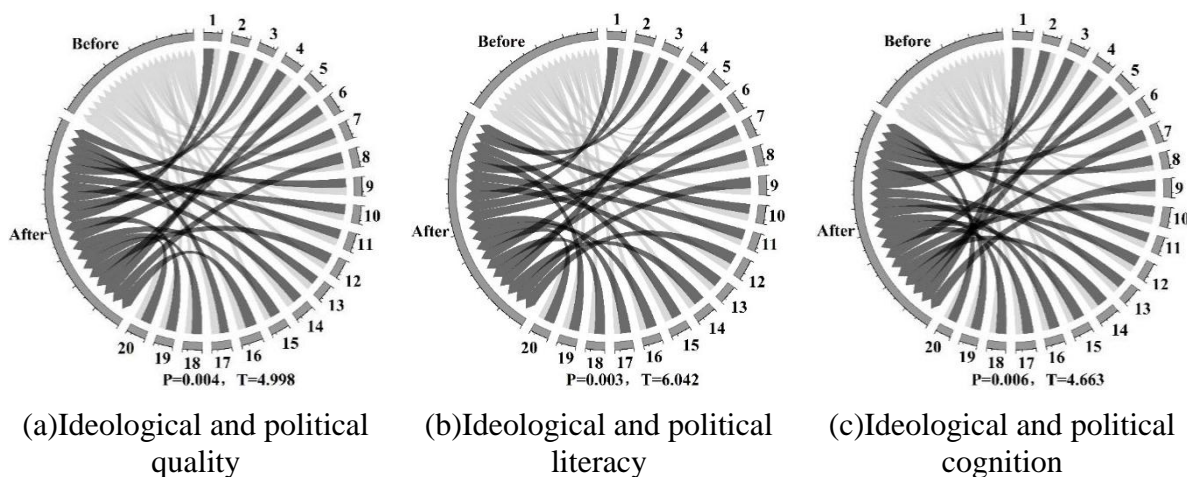


Figure 9: Comparative analysis of the EG before and after the intervention

5 Strategies for Promoting the System in Ideological and Political Practice Teaching

Based on the empirical analysis in Chapter 4, the application value of virtual simulation systems in ideological and political practice teaching has been validated. To facilitate the widespread adoption of blended teaching models integrating virtual simulation systems across more higher education institutions, several promotion strategies are proposed.

5.1 Differentiated Promotion

Differentiated promotion involves segmenting user needs based on the characteristics of ideological and political practice teaching, and implementing tailored promotional strategies. By analyzing the features of ideological and political practice teaching, existing and potential students are categorized into distinct groups with distinct characteristics. This achieves segmentation of student user groups for the virtual simulation system, enabling differentiated promotion within ideological and political practice teaching. The primary demand for virtual simulation systems comes from educational institutions and individual learners. Therefore, adopting distinct promotion strategies for different educational user groups will better enable us to understand the usage psychology and demand characteristics of diverse student populations. For example, in dealing with the institutional concerns, more consideration should normally be given to their needs for stability and services. Conversely, when targeting individual learners, we should focus more on their demands for the technical capabilities and functional features of the virtual simulation system.

5.2 Academic Outreach Channels

Through collaboration with education authorities, we have jointly launched an experimental research project on applying virtual simulation systems to reform ideological and political practice teaching. We regularly organize academic activities to share experiences in promoting

and applying these systems, including arranging observation visits among schools. This academic outreach effectively ensures sustained momentum for the ongoing promotion and application of virtual simulation systems.

6 Conclusion

Virtual simulation technology has progressed remarkably in recent years, with growing scholarly and institutional focus being paid to its application in ideological and political practice teaching at higher education institutions. This paper first clarifies the design philosophy and objectives of the virtual simulation system. Drawing upon computer programming languages and integrated with VR technology, a virtual simulation system was developed. Building on the system's performance in ideological and political practice teaching, a blended learning model merging online and offline instruction was proposed. To strengthen the persuasiveness of the virtual simulation system's application value in ideological and political practice teaching, a corresponding research plan was formulated to validate its effectiveness in this context. Prior to the teaching intervention, students in the control group and experimental group demonstrated comparable levels in ideological and political quality, ideological and political literacy, and ideological and political cognition ($P < 0.05$). This means that the study participants belonged to the same level, which guarantees the quality of the ensuing research results. The significant distinctions between the control group and the experimental group were identified after the instructional intervention with regard to ideological and political quality, ideological and political literacy, and ideological and political cognition ($P < 0.05$). It proves that, in comparison with conventional instruction strategies, a blended instruction strategy utilizing the virtual simulation system allows obtaining better results as for ideological and political qualities, literacy, and cognition of students. Finally, to enable more students to access this blended teaching model, further strategies for promoting virtual simulation systems in ideological and political practice teaching are proposed.

About the Author

Hualiang Fan was born in Luxian, Sichuan, P.R. China, in 1973. He received the Master degree from Sichuan normal university, P.R. China. Now, he works in College of Marxism, Chengdu Polytechnic. His research interests include new Technology in Education, educational technology marketing, etc.

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