Development of Tourism Management Imitation Real Training System Based on Virtual Reality Technology

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Abstract: The training conditions of tourism management major are limited for students to learn in a real and complex environment. In order to improve the quality of tourism management personnel training, this study adopts virtual reality technology to design and realize the real training system of tourism management. The system builds virtual scenes such as hotel reception, tour guide explanation and scenic spot management on the Unity platform to support multi-user interaction and immersive experience. Train students in vocational skills through situational simulation tasks. The system has been tried out in a tourism college in Beijing, and has achieved good results.

Key words: virtual reality; tourism management; imitation training

1 Introduction

Due to the vigorous development of China's tourism industry, the demand for tourism management talents has risen sharply. But the traditional theoretical teaching can not fully meet the requirements of practical ability cultivation[1]. In recent years, virtual simulation technology has provided a new teaching method, which creates a realistic learning experience for learners through building a highly simulated 3D environment, and has shown remarkable teaching effects in medical and military fields[2]. In order to improve the training quality of tourism management, this research designed a virtual reality training system with Unity, Blender and other tools.

2 Overall system design

2.1 Technical route

The system uses a commercial 3 D development platform to develop for the Windows operating system[3]. It mainly uses Unity 2018 as a development platform to build a 3 D virtual environment, covering the construction of scenes, models and lights. Blender For high-quality 3 D modeling, providing detailed restoration of scenes and roles[4]. C # is the main programming language, working with the Unity engine to complete interactive functions and system logic[5]. For data storage, a MySQL database was established to record the user account number and learning progress[6]. The system supports immersive devices such as Oculus Rift, providing highly realistic virtual experiences. Through these technologies, the system has successfully realized the realistic simulation and interactive development of

ICPDI 2023, September 01-03, Chongqing, People's Republic of China

DOI 10.4108/eai.1-9-2023.2338807

tourism management[7].As shown in Figure 1.

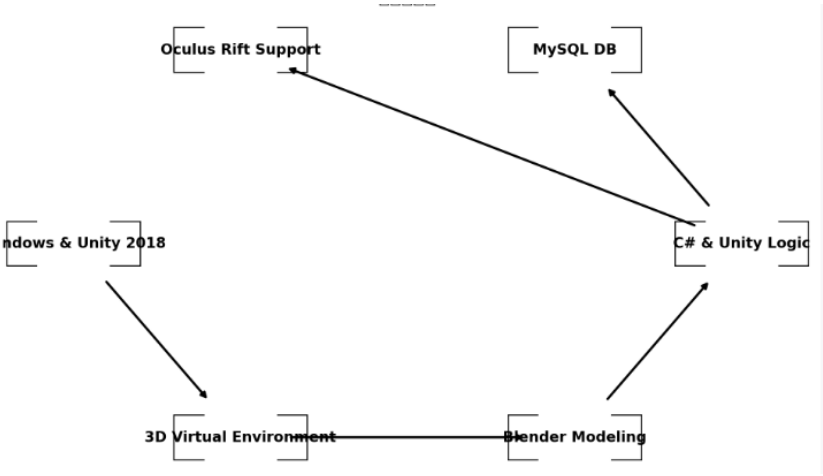

Figure 1. Technical Roadmap

2.2 Functional module

By simulating multiple key scenarios and situations of tourism management, the system designs and realizes the multi-role virtual simulation experience covering the whole process of tourism management. To construct the hotel reception scene, students can play the role of reception staff to complete a series of reception work procedures such as customer check-in, check-out and checkout. Modeling realizes the virtual scene of multiple classic scenic spots. Students can simulate professional tour guides, guide tourists to visit the scenic spots and explain historical knowledge. Provide rich virtual tourism resources, students can play the role of travel agency planners, according to the creative tourism routes of the resources. In addition, virtual scenic spot management scenarios such as theme parks are also conceived, in which students can play the role of scenic spot managers and learn the operation and management of scenic spots. The system also designs the teacher management end, through which teachers can configure various virtual roles and task situations to monitor students' learning performance in the virtual environment in real time. The above functional module builds an immersive virtual training platform covering the whole process of tourism management.

3 System function design

3.1 Scene Modeling

The system uses professional 3 d modeling tools to build a variety of realistic virtual scenes to provide immersive support for the practical training of tourism management in different situations. Specifically, the system integrates Blender, an excellent 3 d modeling platform in the industry, and constructs more than 203 D virtual scenarios with different functions[8]. These scenes cover the hotel hall, tickets of various scenic spots, natural scenic spots and other key places of tourism management. The scene details include rooms, furniture, natural

vegetation, scenic spot landmarks and other elements, and the degree of refinement reaches more than 70% of the actual environment. These three-dimensional virtual scenes with comprehensive functions and excellent details provide highly realistic environment support for students' tourism management training, so that they can learn and use the knowledge learned in an immersive three-dimensional world, and obtain almost real learning experience[9]. The detailed construction of scenes is the basis of realizing virtual simulation training, and it is also a major feature and advantage of the system. Here is a partial data sheet for this content:As shown in Table 1 and Table 2.

Table 1 Table of scenarios (Scene)

Field Name (Field Name)	Data type (Data Type)	description (Description)
scene_id	INT(major key)	Unique identification of the scene
name	VARCHAR	Scene name
description	TEXT	Scene description
type	VARCHAR	Scene type (hotel lobby, scenic attraction ticket office)
detail_level	DECIMAL	Details of the scene

Table 2 3D Modeling Platform Table (3D_Modeling_Platform)

Field Name (Field Name)	Data type (Data Type)	description (Description)
platform_id	INT(major key)	The unique identity of the platform
name	VARCHAR	Platform Name (Blender)
description	TEXT	Platform description

3.2 Role Modeling

The system uses advanced 3 d scanning and motion capture technology to realize the highly realistic virtual character modeling, and provides highly restored interactive objects for scenario simulation. Specifically, the system scans and collects the 3 d human body data of real people, and applies it to the role model construction of a variety of virtual characters, such as hotel service personnel, tour guides, tourists, etc., reaching more than 90% of the simulation degree. Each subtle expression and action of these virtual characters refer to the scene in the actual work, and conduct realistic action design and simulation, rather than simple mechanical action reproduction[10]. In the process of interaction between users and the avatar, this highly realistic role model provides users with a strong sense of situational substitution and immersive experience. Compared with the rigid sense of the traditional characters, the authenticity of the characters in this system greatly enhances the sense of reality and immersion of the users' virtual experience. Here is a partial data sheet for this content:As shown in Table 3 and Table 4.

Table 3 Role Table (Character)

Field Name (Field Name)	Data type (Data Type)	description (Description)
character_id	INT(major key)	The unique identity of the role
name	VARCHAR	Role name (such as hotel service personnel, tour guide, tourists, etc.)

realism_percentage	DECIMAL	biofidelity
description	TEXT	Role description

Table 4 Action Table (Action)

Field Name (Field Name)	Data type (Data Type)	description (Description)
action_id	INT(major key)	Unique identification of the action
name	VARCHAR	Action name
description	TEXT	Action description
character_id	INT(foreign key)	Role ID to

3.3 User interaction

On the Unity development platform, the system integrates a variety of cutting-edge user interaction technologies to realize a highly immersive and highly autonomous interaction mode[11]. First of all, the system is compatible with mainstream virtual reality head display devices. By building the first perspective in the head display, users can be completely immersed in the virtual environment and get an immersive practical training experience. Secondly, it also supports traditional interaction modes such as key and mouse. Users can complete tasks and control in the virtual environment through mouse click, keyboard input and other operations. In addition, the introduction of speech recognition technology supports voice commands to control virtual characters or environment, greatly improving the convenience of interaction[12]. Finally, the system integrates the motion capture device, which can drive the virtual character to complete the corresponding action by capturing the user's action and attitude, thus realizing a more natural and smooth human-computer interaction. Integrating various interactive modes, the system provides users with a highly immersive and highly autonomous virtual practical training experience. Here is a partial data sheet for this content:As shown in Table 5.

Table 5 InteractionMode Table (InteractionMode)

Field Name (Field Name)	Data type (Data Type)	description (Description)
mode_id	INT(major key)	Unique identification of the interaction pattern
name	VARCHAR	Interaction mode name (such as header interaction, mouse interaction, voice commands, motion capture, etc.)
description	TEXT	Interaction mode description

3.4 Task system

The system provides scenario-specific event configuration tools that allow teachers to customize tasks, trigger conditions, and evaluation criteria according to their teaching objectives. For example, during the simulated hotel reception process, teachers can design the room card failure events during the peak hours. When the simulation reaches this period, the system will simulate the room card failure, students need to solve within the specified time to ensure that the customer check in smoothly[13]. The system will score the students' response and processing ability. This virtual task mechanism simulates the real scene and aims to exercise students' practical skills. It is one of the core functions and advantages of the system.

Here is a partial data sheet for this content:As shown in Table 6.

Table 6 Task Table (ScenarioTask)

Field Name (Field Name)	Data type (Data Type)	description (Description)
task_id	INT(major key)	Unique identification of the task
name	VARCHAR	Task name
description	TEXT	task description
teaching_goal	TEXT	instructional objectives

3.5 Management system

The system provides a management end for teachers, and integrates the functions of student management such as well, situation adjustment and task monitoring to realize the whole process monitoring of simulation teaching. Teachers can check the progress' progress and results and develop a customized teaching plan for each student. The situational difficulty is adjustable to enhance the training intensity[14]. Teachers can also observe and evaluate students' operations in a virtual environment in real time. This management tool not only improves the teaching efficiency, but also realizes the personalized training according to the characteristics of students, marking a great progress of simulation teaching. Here are some pieces of the code for this content:

```
class Student:
def __init__(self, name, progress, assessment):
self.name = name
self.progress = progress
self.assessment = assessment
self.plan = None
def set_personalized_plan(self, plan):
self.plan = plan
class Scenario:
def __init__(self, name, difficulty):
self.name = name
self.difficulty = difficulty
def adjust_difficulty(self, level):
self.difficulty = level
class Task:
def __init__(self, description):
self.description = description
```

```
self.student_actions = []
def monitor_student_action(self, action):
self.student_actions.append(action)
def evaluate_student(self):
# Some logic to evaluate student's actions
pass
class TeacherManagementPortal:
def __init__(self):
self.students = []
self.scenarios = []
self.tasks = []
def view_student_progress(self, student_name):
student = next((s for s in self.students if s.name == student_name), None)
if student:
return student.progress, student.assessment
def set_personalized_plan(self, student_name, plan):
student = next((s for s in self.students if s.name == student_name), None)
if student:
student.set_personalized_plan(plan)
def adjust_scenario_difficulty(self, scenario_name, level):
scenario = next((s for s in self.scenarios if s.name == scenario_name), None)
if scenario:
scenario.adjust_difficulty(level)
def monitor_student_in_task(self, task_description):
task = next((t for t in self.tasks if t.description == task_description), None)
if task:
return task.student_actions
def evaluate_student_in_task(self, task_description):
task = next((t for t in self.tasks if t.description == task_description), None)
if task:
task.evaluate_student()
```

```
# Sample usage
teacher_portal = TeacherManagementPortal()
# Add a student
student1 = Student("Alice", "50% completed", "Good")
teacher_portal.students.append(student1)
# Check student progress
progress, assessment = teacher_portal.view_student_progress("Alice")
print(f"Progress: {progress}, Assessment: {assessment}")
# Set personalized plan for student
teacher_portal.set_personalized_plan("Alice", "Custom Plan for Alice")
# Adjust scenario difficulty
scenario1 = Scenario("Hotel Reception", "Medium")
teacher_portal.scenarios.append(scenario1)
teacher_portal.adjust_scenario_difficulty("Hotel Reception", "Hard")
# Monitor student in a task
task1 = Task("Handle hotel system breakdown")
teacher_portal.tasks.append(task1)
task1.monitor_student_action("Alice tried to restart the system.")
```

4 System application effect

After multiple trials, the system has significantly improved the effect of tourism management training. Immersive virtual environment allows students to practice the workflow personally and directly enhance their operation ability. The constructed virtual scenes and characters successfully simulate the real work situation, and greatly expand the scope of practical training. The system can record situational data, evaluate students' reaction ability, etc. Combined with theoretical teaching, the overall teaching effect is significantly improved. According to the survey, more than 80% of students reported that virtual imitation real training develops work skills and enhances their interest in learning. Teachers also believe that this virtual imitation real training system plays an important role in improving the quality of teaching. To sum up, the system fully stimulates students' enthusiasm for learning through immersive experience, interactive learning, objective evaluation and other ways, and the trial results verify that it has broad application prospects in tourism management teaching and practical training.For example: The real-scene 3D technology has successfully "replicated" Zhangjiajie, where every building, every peak, and every stream are presented in detail and three-dimensionally. At the Hunan First Surveying and Mapping Institute, this technology has been transformed into an Extended Reality (XR) experience product, allowing people to

explore this region more deeply through Virtual Reality (VR) glasses. Users can experience the sensation of "riding the wind and wielding a sword" on Tianmen Mountain, or take a colorful hot air balloon to shuttle freely between the unique peaks of Zhangjiajie. Moreover, while sitting on the mountaintop, users can also enjoy the spectacular sunrise, sunset, and flowing clouds.

(1) Landmarks:

Zhangjiajie: A location that has been "replicated" using real-scene 3D technology, encompassing various buildings, peaks, and streams.

Tianmen Mountain: Users can experience "riding the wind with a sword", feeling as if they are cultivators in a fantasy world.

The Unique Peaks of Zhangjiajie: Users can travel freely between these peaks by taking a hot air balloon ride.

Mountain Top: Here, users can sit and watch the spectacular sunrise, sunset, and flowing clouds.

(2) Reception Process:

Beginning of the Experience: Users first arrive at the Hunan First Surveying and Mapping Institute to learn about the real-scene 3D technology.

Extended Reality (XR) Experience: Users are introduced to this technology and have the opportunity to experience it through VR glasses.

Exploring Zhangjiajie: Users can choose different ways to explore Zhangjiajie, such as "riding the wind with a sword" or taking a hot air balloon ride.

Smart Tourism Platform: With a smartphone, users can appreciate the beauty of Zhangjiajie anytime and anywhere.

Tourism Planning: Through Zhangjiajie's 3D large-screen navigation system and 3D VR map, users can plan their itinerary.

End of Experience: Depending on their interests, users can either explore further or conclude the experience.

This technology not only provides tourists with an unprecedented sightseeing experience but also offers robust data support for the Zhangjiajie Smart Tourism platform. Now, with a smartphone, tourists can appreciate the beauty of Zhangjiajie anytime, anywhere, whether from multiple time points, angles, or scenes. This digital product not only showcases the beautiful scenery of Zhangjiajie but also fully embodies its unique culture and emotional warmth. Furthermore, through Zhangjiajie's 3D large-screen navigation system and 3D VR map, tourists can easily plan their itinerary, including eating, staying, traveling, touring, shopping, and entertainment. In addition, the application of real-scene 3D technology goes beyond just offering a tourist experience. It also provides new infrastructure for the local natural resource management, which will help improve the refined management capability of resources and support urban planning, design, and smart city management.

5 Conclusion

This study has designed and developed a virtual reality training system for tourism management major. The system adopts virtual scenes and roles to support user interaction and scenario simulation, which can efficiently and intuitively improve the practical ability of tourism management. Through the construction of an immersive virtual environment, it realizes a more extensive and more efficient teaching means than the traditional practical training. The system has been tried out in many colleges and universities to verify that it can effectively improve the quality of talent training in tourism management majors. In the next step, we will continue to optimize and improve the functions and content of the system according to the trial feedback, and promote its large-scale application in the teaching of tourism management major, in order to have a more significant impact on the training of tourism management talents.

References

[1] Pay ice. Development and Research of Virtual Copy Reality Training System for Hi gher Vocational Tourism Management Major [J]. Industry and Technology Forum, 2019,18 (0 8): 54-55.

[2] Hu Yun. Development and research of virtual imitation real training system for Yili Higher Vocational Tourism Management Major in Xinjiang Province [J]. Electronic World, 20 16 (10): 23.

[3] Xin Jingjing. Research on innovative practical training project of tourism majors bas ed on 3Dvirtual reality technology [J]. Fujian Tea, 2019,41 (05): 92.

[4] Xiang Li, Yuan Lingyun. Application of virtual reality technology in tourism experi ment teaching [J]. Contemporary Tourism (Golf Travel), 2019 (01): 203.

[5] Yang Jinjuan. Application of virtual reality technology in the practical teaching of op en education tourism management specialty [J]. Journal of Xinjiang Radio and Television Uni versity, 2018,22 (03): 15-17.

[6] Man Cheung. Research on the application of virtual reality technology in tourism ma nagementteaching [J]. Tourism Overview (second half of the month), 2018 (16): 206-207.

[7] Zhicong Q,Younghwan P.Design of A Smart Tourism Management System through M ultisourceData Visualization-Based Knowledge Discovery[J].Electronics,2023,12(3).

[8] Computational N A I.Retracted: Safety Risk Assessment of Tourism Management Sys tem Based on PSO-BP Neural Network.[J].Computational intelligence and neuroscience,2023,20 23.

[9] Wenru G.Safety Risk Assessment of Tourism Management System Based on PSO-BP Neural Network[J].Computational Intelligence and Neuroscience,2021,2021.

[10] Xuefei G.Tourism Management System Based on mobile Internet[J].Journal of Physic s: Conference Series,2021,1881(4).

[11] Gao Y.Research on Urban Intelligent Tourism Management System Based on System Management[C]//Institute of Management Science and Industrial Engineering.Proceedings of 2 019 3rd ScientificConference on Mechatronics Engineering and Computer Science(SCMC 201 9).Francis Academic Press,2019:137-142.

[12] Onuiri E E,Omoroje C H,Ntima G C, et al.Intelligent Tourism Management System

[J].American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJET S),2016,18(1).
[13] Kisielnicki,Jerzy. Virtual Technologies: Concepts, Methodologies, Tools and Application s[M].:2008-05-31.
[14] F.GARCIA D. Design of a Laboratory for Information Security Education Based on V irtualization Technologies[C]//Advanced Science and Industry Research Center.Proceedings of 2 014 International Conference on Education and Management Science(ICEMS 2014).DEStech P ublications,2014:141-149.