

Simulation application of virtual reality technology in legal education

Kunyi Jian¹, Peng Nai^{1,3} and Tao Yu²

¹Law School, Yunnan University of Finance and Economics, Yunnan Province, People's Republic of China

²Law School, Yunnan Minzu University, Yunnan Province, People's Republic of China

³E-mail: 863193534@qq.com

Abstract. The virtual simulation teaching of law is a systematic practice course of judicial case handling. This course introduces VR technology, enabling testers to play the role of a judicial officer in a virtual environment to handle cases. This design is realized through the intersection of the teaching design by the arts and sciences, the construction of virtual models, and man-machine interaction. Through this design, students can improve their ability to handle cases, develop students' thinking, and enhance students' ability to use their knowledge comprehensively. In order to ensure better experimental results, it is necessary to provide technical support from scene simulation, case simulation, mechanism simulation and so on.

Legal education is related to the construction of a country under the rule of law and a society ruled by law. Its purpose is to train qualified legal talents for the country [1]. Chairman Xi Jinping pointed out: "The discipline of law is a highly practical discipline. Legal education should handle the relationship between knowledge teaching and practical teaching. It is necessary to break the institutional barrier between universities and society and introduce the high-quality practical teaching resources of practical work departments to colleges and universities. Strengthen the exchange of legal education, legal researchers and practitioners of the rule of law." The Ministry of Education's "Opinions on the Use of a Combination of Rule of Law Education and Moral Education to Train Excellent Legal Talents 2.0" (hereinafter referred to as "2.0 Opinions") also states: "It is the key to strengthening law education to emphasize practice." At present, legal education attaches great importance to knowledge and despise practical ability. It attaches importance to the cultivation of academic ability and despise the training of applied ability. The legal knowledge is shelved and cannot be used [2]. In view of this, we are trying to innovate in systems and technologies to introduce the teaching methods of natural science laboratories into law teaching. Through VR technology, we will use simulation experiments to enable students to enter the virtual environment to act as judicial officers and enhance students' judicial practice.

1. Research background

Since the promulgation of the "2.0 Opinions" and the "National Standards for Undergraduate Professional Teaching Quality in Colleges and Universities", it has become urgent to change the teaching methods of law practice teaching and improve the teaching system of law practice teaching [4]. It should be noted that China will adopt a profound and systematic reform of legal education.



1.1. Status and classifications of current teaching contents of legal education

Legal education is a very practical subject. The realization of fairness and justice requires both theoretical development and case handling. Judging from the supply and demand of labor in the society, the legal talents required by the society are mainly concentrated in the substantive departments. In order to prove this argument, we have established an analytical model. Taking Kunming city in Yunnan Province of China as an example, we conducted statistics on the personnel engaged in legal research in public universities in this city, and compared the number of court staff in this area. (See Table 1, Table 2)

Table 1. Number of people engaged in legal research in public universities in Kunming city of Yunnan province.

Universities	Number
Yunnan University	81
Kunming University of Science and Technology	64
Yunnan Normal University	80
Yunnan University of Finance and Economics	43
Yunnan Minzu University	33
Southwest Forestry University	32
Yunnan Police Academy	30
Total	363

Note: the data comes from the official website of the universities (last accessed on September 24, 2019).

Table 2. Statistics on the number of judges in the city of Kunming

Cities	Number
Yunnan Higher People's Court	178
Kunming Intermediate People's Court	144
Kunming Wuhua District People's Court	54
Kunming Xishan District People's Court	48
Kunming Guandu District People's Court	49
Kunming Panlong District People's Court	46
Kunming chenggong District People's Court	20
Total	539

According to the standards of China's judicial system reform, judges account for 34% of the total number of court staff. Therefore, based on the above data, it can be estimated that the total number of court staff in Kunming is about 1,585. It can be seen that in Kunming, the number of court staff is more than four times higher than that of university legal researchers. This is calculated without considering the types of other practical work such as prosecutors and lawyers. Therefore, it is not difficult for us to conclude that the demand for talents in the legal profession is mainly concentrated in the legal practice area, and the training of law students needs to be oriented to practice.

The contents of current legal practice teaching can be divided into the following categories: mock court, case teaching method, and holiday internship. Although the above several teaching models have practical forms, they lack the essence of practice. Most of the models return to the path of theoretical study, and it is difficult to improve the students' practical ability.

The first is the mock court. Although this teaching method restores a certain court trial site, it pays too much attention to the form of performance and neglects the training of students' ability to handle cases. Teaching presents the shortcomings of fragmentation and lack of simulation. The so-called fragmentation means that the cases used by students often only have basic cases, excluding evidence,

procedures, etc. The disputes of students in the courts are only related to the application of the law, but the complete case handling procedure was split. Insufficient simulation refers to the lack of simulation in the mock court. Essentially, students are allowed to put on the robe for qualitative discussion of the case, because the case that the student contacts is a case that is cut into pieces, and the only part of the legal dispute is there are a lot of opinions on the Internet, so in the teaching, we will see many students go online to get the script of the court speech, and then put on the robe to interpret it, which greatly weakens the teaching function of the mock court, more like a stage play.

The second is the case teaching method. This teaching method was originally a research method of scholars. For example, Chen Xingliang from Peking University used this method to write teaching materials and gained wide acclaim [12]. Case teaching method is different from "Follows the precedent". It is not a method of judges' referee cases, but a teaching method. It uses a specific case to help students understand the use of abstract knowledge. Therefore, the essence of the case teaching method is theoretical teaching, but it is only teaching by means of cases. Cases can help students understand knowledge, but they do not allow students to understand the process of handling cases, so the role of improving students' practical ability becomes limited.

Again, it is a holiday internship. Take the Yunnan University of Finance and Economics Law School as an example. The student's holiday internship mainly includes regular and irregular (see Table 3). During regular internships, the school will arrange holidays (usually two weeks) to conduct legal practice training for students. The main contents include inviting staff from the legal practice department to communicate with students in the school and leading students to visit the courts and law firms. During irregular internships, students use the summer vacation to go to the courts, procuratorates, law firms and other legal work departments for internships, and then submit certificates and reports to the school, according to which the school provides credits to students.

Table 3. Yunnan University of Finance and Economics Law School Student Internship Mode

Regular internship internships (two weeks)	Campus internship	Interview with staff in the legal work department
	Off-campus internship	Visit the legal work department
During irregular internships	Off-campus internship	legalwork department internship

At present, there are three shortcomings in the model of holiday internship: first, the organized internship time is too short. It is difficult for students to handle a complete case in two weeks, whether it is interviews with legal staff or visiting legal workdepartment, students are only onlookers. They can only obtain a kind of intuition through observation, and it is difficult to have a real experience in legal work. Second, although the irregular internships are long-term, there is a lack of school organization, and students' participation in internships lacks guidance and institutional guarantees. The staff of legal work department is unwilling or difficult to hand over the work of assisting the case to a student whose legal status is unknown. Judging from the student's internship report, most of the students' internships are trivial, and there are not many opportunities to get in touch with the case. From the 2018 student internship report of Yunnan University of Finance and Economics Law School, almost all the student internship spent a lot of time introducing them to learn to bind the files and cleaning, but they are not deeply aware of the judicial cases. Over time, students regard the internship as a task for graduation, as long as they can get an internship certificate to solve this trouble. Third, students have no sense of role in the process of internship, and it is difficult to form a real feeling of handling the case. As a practical operation, it is difficult to form an experience and grasp by listening alone. Once engaged in specific work, the students also do not know how to proceed. This is like driving and surgery,listening to other people's operating experience is not likely to make you a driver or a surgeon directly.

1.2. Construction of virtual simulation teaching model of legal education

The crux of the problem lies in the fact that the legal employment market requires students to have the practical ability of law, but students do not have the legal status to handle the case, it is difficult for

students to acquire this ability through training. The inconsistency between job market demand and teaching methods has led to an imbalance in legal education (see Figure 1).

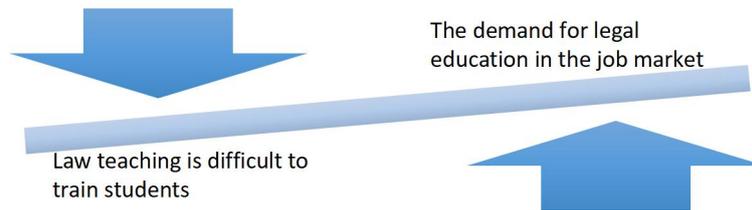


Figure 1. Teaching leverage imbalance.

Therefore, we need to re-construct a teaching model to cope with this challenge. On the one hand, we must consider the ability of students to handle cases, and on the other hand, the reality that students do not have legal status. To this end, we try to introduce VR technology into the teaching of law practice, and construct a legal practice teaching model of virtual simulation. The purpose of practical teaching is to develop students' vocational skills [5]. Therefore, the teaching model needs to be compatible with the characteristics of the legal profession, and then the following design principles are required.

Principle 1: the virtual simulation teaching of law needs to simulate the real legal profession, so that students can experience the case in an immersive way. A major feature of the legal profession is the personal experience of the judiciary. This can also be confirmed from the goal of the state's reform of the "judicial case responsibility system". The judges need to be responsible for their own judgments, which will be the future legal profession trend of our country. Regardless of the role played in the legal profession, personal handling of the case will be a basic requirement. Therefore, the first purpose of virtual simulation teaching is to let students actually enter the case and personally review the evidence of the case to understand the content of the legal profession.

Principle 2: virtual simulation teaching should enable students to experience the complete procedures for handling cases. The content of the legal profession is to handle the case, and the realization of all fairness and justice will ultimately be reflected in the specific case. As Chairman Xi Jinping pointed out, it is necessary for the people to feel fair and just in every judicial case. Practice teaching can't be separated from case-handling training, students will not handle cases, and instilling more fair and just ideas will fail. Only by making students experience the entire process of the case, the knowledge learned in the classroom can truly be associated with practice and become knowledge that can be used.

Principle 3: virtual simulation teaching should realize the simulation of professional roles, so that students can experience professional content in virtual roles. Each profession has its own ethics, methods and skills, which are the wealth gained through reflection on work. Bystanders can evaluate a profession, but cannot experience a profession. Theory becomes a profession, and people's actions are required to transform knowledge into their own experience. As some scholars have pointed out, the teaching of law depends on the personal experience of students [6]. Therefore, the best way for students to understand a profession is to let them go through this profession and gradually acquire the essence of knowledge in the course of action.

Focusing on the above experimental principles, we introduce VR technology into the teaching of law practice. In the past, VR technology was mainly limited to the research scope of science and engineering. Its advantage is that when the experimental target and experimental conditions conflict, VR technology forms the sensory simulation in the human brain through audio and video output, thus making people feel the feeling of entering the real scene. Engineers can experiment in virtual reality. For example, some engineers have built an interactive Mars rover virtual training system through Unity3D virtual reality software to simulate the Mars environment trainers operating space vehicles [7]. The conclusion that VR technology is applied to teaching can effectively save teaching costs has also been confirmed in the area of science and engineering. For example, in the field of mechanical

teaching, domestic colleges and universities have overcome the difficulties by introducing VR teaching methods in response to many problems such as short practice time and tight equipment resources [8]. Another example is Zhu Wenhua and other scholars took the cylindrical gear reducer as the research object, and developed a set of teaching software based on Unity3D software to improve the interaction and immersion of practical teaching through virtual technology [9]. Whether it is experiment or teaching, the application of VR technology in science and engineering neighborhoods is relatively mature, but it is not common to introduce this technology in liberal arts teaching. Even if liberal arts teaching transplant VR software into the classroom, it only creates a virtual simulation of audio and video effects, and is never a teaching system built using liberal arts logic. Therefore, we try to establish a VR system based on the needs of law practice teaching. The core program of the system is a complete case-handling process that provides students with a scenario of each judicial workflow in a virtual simulation manner, which in turn allows students to advance the proceedings in this environment.

We envision the first phase of the experiment starting with a criminal case. We will restore the cases that have been completed by the court to the computer system, so that students can access the virtual evidence materials. The litigation process is promoted from the discovery of cases, analysis of the case, construction of the evidence system, and response to trials. We will group students, including the investigation team, the public prosecution team, the defense team, the trial team, etc. Some students will act as defendants, victims and witnesses. Then, within the prescribed time, students are required to carry out all aspects of the case in the virtual environment. We will follow the criminal procedure to form a VR system design with different tester groups (See Figure 2, Figure 3, Figure 4, Figure 5, Figure 6).

Testers in the investigation team should learn how to obtain and fix evidence. We will use VR technology to carry out virtual crime scene restoration. The tester will conduct on-the-spot investigation through the VR helmet to the crime scene, obtain evidence and fix the evidence, and conduct virtual investigation experiments when necessary. At the same time, for the acquisition of verbal evidence, we consider designing two test paths. In path 1, we connect the tester's VR helmet to the VR helmet that acts as a suspect and witness, and directly implement the simulation interrogation or inquiry in the form of identity play; in path 2, according to the dossier material, the engineer virtual suspects and witnesses in the computer, allowing the virtual electronic robot to accept the tester's question or inquiry. The former test is more conducive to improving the tester's ability to communicate with real people, while the latter test is more conducive to improving the tester's ability to deal with real cases.

The Public Prosecution Team testers need to train the skills to review the case. Similarly, VR technology can be used for on-site exploration and investigation experiments; in addition, VR technology will simulate the scene of suspects being interrogated, and test whether the tester can effectively protect the legitimate rights and interests of the suspects. If necessary, the virtual defendant will redressing injustices, let the tester judge whether it is necessary to initiate a special investigation procedure; at the same time, as a prosecution, it is necessary to communicate with the testers of the defense team through the VR system to listen to the opinions of lawyers and parties.

Testers in the defense team need to train defense skills. Through the environment of the VR system virtual law firm, the tester needs to meet the parties and the family members of the parties to examine the tester's negotiation skills; through the VR system to restore the case environment, the lawyer must find evidence that the defendant is not guilty or worthy of forgiveness at the virtual scene of the case; talk to role-playing or virtual witnesses to gain testimony; communicate with judges and prosecutors through VR helmets.

Testers in the trial team need to train trial skills. Through the interconnection function of VR technology and information system, the court trial site is simulated to examine the evidence submitted by the public prosecutor and the defender to the court, and listen to their opinions, organize the debate in the virtual environment, and finally announce the judgment of the judge. The test group testers need to judge the case according to the logic of "evidence-fact-law application", so as to obtain a real case-handling experience. At this time, the instructor can also enter the VR virtual court as an observer and watch the final performance of each group of testers.

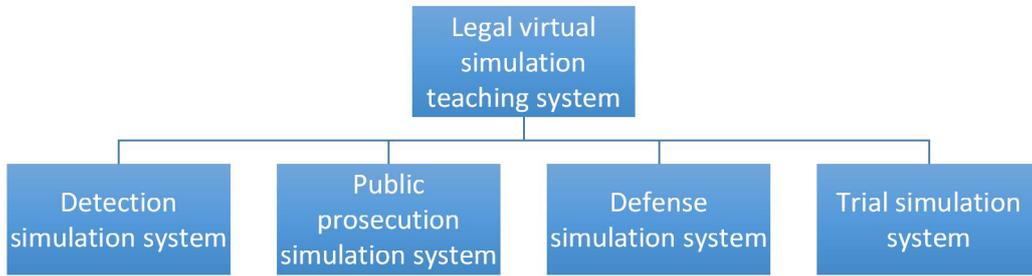


Figure 2. Virtual Simulation Teaching System Structure.

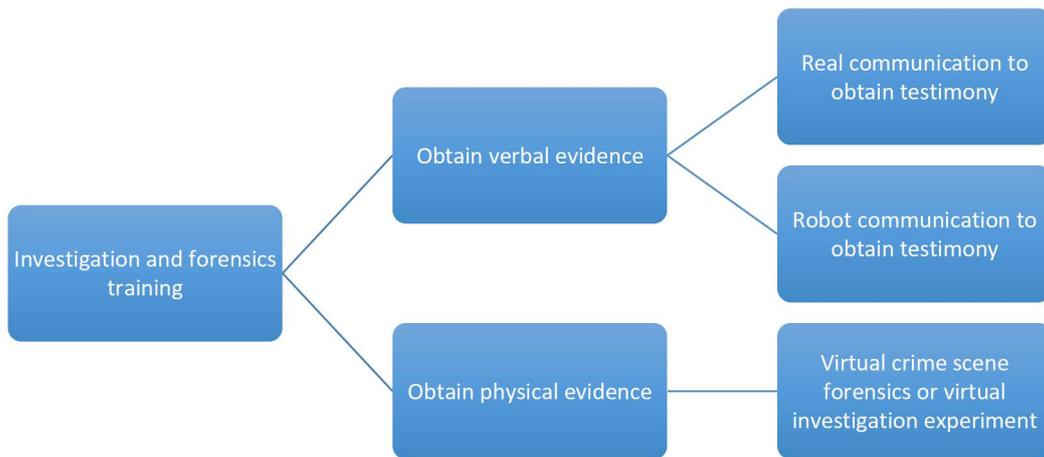


Figure 3. Detection simulation system.

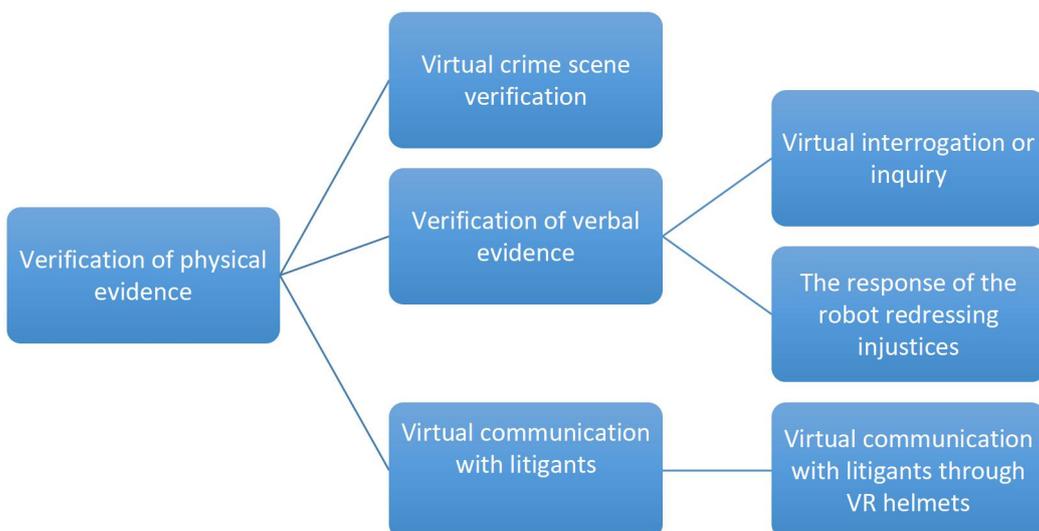


Figure 4. Public prosecution simulation system.

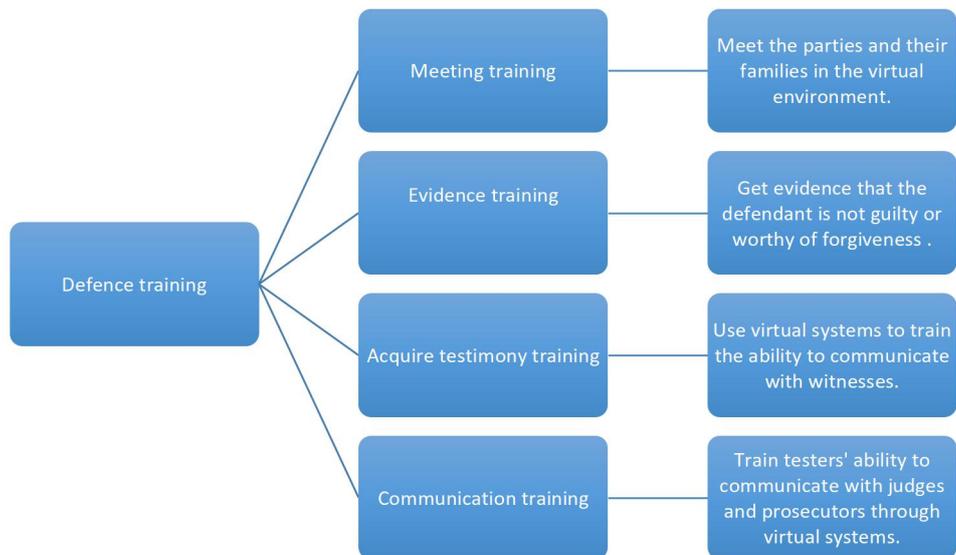


Figure 5. Defence simulation system.

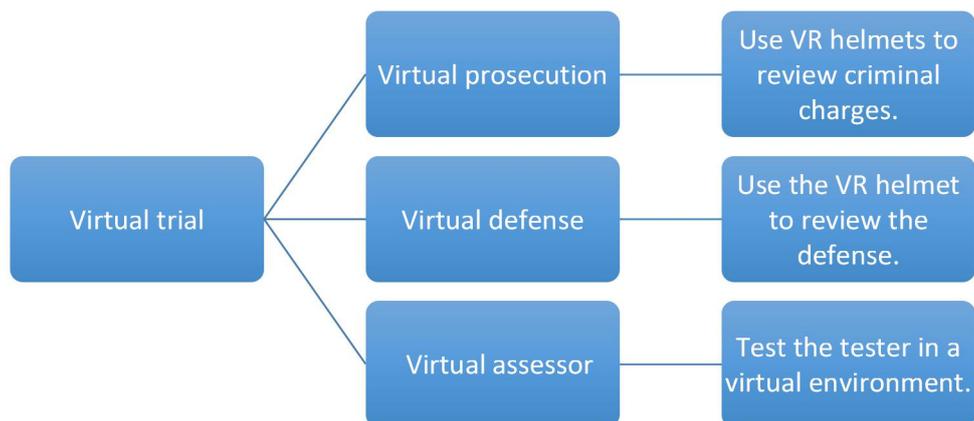


Figure 6. Trial simulation system.

It should be noted that law is a complex academic system composed of multiple legal departments. For each kind of legal department, the virtual simulation teaching system needs to be designed according to the characteristics of its own disciplines. Here we only try criminal law as an example. If we achieve good results, we will promote the technology of other legal departments. Improve the entire virtual teaching system of law.

2. Research methods

Generally speaking, this teaching design uses the idea of introducing VR technology into law teaching, forming a model virtual teaching design in detail, and then promoting the simulation teaching experiment process through information technology, so that students can get the real case handling experience.

2.1. The teaching design of the intersection of arts and sciences

In the past, the simulation of law teaching was insufficient, and it was difficult for students to have a real experience of handling cases. However, relying solely on liberal arts teaching methods has to face the obstacles that students do not have legal status. Teaching requires students to handle cases like

judges, but the law prohibits those who do not have legal qualifications to handle cases. This creates a paradox that cannot be resolved in the liberal arts teaching mechanism. The VR technology of science and engineering can solve this problem very well. On the one hand, the virtual simulation of VR technology enables students to obtain the opportunity to handle cases without having legal status; on the other hand, VR virtual simulation technology provides students with virtual case handling scenarios allow students to directly enter the environment of case handling.

Although the application of VR technology to teaching has been practiced by many scholars, the system is still limited to science thinking only from the perspective of assisted teaching. If VR technology is not programmed based on the key to the litigation process, it is only the effect of audio and video. Students can be brought into the scene in a certain teaching session, but it is difficult to be brought into the proceedings. VR technology becomes a simulation game machine in the classroom, and it is difficult to improve the ability of students to handle cases.

Our design combines the liberal arts thinking with the technology of science, using liberal arts thinking as the basis for programming, and using science technology to break through the experimental barriers of the liberal arts area. Then in the virtual world to build a social relationship and social collaboration that meets the needs of liberal arts teaching, testers can gain a sense of social role through experimentation.

2.2. Construction of virtual teaching model

This design attempts to form the basis of modeling the VR system through litigation procedures. Specifically, it converts the legal language of the litigation procedure into a computer language, turning the real-world litigation procedure into a computer world litigation procedure. This allows the tester to feel the true existence of the proceedings in the virtual world. We mainly implement computer modeling in terms of both the type of litigation and the type of tester. First, the model is classified according to the type of litigation, so that the VR program matches the various litigation processes in the real world. Secondly, the model is classified according to the type of litigation participants, so that the VR program matches the realworld litigation role.

2.3. The combination of networked interaction and human-computer interaction

This design will establish two kinds of interactive training: VR helmet networking interaction and human-computer interaction. If the test requires different litigation participants and the evaluation of the test results is more subjective, we tend to adopt the VR helmet networking interaction method, so that the tester can obtain the virtual world role to carry out virtual communication. A typical example is the virtual trial. If the test needs to be operated in accordance with the litigation procedure, the evaluation of the test results is more objective. We tend to adopt a human-computer interaction method. If the tester can complete the operation according to the preset procedure, the corresponding score can be obtained. The VR helmet networking interactive test needs to be scored by the teacher, while the human-computer interaction test only needs to be evaluated by the computer.

3. Research significance and promotion

Legal Virtual Simulation VR teaching is a teaching innovation for the lack of practical ability of law students. The advantage of this system is that it can enable students to obtain the real experience of handling cases in a virtual environment, thus truly improving students' legal practice ability.

First of all, the virtual simulation experiment of law helps to improve students' ability to handle cases. In the past, the cases in which students studied in the law classroom actually removed the facts and evidence, leaving only pure legal application. The student's debate is based on existing facts and evidence. This led to the case being artificially separated, and the student was only learning a piece of the case, even the smallest piece. Therefore, it is very limited to improve students' ability to handle cases. Once the VR system is adopted, a real case and case handling process can be restored in the virtual world, which can effectively improve students' comprehensive analysis ability of the case [9]. Students discover the facts of the case based on the evidence, use evidence to prove their claims, and finally debate and judge based on the evidence, the theory can be realistic, and the knowledge can be flexible use.

Secondly, the VR simulation teaching of law has opened up the academic vision of students. A contradiction in law teaching: students need to acquire systematic legal knowledge, establish a methodology to analyze problems and solve problems, and they need to receive systematic training in schools; however, the relatively closed environment of schools also causes students to have narrow academic horizons. Students are not paying enough attention to legal practice issues and staying in textbooks. It is difficult to form criticism and reflection on knowledge. Through the VR simulation teaching of law, students can truly participate in the handling of real cases, which is to enable students to comprehensively apply knowledge, and thus enhance students' ability to identify cases, apply laws, explain laws, and choose legal methods [10].

Thirdly, the virtual simulation teaching of law is conducive to improving students' ability to use knowledge comprehensively. In the past, law teaching often introduced knowledge to students through scattered departmental laws. The links between the courses were not close, and students' ability to comprehensively use knowledge was insufficient. The departmental law curriculum is relatively isolated. Even if students use a specific case to study, they only discuss the legal application of the case and do not pay attention to the evidence of the case. The training that students can get is still at the theoretical level, and it is difficult to form a comprehensive judgment training system for evidence, facts and law. However, in dealing with cases, the knowledge of a single legal department is often difficult to deal with, which requires students to have the ability to use legal knowledge comprehensively. Virtual simulation teaching takes the case as the main teaching content, and the separation between knowledge is repaired based on the purpose of handling the case. In the process of simulating the case, students will not clearly feel the boundaries between knowledge. Students will apply knowledge according to their own needs, and improve their ability to analyze and solve problems. At this time, students have become the center of teaching, knowledge serves the needs of students, and students' ability to use knowledge comprehensively has been improved.

4. Conclusion: prerequisites and safeguard measures

In fact, simulation teaching has long been used in training rule of law in many countries. For example, in Germany, candidates want to serve as judges and prosecutors. He or she has to study four years of law and pass the first national exam before completing. Two years of internship and passed the second national exam [11]. It can be seen that in Germany, practical teaching of law is as important as theoretical teaching. Practice teaching in Germany shows a simulation: candidates are asked to work like judges and prosecutors. This kind of simulation training is to provide a training mechanism by legally constructing a social mechanism. And what we are thinking about is creating this condition in the virtual world. Therefore, the virtual training conditions of the computer need to be as perfect as the real world mechanism, so as to ensure that the VR simulation teaching can obtain the same training effect as the real world. In order to achieve this goal, we believe that the design of the VR virtual teaching system requires the following conditions: scene simulation, case simulation, and mechanism simulation.

The first is the scene simulation condition. The scene of the case is not just the court, but every space environment needed to handle the case. As a case-handler, personally experiencing the space environment of a case is the basic condition for obtaining facts and making judgments. The teaching of virtual simulation is not only to establish a virtual court, but to restore the space environment of the entire case in the virtual world. The trainer must obtain verbal evidence in a virtual environment, be able to conduct on-site investigations of the case, and be able to meet with the client at a specific place like a lawyer. These spatial and environmental conditions enable students to gain a deeper knowledge. Therefore, when designing the VR virtual teaching system, engineers and legal experts are required to establish a separate database for the scenarios required by the proceedings, as the basis material of the VR virtual teaching system.

The second is the conditions for case simulation. The reason why the previous practical teaching did not achieve the effect of teaching simulation is that the case for training is not complete and true. Although the case itself may have happened in the real world, this truth can only be called the truth of the matter, and it cannot be called the truth of the case. The truth of the matter is a simply example to provide material for the debate. However, as a case, in addition to the facts of a case, evidence of the

case is also required. If students are involved in a case, it is not enough to see the facts of the case. Just as every citizen can get the case matter through the Internet and present his own analysis, but we will not say that this is the handling the case, if the law school students It is only an analysis of the case matter and it cannot be regarded as handling the case.

Therefore, providing students with evidence-supported cases becomes the key to the success of VR virtual teaching. Each experimental project of the VR teaching system must be designed around real cases, which has to consider the problems of cooperation and risk management between the university and the judicial organs. On the one hand, colleges and universities need to obtain dossiers from the judicial organs to provide students with real cases. This requires action to break the institutional barriers between universities and the judicial organs to establish a true cooperative relationship. Turning the use of the judicial organsdossiers into an institutionalized operational process. On the other hand, universities and the judicial organs need to consider the issue of case data storage and confidentiality risks. In addition to considering the educational value of the case, the choice of case must also consider the confidentiality of the case. The content of information in the evidence materials involving national and trade secrets and personal privacy needs to be technically handled by professional to prevent information leakage, and a complete monitoring mechanism and accountability mechanism should be formed in the process of using the dossiers.

The teaching use mechanism of the judicial organs' dossiers is a complicated process, and it takes a huge technical cost for engineers to design a test program based on the dossiers. So our idea is to build a library of teaching cases to provide material for engineer programming. Yunnan University of Finance and Economics is negotiating with the Yunnan Provincial People's Procuratorate to build this cooperation platform. We consider forming a team of experts to focus on selecting a batch of cases with teaching value, focusing on the technical processing of secret information, and building a case library for simulation teaching.

The third is the mechanism simulation condition. Judicial justice is first manifested through procedures, so virtual simulation teaching can not be separated from the justice of the program to discuss the justice of the case. When conducting virtual simulation teaching, a set of procedures that are strictly in accordance with the rules of evidence and the rules of litigation are required. Due to the savings in teaching time, the time for the proceedings can be appropriately shortened. However, virtual teaching should be accompanied by a systematic litigation rule: for example, a virtual prosecutor must sue in court within one week, and a virtual judge should make a judgment within one week. These mechanisms must be developed in advance and entered into a simulation system to foster students' awareness of the procedures for handling cases. At the same time, in addition to relying on computers, teaching evaluation requires the participation of expert groups. It is necessary to form a professional experimental evaluation team (which can be composed of legal researchers, judges, prosecutors, and lawyers) to score testers' performance and provide practical guidance outside the VR system.

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