Application of Intelligent Mobile Terminal in Virtual Building Construction Training Teaching

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Abstract. The conventional teaching method of building construction training is mainly desktop real-time data interaction. Although the investment cost is low, its immersion is poor, which affects the effectiveness of practical teaching courses. Therefore, the application of intelligent mobile terminal in virtual building construction training teaching is studied. Establish the function module of virtual building construction training teaching, and improve the immersion function of the training teaching course. Simplify the teaching task of virtual building construction training based on intelligent mobile terminals, reduce other costs to the minimum, increase the investment in interactive equipment, and meet the immersive experience of students in practical teaching. Manage the virtual building construction training report, and conduct the whole life cycle training management for students in the whole training teaching process, so as to achieve the immersion and effectiveness of the training teaching. The simulation experiment proves that the average benefit function of this teaching method is 24.6, and its intelligent mobile terminal has low latency and energy consumption, which has high terminal efficiency.

Keywords: Intelligent Mobile Terminal · Virtual Building Construction Training Teaching · Teaching Task

1 Introduction

The construction industry is one of the three pillar industries of China's national economy, and its sustainable development can simultaneously drive the continuous development of multiple related industries. It plays a very important role in promoting employment, accelerating the transfer of rural surplus labor, and driving the development of related industries. Virtual reality technology is a new field of computer research. In recent years, it has gradually attracted the attention of all circles, and has been further developed in the application field. As a new technology in the computer field that integrates a variety of science and technology, it has involved many research and application fields, and is considered to be an important development discipline in the 21st

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century and one of the important technologies that affect people's lives. Virtual reality technology is an advanced computer user interface, which integrates computer graphics, computer simulation technology, multimedia technology, artificial intelligence technology, human-computer interface technology, sensor technology and other cross technologies. It achieves a special purpose by providing users with various intuitive and natural real-time perception interactive means such as viewing, listening, and touching. "Immersion", "interactivity" and "conceptualization" reflect the key characteristics of the VR terminal, and emphasize the leading role of human in the VR environment. Modern architecture has high technical content, diverse structural forms, complex process, and great difficulty in construction organization and management. It is necessary for higher architectural vocational education to cultivate construction technicians and management talents who have both college level professional knowledge and advanced skills and are good at transforming engineering drawings into physical entities. The practical teaching of construction engineering technology is an important link in cultivating students' hands-on and innovative abilities. The implementation of virtual reality training room technology will have a profound impact on exploring and developing modern educational ideas, improving educational technology levels, improving experimental and training environments, optimizing teaching processes, and cultivating talents with innovative awareness and ability.

Reference [1] proposes an exploration of a blended virtual training teaching model for vocational colleges based on deep learning. Combining deep learning with vocational training teaching, analyzing the theoretical and practical foundation of integrating deep learning into vocational training teaching. Supported by theories such as blended learning and virtual simulation technology, analyzing problems and other five stages to form a blended virtual training teaching mode for deep learning in vocational education. By conducting experiments to verify the promoting effect of this model in cultivating students' innovative thinking, we aim to assist in the cultivation of innovative and highly skilled talents. Reference [2] proposes the construction of a logistics training and teaching center based on Internet of Things technology. Starting from the development of the logistics industry and the demand for logistics talents, this paper elaborates on the goal, significance, and feasibility of constructing a logistics teaching and training center based on Internet of Things technology. The overall planning and specific design of the construction plan of the training and teaching center are also carried out, and the expected teaching results of the Internet of Things intelligent logistics laboratory are discussed.

Due to the limitations of teaching conditions and the impact of construction season, economy, site, traffic and safety, students have fewer opportunities to go to the construction site to carry out hands-on construction. It is difficult to carry out practical training in the real environment for each link of the construction process and quality inspection. There are great limitations in understanding and mastering the construction technology, which not only involves a lot of funding issues, it also involves personnel training cycle, construction safety, resources, environment and other issues. Virtual construction technology can track every link in the construction process, and carry out training, verification, optimization of construction technology and construction organization in the whole process of construction and production. At the same time, because virtual

reality technology has the advantages of low cost, good versatility, easy modification, high security and other traditional technologies in application, it makes the application of virtual technology in building construction urgent and possible. Intelligent mobile terminal is the mainstream of the development of mobile Internet industry today [3–5]. It has the ability of high-speed access to the network, can carry various open operating systems, has independent operating space, and supports users to install apps independently. Common mobile intelligent terminals in life mainly include smart phones, vehicle mounted intelligent terminals, laptops, wearable devices, etc. Driven by these emerging technologies, enterprise planning and national policies, mobile intelligent terminals have developed rapidly and become the main tool for people to store and obtain information in their daily work, study and life, especially the intelligent mobile terminals that dominate the market. Therefore, this paper studies the application of intelligent mobile terminal in virtual building construction training teaching, and makes full use of virtual reality technology, computer technology, network technology, multimedia technology, etc. To realize the true reproduction of construction technology and quality inspection operation process on the computer, so that students can interact with the terminal realistically and immersively. Achieve the same learning effect as the on-site training, promote the teaching modernization reform of the course, improve the teaching quality, reduce the training cost and risk, and improve the students' professional ability and quality.

2 Design of Virtual Building Construction Practice Teaching Method Based on Intelligent Mobile Terminal

2.1 Establish Virtual Building Construction Training Teaching Function Module

This paper integrates "teaching, learning and doing" as a whole to strengthen the cultivation of students' ability, and adopts the "action oriented" teaching mode based on the project teaching method. The realistic three-dimensional audio-visual effect and natural interactive operation function of the virtual terminal of the construction practice training strongly attract students to participate in the scene mode, explore freely and learn independently, actively build their knowledge structure, cultivate innovative ability and exploration spirit, and truly reflect the teaching method of teaching according to materials. From this, a virtual teaching framework for building construction training is constructed, as shown in Fig. 1 below.

As shown in Fig. 1, this paper divides the virtual building construction training teaching into five functions: students use virtual training terminals to make the teaching mode more vivid; Students can operate through virtual training and complete practical training that is difficult to carry out under real conditions; Students can repeatedly operate key practical training without limitation of time and space, so as to achieve the effect of repeated review and consolidation of learning, and further promote the reform of practical training teaching methods and contents; The interaction between students and virtual training scenes is completed through visual training objects, and the detailed description of relevant scenes makes the design of training objects more effective to highlight the training objectives; Use the mouse to interact with visual training objects. Virtual training objects and students can interact by clicking or dragging the mouse. When developing

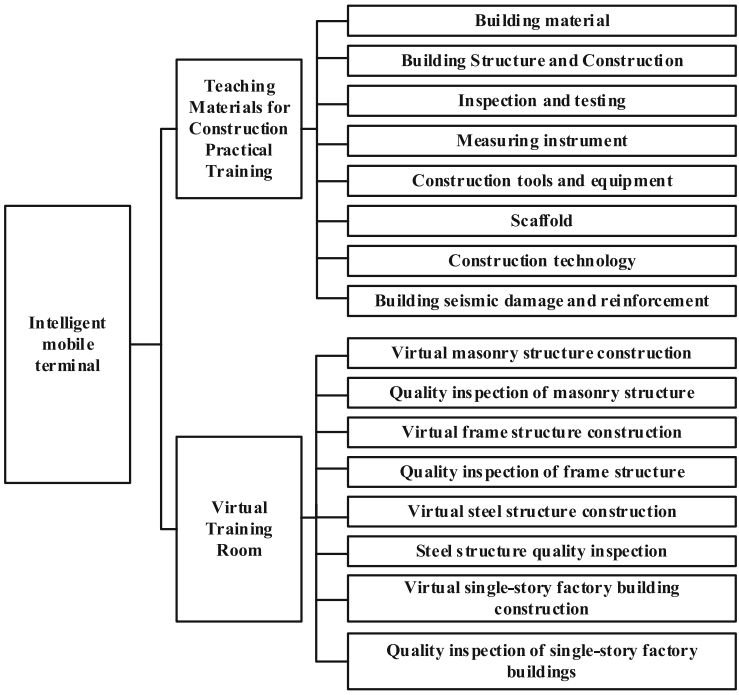

Fig. 1. Virtual Teaching Framework of Building Construction Training

an intelligent mobile terminal [6, 7] website, the terminal realizes dynamic interaction through HTML technology, and the generated pages are HTML pages. Users can directly double-click the homepage of the training website to enter the virtual training, and can set pages on the server for sharing. Intelligent mobile terminal websites can be optimized based on the characteristics and screen size of mobile devices, enabling users to easily browse and use website content on their phones or tablets, providing a better user experience. At the same time, developing intelligent mobile terminal websites can expand the user coverage of the website and attract more mobile users to visit the website. Considering students' habitual thinking and qualitative thinking, the operation design in virtual training conforms to people's logical thinking, and has strong operability and interactivity. Based on the characteristics of virtual reality technology and building construction courses, this paper divides the teaching route of virtual building construction training, as shown in Fig. 2 below.

As shown in Fig. 2, the building construction training virtual intelligent mobile terminal is built by self-development. The training teaching team is composed of vocational education experts, professional leaders, backbone teachers, industry and enterprise experts, and computer professionals. Based on students' learning, it is divided into practical teaching curriculum system, curriculum standards, evaluation standards, productive training standards on post training standards, etc. Guided by constructivism and humanism learning theories and referring to the virtual building construction training materials, this paper improves the immersive function of the practical teaching course from the

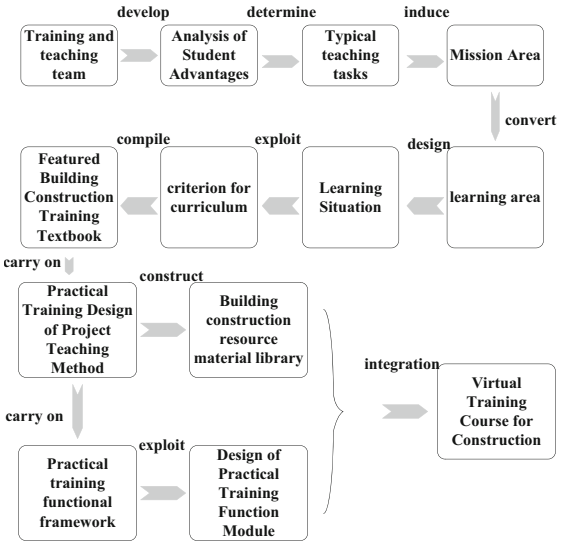

Fig. 2. Teaching Route of Virtual Building Construction Training

aspects of practical teaching objectives, practical teaching contents, practical learning environment analysis, practical teaching method design, practical learning evaluation, etc., in combination with the characteristics of virtual reality technology and courses. To really improve the learning quality of students majoring in construction engineering.

2.2 Simplify Virtual Building Construction Training Teaching Tasks Based on Intelligent Mobile Terminals

In this paper, the intelligent mobile terminal is applied to the virtual building construction training teaching process, utilizing the high-performance processors, operating systems, and various applications of intelligent mobile terminals to perform various functions and tasks, as well as supporting the installation of various applications. By downloading and using various software through the application store, the advantages of meeting users' personalized needs and reducing other training costs are met, increase the investment in interactive equipment, and meet the immersive experience of students in practical teaching.

The main task of virtual building construction training teaching is to study the general laws of construction technology of building engineering, the construction technology and process principle of each major type of work of building construction, and the development of new technology and process of building construction. Through learning and training, students can understand and master the construction technology and process principle of each major type of work in construction engineering, highlight the cultivation of professional post ability of construction workers, and cultivate students' basic ability to independently analyze and solve construction technology problems in construction engineering. Use "immersion", "interaction" and "conceptualization" to create the authenticity of architectural construction training courses.

Immersion, also called telepresence, refers to the emotional reflection of the observer on the virtual world. Users are fully integrated into this virtual world, just like people interact with nature in the real objective world, giving people a sense of immersive. Interactivity. Virtual reality is an open environment that can respond to user input. People can use some sensor devices such as keyboard, mouse, data glove, etc. to operate with objects in the virtual environment to get feedback information. Conceptual, virtual reality technology has a broad space for imagination, which can broaden the scope of human cognition. It can not only reproduce the real environment, but also conceive any objective environment at will. Users immerse themselves in the virtual environment and acquire new knowledge to improve their perceptual and rational understanding, thus enabling users to deepen their concepts and sprout new associations. The characteristics of intelligent mobile terminals include portability, versatility, real-time interconnection, personalized customization, Multi-touch and interaction, information acquisition and sharing, and personal assistant functions. Based on the characteristics of intelligent mobile terminals [8–10], this paper analyzes the virtual building construction training teaching, as shown in Fig. 3 below.

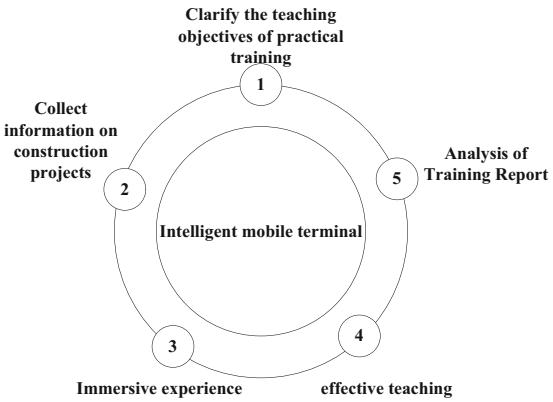

Fig. 3. Teaching analysis model of intelligent mobile terminal

As shown in Fig. 3 1 is to clarify the practical teaching objectives; 2 To collect information on construction projects; 3 is immersive experience; 4 is effective teaching; 5 is the analysis of training report. In order to ensure the orderliness of the whole teaching process, this paper assumes that there is a time slot structure in the operation of intelligent mobile terminals, and each terminal is connected to a server, then the communication established between the terminal and the designated practical teaching course is expressed as:

$$P = \sum_{m \in M} X_s^m(t), \forall s \in S, t \in T \tag{1}$$

In formula (1), P the communication range established for the terminal and the designated practical training teaching course; $X_s^m(t)$ communication request established for training course s and terminal m at time t; S is a practical teaching terminal; T for the whole training teaching time. When $P =$ At 1 h, $X_s^m(t)$ means that the communication between the training course s and the terminal m is successfully established at time t, and the next teaching operation can be carried out. In order to reduce the cost of practical teaching courses, this paper predicts the time when the terminal sets up communication for mobility, and simplifies the practical teaching tasks. The probability density function expression of the simplified model of practical teaching tasks is as follows:

$$f_{\tau_s}(t) = \begin{cases} \frac{1}{\tau_s} e^{-\frac{1}{\tau_s}}, & t \geq 0 \\ 0, & t < 0 \end{cases}, \quad s \in S, \quad t \in T \tag{2}$$

In formula (2), $f_{\tau_s}(t)$ is the probability density function expression of the simplified model of practical teaching tasks; τ_s refers to the time occupied by the training course in the training task. Order τ_s obeys the Gaussian distribution, and the task occupation probability follows t the training task can be simplified by increasing and decreasing. Assuming that the construction practice teaching task does not transfer, that is, under the condition of completing a teaching task, the constraints of the simplified model are expressed as:

$$p_s^0 = \int_{t_S^M}^{+\infty} f_{\tau_s}(t)dt \tag{3}$$

$$p_s^1 = \int_0^{t_S^M} f_{\tau_s}(t)dt \tag{4}$$

$$p_s^0 + p_s^1 = 1, \forall s \in S, t \in T \tag{5}$$

In formula (3–5), p_s^0 the probability of completing a practical teaching task for students; p_s^1 probability of completing two practical teaching tasks for students; t_S^M adjust the time of training course S on terminal M. The intelligent mobile terminal itself carries limited computing power, so the local computing delay of the terminal is:

$$T_s^L(t) = \frac{m_s \gamma_s}{f_{\tau_s}(t)}, \forall s \in S, \forall t \in T \tag{6}$$

In formula (6), $T_s^L(t)$ local computing delay for training course s; m_s data volume of virtual building construction training teaching task; γ_s is the calculation task of training course s. The energy consumption generated by the calculation training teaching task is mainly related to the terminal computing capacity. The energy consumption generated by each training task is expressed as:

$$E(t) = \kappa (f(t))^2, t \in T \tag{7}$$

In formula (7), $E(t)$ energy consumption for each training task; κ the conversion coefficient of periodic energy consumption; $f(t)$ calculate the energy consumption at the terminal for the training task. The data volume of known virtual building construction training teaching task is m_s the time delay of simplified practical training teaching task is:

$$T_s^U(t) = \frac{m_s}{R_s^U(t)}, \forall s \in S, \forall t \in T \tag{8}$$

In formula (8), $T_s^U(t)$ is the time delay of the simplified practical teaching task; $R_s^U(t)$ is a shortage of uplink scenarios for practical teaching tasks. $R_s^U(t)$ smaller the size, the higher the quality of the whole building construction training teaching, and the better the effect of teaching task simplification.

2.3 Management Virtual Building Construction Training Report

In this paper, virtual simulation technology is used to determine the entity model of the training together. The Java3D scene map is constructed from examples, integrating objects such as defining graphics, sound, light, position, direction, and the surface properties of visual objects and sound objects. A common graphic definition is a data structure consisting of nodes and arc edges. A node is a data element, and an edge is the relationship between data elements. The nodes in the scene graph are Java 3D instances, and the edge shows the relationship between these Java 3D instances. Java 3D scene graph is a tree structure constructed from a bunch of nodes with parent-child relationship. In the tree structure, there is only one node that is the root node, and other nodes can be accessed along the arc starting from the root. The nodes in the tree structure have no loops. A scene graph is formed by a tree rooted in a Locale object. Each scenario map has a unique Virtual Universe, which has a series of Locale objects. A Locale object that provides a reference point in the virtual world. The Locale object can be regarded as a sign to define the position of visual objects in the virtual world. Structured and modular programming methods are mainly used when planning multi scene navigation. Each solid model has its own unique functions and can be reused. The entity model can be either a static model or a dynamic model, and interaction can be achieved by adding action scripts. If there are multiple scenes, multi scene navigation is generally used to connect the scenes. Multi scene navigation needs to design a master control module to control the playing sequence of scenes. The virtual training part of this terminal is the multi scene navigation mode. This article uses the form of virtual animation to provide students with practical training experience, as shown in Fig. 4 below.

As shown in Fig. 4, (a) is the construction animation of prefabricated buildings; (b) Animation for building construction; (c) Animate the construction of steel plates; (d) Aerial shot scene animation for the building. In this paper, animation is added to the intelligent mobile terminal to enhance the effect of practical training and teaching. Most demonstration animations are two-dimensional animations made in Flash, but according to the special visual requirements of some animations, some three-dimensional animations are made in Java3D. There are three basic methods for Flash to produce animation: frame by frame animation: frame by frame animation is to edit the content of any number of keyframes, and then play the content of keyframes in order to form animation,

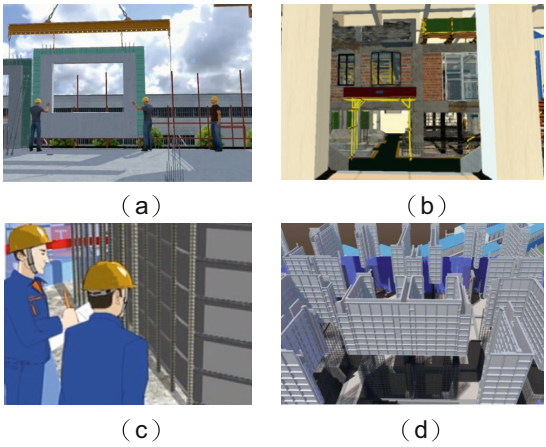

Fig. 4. Animation of Virtual Building Construction Training Teaching

which is tedious to produce; Compensation animation: pre define the content of the start point and end point of the animation. The process from the start point to the end point is compensation animation; Timeline special effect: it can provide users with "automatic" animation and visual effects that can be applied to objects, and can achieve effects such as copying to mesh, deformation, transformation, separation, expansion, projection, etc. The running effects of Java3D and VRML programs are basically the same. In Java3D, there are interpolator objects similar to VRML interpolator nodes, which can be combined with Alpha class to write various types of 3D animation programs. The Alpha class in Java3D has the same function as the key field in VRML. It is used to output the normalized time, but it can handle more complex scheduling problems. The functions of various interpolator objects in Java3D are similar to those of VRML interpolation nodes, which can be used to rotate the shape, move the coordinates of the shape, change the color of the shape, etc. In the animation, the TimeSensor continuously sends the time slice information. After receiving the time slice, the interpolator node will send it to the corresponding domain of the Transform node through interpolation calculation and path according to the set key points to realize the animation. When encountering complex animation design, the interpolator node is replaced by a code added to the Script node. These codes can generate and output animation data according to different animation requirements, which improves the flexibility of animation design. According to the virtual situation of building construction training, the teaching configuration is analyzed, as shown in Table 1 below.

As shown in Table 1, according to the characteristics of building construction, this paper collects a large number of construction cases all over the country, including building materials, structures and structures, detection and testing, measuring instruments, construction equipment, scaffolding, construction technology, engineering management cases, building seismic damage and reinforcement, current building regulations and technical standards, etc. The resource material library mainly includes text resources, picture resources, animation resources and video resources. The resource material database can search the building construction material resources by searching, which can realize the

Table 1. Teaching Configuration of Building Construction Training

Category	To configure
The server	CPU: main frequency 1.6G
	Memory: 512MB DDR
	Video card: 256M video memory
	Network card: 10/100M adaptive network card
	Hard disk: 160G
Client	CPU: main frequency 1.6G
	Memory: 512MB DDR
	Video card: shared video memory 128M
	Network card: 10/100M adaptive network card
	Hard disk: 80G
Network	Network transmission rate: 10Mbps
	Transmission medium: Class V twisted pair

retrieval of all materials, and can also realize the classification retrieval by category. Due to the new characteristics of virtual reality technology, the establishment of virtual training rooms only requires less funds, and the funds required for software upgrading and maintenance are less than those required for traditional instrument training rooms. Virtual reality technology has basically matured, has been widely used in the field of testing, and is also the development direction of future testing technology. The rapid development of network technology provides a strong technical guarantee for the realization of virtual training terminals. Computers are the hardware foundation of virtual instruments. General training rooms have a considerable number of computers. You can build virtual instrument terminals only by purchasing some relevant virtual instrument hardware, and the cost of purchasing these hardware is far lower than that of purchasing traditional instruments and equipment. It can be seen that after the application of intelligent mobile terminals to virtual building construction training teaching, it has economic feasibility, technical feasibility and resource feasibility, and can improve the quality of building construction training teaching to the greatest extent.

3 Simulation Experiment

In order to verify whether the practical teaching method designed in this paper has practical value, this paper has built a simulation experiment platform and carried out simulation analysis on the above methods. The practical performance of the conventional virtual building construction training teaching method based on deep learning, the conventional virtual building construction training teaching method based on the Internet of Things, and the virtual building construction training teaching method based on intelligent mobile terminals designed in this paper are analyzed to find the best teaching

scheme. The specific experimental preparation process and the final experimental results are shown below.

3.1 Experiment Preparation

The simulation hardware condition is a small portable computer equipped with 3. 2 GHz AMD R7 processor and 16 G RAM, and the software condition is Intelli J IDEA software with Java-JDK1. 8 environment. The task is set as a radar emitter identification task with a data volume of (20005000) MB. The data volume of large tasks in this chapter is several times that of small and medium-sized tasks, and the computing resources of the cloud computing center are also several times that of the MEC server. The simulation parameters are shown in Table 2 below.

Table 2. Simulation Parameter Settings

Parameter description	Parameter value setting
Initial number of terminals	30
Energy consumption for terminal mode conversion	300 J
Maximum tolerance delay	13 min
Local computing resources of the terminal	Random (1, 2) GHz
Computing resources assigned to a single task by the MEC server	Random (10, 15) GHz
Computing resources assigned to a single task by the cloud computing center	Random (1000, 1100) GHz
Size of task upload data	Random (2000, 5000) MB
Task return fuzzy prediction coefficient	0.3
Cloud computing communication delay estimation coefficient	1.1
Energy consumption conversion coefficient	10–19
Weight of delay in revenue	0.5
Weight of energy consumption in income	0.5
Terminal standby mode power	12 dBm

As shown in Table 2, building construction training teaching tasks are arranged within 100 s in this experiment. The average power of uploaded teaching tasks is about 30 dBm, and the noise power is about – 88 dBm, which can ensure the normal operation of mobile terminals. In this experiment, according to the basic needs of training teaching, the user roles are divided into the director of the training center, training administrator, training teacher, student, terminal administrator, etc. Among them, the director of the training center is the main participant in teaching, and is mainly responsible for the tasks of reviewing the training plan, viewing the training plan, reviewing the training application, putting forward and confirming reports for the inventory of construction

consumables and tools, making statistics and reviewing the standing book, reviewing the application for modifying the training results, reviewing the application for make-up examination, and reviewing the application for reeducation.

The training administrator is the main participant in teaching and is mainly responsible for publishing the approved training plan, making training arrangements according to the training application form, publishing the training schedule, confirming the lending registration and return registration of construction consumables and tools, counting construction consumables and tools, establishing and registering account information for account management. Set the sign in and sign out time and form the management record of the training process during the training process, register and review the training results and then publish them, modify the training results, register the make-up examination for students' training, arrange the make-up examination, review the make-up examination results, publish the make-up examination results, assign classes for re education, review the re education results, publish the re education results and other tasks. As the main participants in teaching, the training teachers are mainly responsible for writing the training plan, viewing the training plan and review results, training use application, viewing the use application results and training schedule, borrowing and returning applications for construction consumables and tools, reviewing the training process, reviewing the training report, evaluating the training results, filling in the training results, putting forward the application for modifying the training results view the modified practical training results, assess make-up examination results, generate retake results and other tasks.

Students are the main participants in teaching. They mainly view training plans, training schedules, sign in and sign out during training, write training reports, modify applications for training results, view training results, apply for make-up examinations, participate in make-up examinations, view make-up examination results, apply for revision, view class information for revision, participate in revision, and view revision results. The terminal administrator is responsible for teacher information management, student information management, professional information management, department information management, training type information management, construction consumables and tools information maintenance, user type information management and other tasks. The use case diagram of construction practice teaching management is drawn, as shown in Fig. 5 below.

As shown in Fig. 5, the training teacher enters the terminal login interface, enters the administrator user name and password in the user name and password box, and click the "Login" button; Enter the main interface of the terminal, select and click the "Basic Information Management" button; Enter the "Basic Information Management" interface and select the "Teacher Information Management" menu button; Enter the "Teacher Information Management" interface and select the "Teacher Information Maintenance" menu button; Display the teacher information list, and select information maintenance operations: add, modify, or delete; The teacher information editing interface is displayed. If you select Add or Modify, fill in or edit the required items of teacher information; Save the new or deleted teacher information to the teacher information table in the terminal database. Students enter the terminal login interface, enter the administrator user name and password in the user name and password box, and click the "Login" button; Enter the main interface of the terminal, select and click the "Basic Information

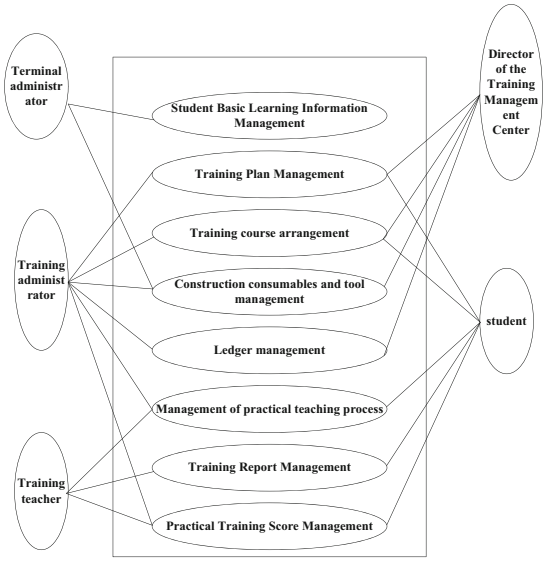

Fig. 5. Use case diagram of construction training teaching management

Management" button; Enter the "Basic Information Management" interface and select the "Student Information Management" menu button; Enter the "Student Information Management" interface and select the "Student Information Maintenance" menu button; Display the student information list and select the information maintenance operation: add, modify or delete; The student information editing interface is displayed. If you select Add or Modify, fill in or edit the required items of student information; Save the new or deleted student information to the terminal database student information table. The teacher enters the terminal login interface, enters the training teacher's user name and password in the user name and password box, and click the "Login" button; Enter the main interface of the terminal, select and click the "Training Plan Management" button; Enter the "Training Plan Management" interface and select the "Training Plan Writing" menu button; Enter the "Training Plan Writing" interface and click the "Add" button; Enter the training plan content editing interface and edit the content of the training plan, including: training name, training teacher, training project, training object, training semester, training purpose, training content, training requirements, training class hours, training textbooks, training reference books, training tools, training consumables, etc.

The training teacher can query the corresponding training report in the terminal by the name of the instructor and by the name of the student, directly review the training report, and give the evaluation results of the training report; Fill in the training results in the terminal and save them; The training administrator directly views the evaluated training results in the terminal, reviews them, and then publishes the training results. Students can directly query the training results through the terminal, and can view the training results by querying by student name and by training name respectively. By reviewing the data constraints of the business steps of the training report, filling in the data constraints of the business steps of the training results, saving the data constraints of the business

steps of the training results, reviewing the data constraints of the business steps of the training results, publishing the data constraints of the business steps of the training results, querying the data constraints of the business steps of the training results, etc., Ensure the orderly implementation of the whole virtual building construction training teaching course.

3.2 Experimental Results

Under the above experimental conditions, this paper randomly selects 10–80 terminals, and used the methods of reference [1], the methods of reference [2], and the intelligent mobile terminal based virtual building construction training teaching method designed in this paper. The experimental results are shown in Table 3 below.

Table 3. Experimental Results

Number of terminals	The benefit function of reference [1] method	The benefit function of reference [2] method	The benefit function of the virtual building construction training teaching method based on intelligent mobile terminal designed in this paper
10	8.25	8.24	8.20
20	17.19	17.37	15.43
30	26.21	26.49	19.98
40	34.54	32.18	22.36
50	44.14	45.63	27.43
60	52.26	49.52	30.34
70	63.45	52.18	34.66
80	71.36	69.40	38.07

As shown in Table 3, in the process of virtual building construction training teaching, the benefit function is the key indicator to test the teaching quality. The smaller the benefit function, the lower the delay and energy consumption of the intelligent mobile terminal, and the higher the terminal benefit. From the experimental results, it can be seen that when the number of terminals is small, the benefit function gap of the three teaching methods is small. With the increasing number of terminals, the benefit function of the virtual building construction training teaching method based on intelligent mobile terminals designed in this paper is significantly lower than the benefit function of reference [1] method and the benefit function of reference [2] method, and has always been in the optimal position. In other words, the teaching performance of the three teaching methods is ranked as follows: the virtual building construction training teaching method based on intelligent mobile terminal designed in this paper > the methods of reference [1] >

the methods of reference [2], which plays an important role in improving the quality of virtual building construction training teaching.

4 Conclusion

Virtual training teaching is a combination of computer technology, software technology, network technology and traditional training instruments to change the construction mode of training terminals, improve the overall performance of training, and break through the space-time constraints of training operations. It is a change in traditional training methods and the third scientific research method after theoretical research and training research. This kind of training neither consumes equipment nor is restricted by the external conditions such as the site. It can be operated repeatedly and has strong interactivity. It can more truly reflect the training object and process. It is a mirror image of the real science and technology field.

In this paper, intelligent mobile terminals are applied to virtual building construction training teaching. By establishing a virtual building construction training teaching function module, the immersive function of the training course is enhanced, and the immersive nature of the training teaching is effectively achieved. The use of terminals can simplify virtual building construction training teaching tasks and reduce other costs. The use of terminals can maximize the potential of virtual training courses, provide a better learning place for students in the College of Architecture and Engineering, and improve the overall teaching quality.

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