3D ADVENTURE GAME DEVELOPMENT: CHINESE TRADITIONAL TRAIL

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ABSTRACT

This study aims to develop a 3D adventure game to promote the popularization of traditional Chinese customs and culture. The game was designed to help more people in different cultural environments learn about traditional Chinese customs and culture more conveniently and efficiently so that traditional Chinese customs and culture can be effectively promoted. The game will provide a suitable environment for users to explore traditional Chinese customs and culture in close contact. In the map provided by the game, users can operate the character to walk around by themselves and explore conventional Chinese customs, activities, objects, etc. The game will be developed primarily in Unity3D, and the scene maps will be built with Blender. The game will be created in Unity3D and programmed in c#. The game is divided into two main modules: outdoor and indoor. Objects with Chinese traditional cultural characteristics will be distributed in various parts of the map. Users can click on a specific item, and the information about the item will be introduced or interacted with after the click. The game is presented in 3D style, making the scenes and objects more realistic and detailed. The adventure game format enhances the user's motivation and brings the user a high degree of freedom in the game experience. Users can better understand and experience traditional Chinese customs and culture through immersive exploration and interaction.

INTRODUCTION

With China's development becoming increasingly modern, the new generation of young people is becoming increasingly distant from traditional Chinese culture and

customs. Many excellent traditional Chinese cultural customs have been gradually forgotten under the influence of modernization, resulting in fewer and fewer people understanding traditional Chinese culture and customs. At the same time, there are problems in spreading the knowledge of traditional Chinese culture and customs. In the literature of Xiaomei Shang and Yaonan Li (ICMESS 2018), it is pointed out that there are severe deficiencies in new media in disseminating traditional Chinese culture. The main body of dissemination is dominated by the lack of official and professional attractiveness, and at the same time, the form of dissemination is single. This results in a smaller scale and intensity of traditional Chinese cultural knowledge dissemination.

Traditional teaching methods are monotonous and inefficient in disseminating knowledge. Monotonous lectures in conventional education make students disinterested and easily distracted, making it difficult for them to absorb knowledge efficiently. In a study conducted by Scott Freeman, Sarah L. Eddy, Miles McDonough, Michelle K. Smith, Nnadozie Okoroafor, Hannah Jordt, and Mary Pat Wenderoth (12 May 2014), it was found that in traditional stand-up lectures, undergraduate students were 1.5 times more likely to fail a course than students who used more motivational techniques. Conventional teaching methods are also less applicable and require more time and effort. In traditional education, students have to set aside time to attend lectures, which does not allow them to study anytime, anywhere. When attending lectures, it is necessary to be energetic and control their concentration on unattractive content.

Many traditional educational games are very monotonous... There is no need to be polite here; most severe/educational games are just too serious... and boring. Mathias Poulsen, Serious(ly) Good Games? Currently, feedback about the boredom of traditional educational games can be found in many magazines, websites and other platforms. Some game designers create educational games that are neither motivating nor fun (Robert Haworth, Kamran Sedig,2011). Many educational games lack good form and style design, which makes it difficult to attract users for immersive and efficient learning. An example of a game is Team Xtreme, a game listed by 1 More Castle as one of the worst educational games ever. The game aims to improve users' understanding of weather patterns and natural disasters but has been criticized for being too simple and engaging for students. Monotonous traditional educational games are inefficient in disseminating knowledge and cannot serve a good educational purpose. Therefore, this project develops an educational 3D game called "Chinese Traditional Trail." The game provides free exploration and implanted challenges of

moderate difficulty to attract players better and increase their motivation while improving their knowledge-learning efficiency. It enables players to learn about the relevant cultural knowledge efficiently, thus promoting the efficient spread of traditional Chinese culture.

The development of this project will focus on increasing the users' motivation to play the game as well as the immersive experience, and at the same time, increasing the users' learning efficiency about the knowledge related to traditional Chinese culture. The objectives of this project are to research and collect information about traditional Chinese culture and customs, to design and develop a computer game application about traditional Chinese culture and customs, and to test the developed game application through user acceptance testing.

The program is an educational 3D adventure game for users of all ages. The target users are mainly students and those interested in traditional Chinese culture. The game promotes a broader and more effective dissemination of traditional Chinese culture. The game supports personal computers. The language used in the game is English.

METHODOLOGY

The project is being developed using the Agile Process Model. The Agile Process Model is a software development methodology based on iterative development. This approach divides the project into several phases and emphasizes continuous collaboration and improvement. In the development process using this methodology, each iteration is designed as a complete software development lifecycle, including planning, requirements analysis, design, coding and testing before a working product is delivered to the customer. The methodology allows for continuous improvement based on customer satisfaction and needs.

Planning

Identify user needs and related game development tasks. Define the educational objectives of the game. Determine how driving content will be integrated into the game being developed. Obtain feedback from stakeholders to ensure the game meets their needs.

Design

Design the game mechanics, the characters that will appear in the game and the

environment in which the game will be played. Identify the traditional Chinese cultural objects and activities featured in the game. Make a storyboard for the game. Obtain stakeholders' feedback to ensure the game is engaging and meets its educational objectives.

Coding

Develop the game using an iterative approach. Group the features of the game that need to be developed. Work on and test a small part of the game at a time. Complete the development and testing of the previous section before moving on to the next section. This allows for timely feedback from stakeholders to ensure the game is engaging and meets the desired game objectives.

Release

Deploy the game into the working environment. Feedback is sought from users to ensure that the game meets its intended purpose and needs.

Acceptance testing

Gather user feedback and make changes and improvements to the game based on that feedback. Ensure that the game can be continuously improved based on changing requirements and feedback.

The project collected and analyzed the information and results of the user testing in two main phases. Seventeen users who might be interested in traditional Chinese culture were arbitrarily selected for this project. Firstly, the test users were provided with the operation manual, and the operation feedback was collected based on the test cases. After ensuring the users completed the game experience, the test users were given an experience feedback questionnaire to gather suggestions and experience feedback. Finally, the test results were summarised and analyzed, and the problems were modified. Some of the functions were improved according to the users' feedback.

DECISIONS AND CONVERSATIONS

The 3D educational adventure game Chinese Traditional Trail has been developed, and all the related documentation has been completed. Chinese Traditional Trail is developed in Unity, mainly in C#, and scripted in Visual Studio. The game uses SQLite as the database so that the relevant data can be saved locally promptly. At the same time, the game is modeled by Blender.

After entering the game, the player will see the main interface shown in Figure 1. If it is the first time the player has played the game, he needs to click the Register button to register his account. If you already have an account, you can log in by clicking the Log In button.

Figure 1 Main game interface

You will be brought to the registration page shown in Figure 2 when the Register button is clicked. Players must enter a customized username and password with a length greater than 3 to register as a user. After completing the fields, click the Register button. The game will pop up a prompt to inform the player whether the registration is successful.

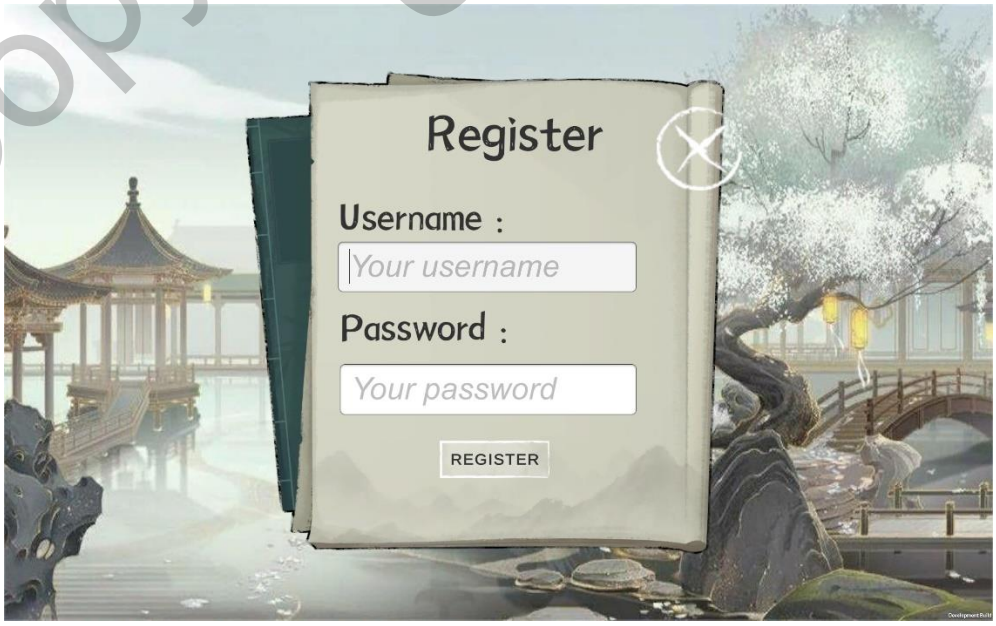

Figure 2 Registration interface

Players with an account can click the login button to enter the login screen shown in Figure 3. After entering a valid username and password, you can successfully log in to the game.

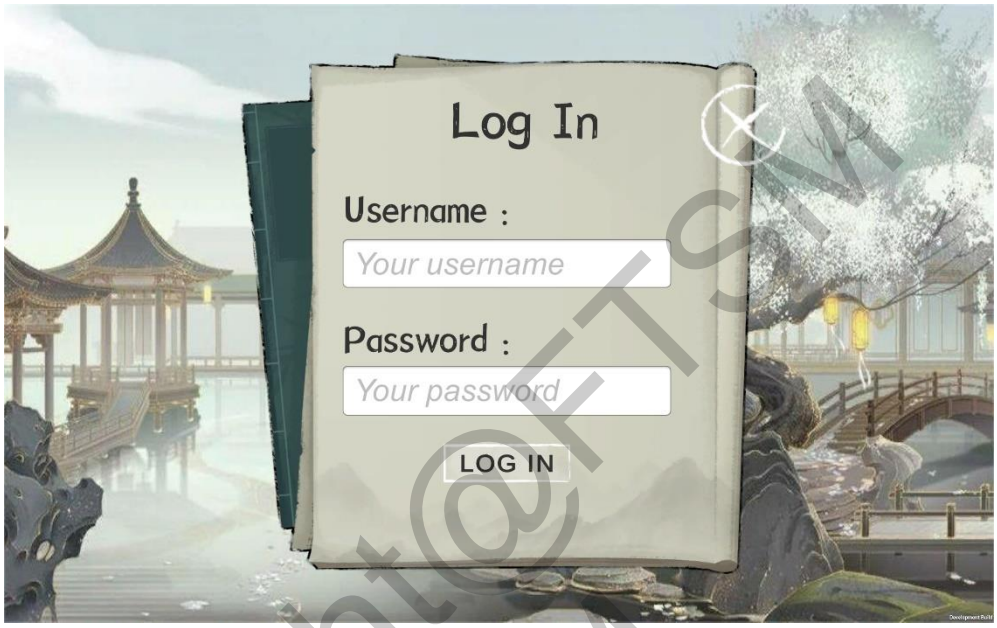

Figure 3 Login screen

After successfully logging into the game, the player will first come to the outdoor map. The game will provide the player with the game guide content and instructional video shown in Figure 4. It tells the player about the game's main mission and how to operate it.

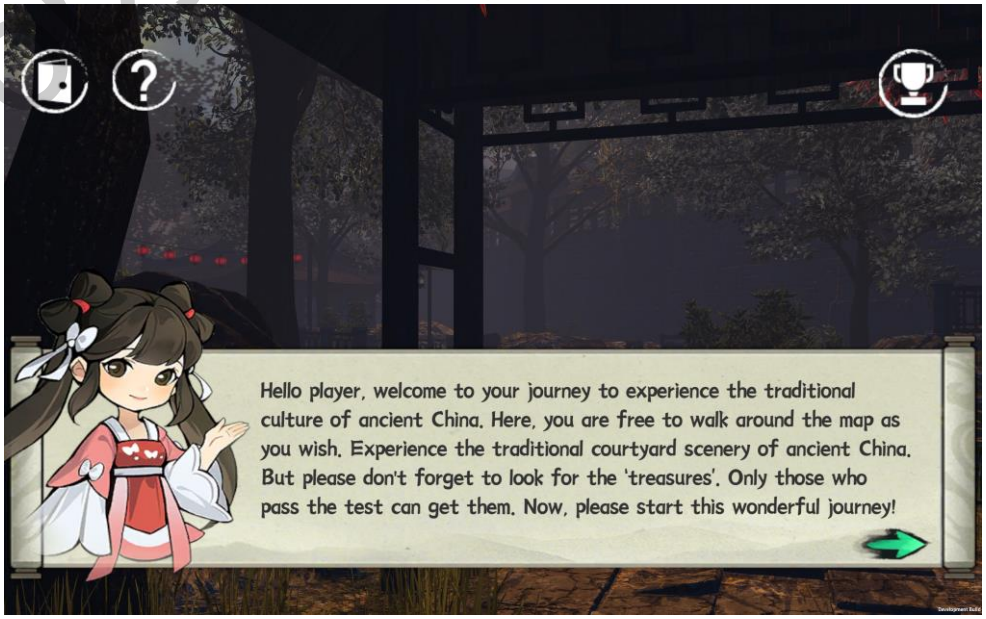

Figure 4 Game guide interface

Players can freely explore the outdoor map after completing or skipping the instructional video. As shown in Figure 5, a certain number of special items will be placed on the map, and players will interact with them by clicking on the item.

Figure 5 Interactable objects

As shown in Figure 6. After the player clicks on a special item, the knowledge and information about that item will appear. Players need to finish reading and learning the information. After learning, the player can proceed to the related challenge by clicking the Continue button.

Figure 6 Item Information

After completing the relevant challenge, players can obtain the reward props corresponding to that item. Players can click on the backpack button in the upper right corner to open the backpack and view the quest props that have been obtained. The backpack interface is shown in Figure 7.

Figure 7 Backpack interface

Once players have collected enough quest props for the outdoor map, they can click on the main buildings in the outdoor map to submit quest props and unlock the indoor levels.

Figure 8 Map switching items

After the player enters the indoor map, free exploration is possible. You must interact with the items on the map similarly and collect enough quest props by completing the challenges.

Figure 9 Interactable objects in indoor maps

After completing the collection of all items, as shown in Figure 10, the game will pop up a reminder of reaching the pass achievement. Players can continue exploring on the map or exit the game directly.

Figure 10 Passing tips page

Software Functionality Test Results

17 users completed the test, and the functionality results are compiled and presented as follows:

Table 1 Software Functionality Test Results

Test Case ID	Content of the test	Pass/Fail	Remark
Case_001_1	Invalid account cannot be registered	Pass	-
Case_001_2	Valid accounts can be registered	Pass	-
Case_001_3	Accounts cannot be re-registered	Pass	-
Case_002_1	Can't log in with a non-existent account	Pass	
Case_002_2	Registered accounts can successfully log in	Pass	-
Case_002_3	The same account cannot be online at the same time	Pass	-
Case_003_1	Buttons for interacting with items work	Pass	-
Case_004_1	Normal increase of items in the backpack after a successful challenge	Pass	-

Table 1 summarizes the functional testing feedback from 17 users after using the Chinese Traditional Trail game. The feedback results indicate that each major function of the Chinese Traditional Trail can be smoothly implemented.

User Feedback Questionnaire Result

After 17 users completed the Chinese Traditional Trail game, they filled out the feedback questionnaire. Figures 11 to 25 below show the 15 questions in the questionnaire and the statistics of the feedback results given by the 17 users.

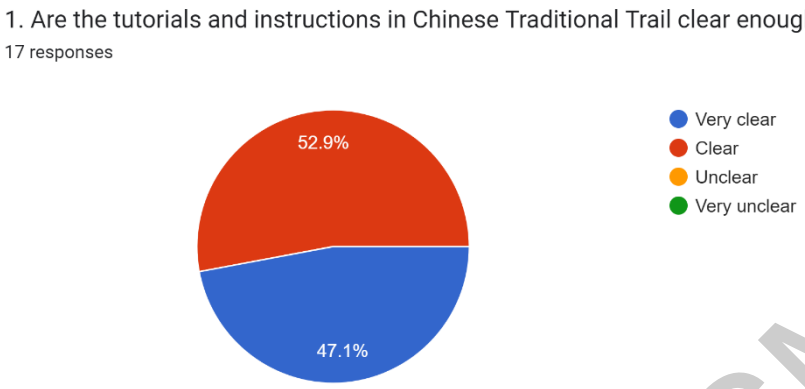

Figure 11 Game Tutorial Feedback

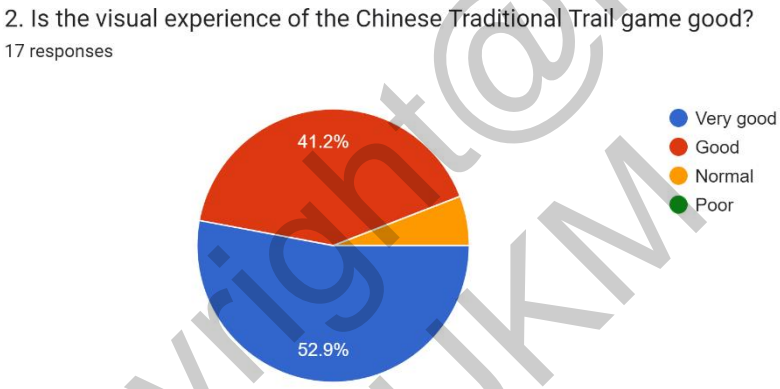

Figure 12 Game Visual Feedback

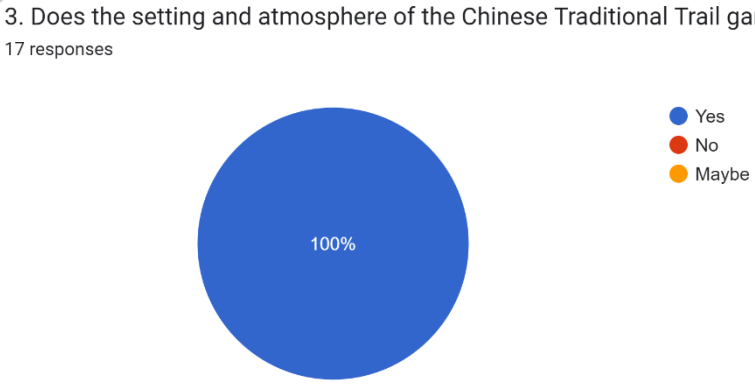

Figure 13 Theme Fit Feedback

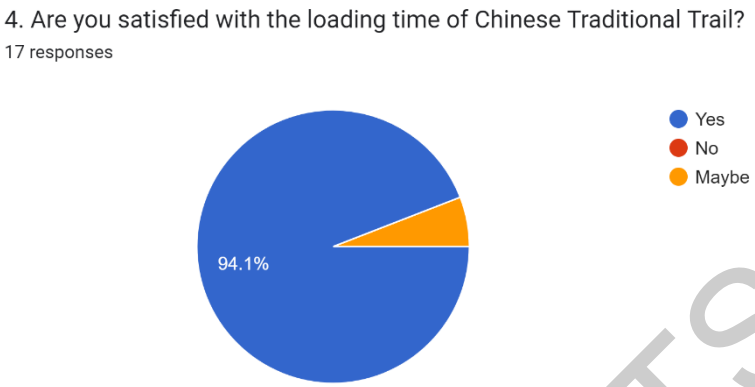

Figure 14 Performance Feedback

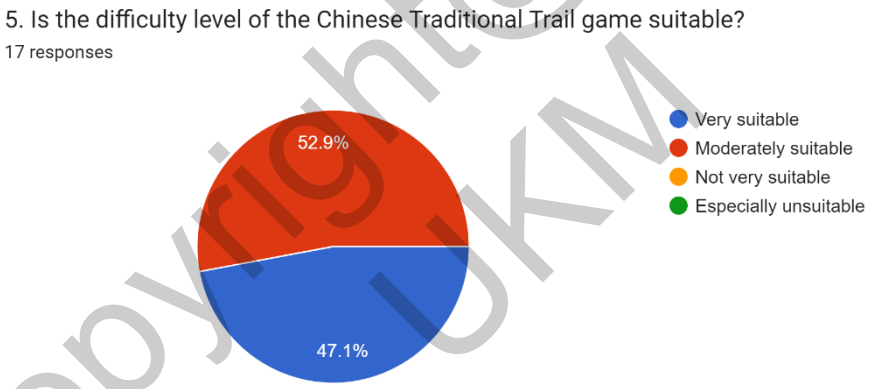

Figure 15 Challenge Difficulty Feedback

6. Can the Chinese Traditional Trail game help you experience the traditional culture and customs of ancient China?

17 responses

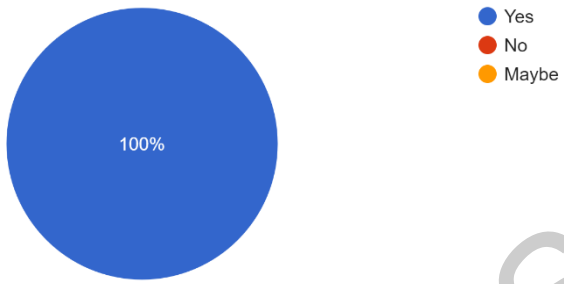

Figure 16 Feedback on Promoting Cultural Feelings

7. After playing Chinese Traditional Trail, have you learnt anything about ancient Chinese objects?

17 responses

Figure 17 Knowledge Dissemination Efficiency Feedback

8. Do you find the Chinese Traditional Trail game attractive?

17 responses

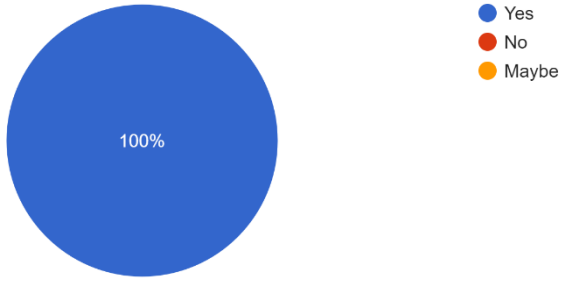

Figure 18 Game Attractiveness Feedback

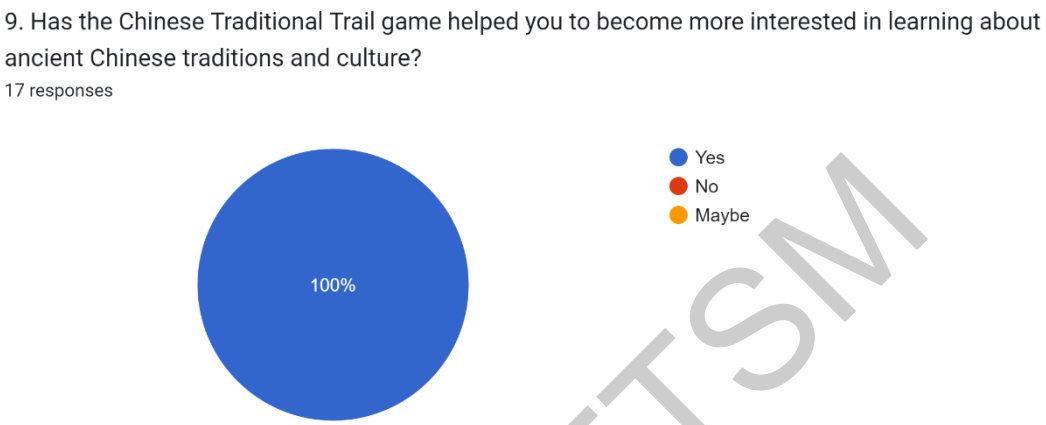

Figure 19 Feedback on Promoting Interest in Learning

Figure 20 Feedback on ease of operation

Figure 21 Learning Efficiency Feedback

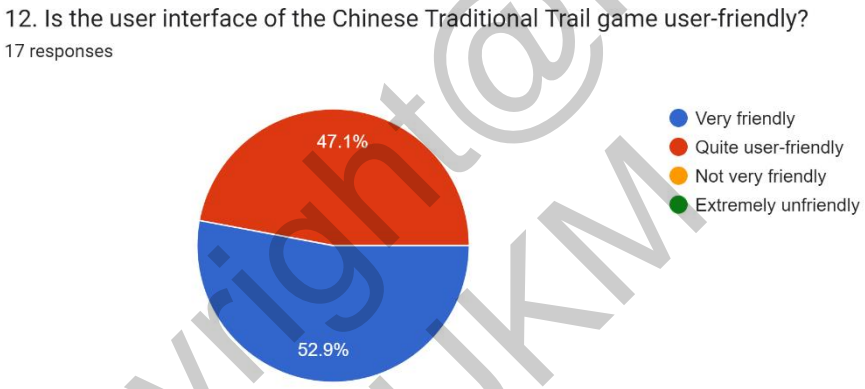

Figure 22 Feedback on User Interface

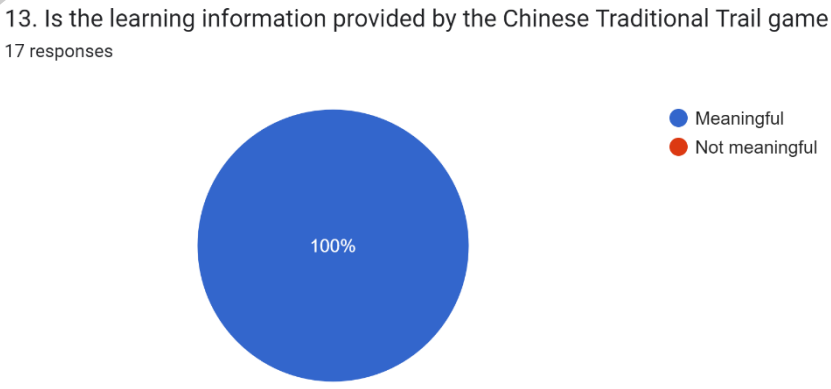

Figure 23 Feedback on Game Meaning

Figure 24 Feedback on Expectation Conformity

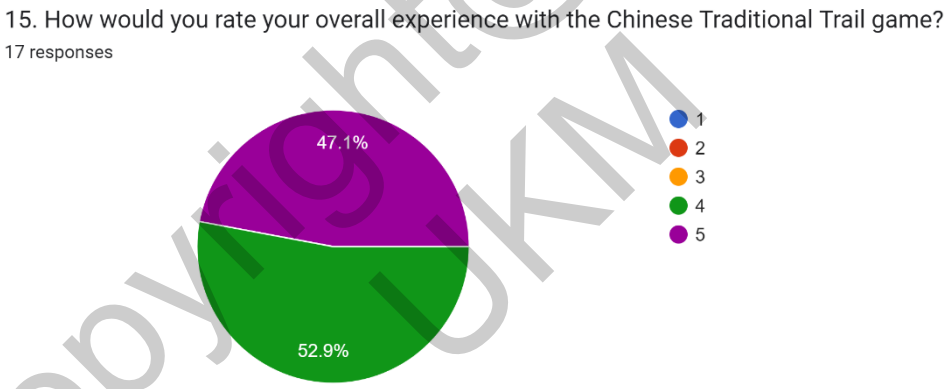

Figure 25 Overall Evaluation

Based on the analysis of the results collected from the 17 questionnaires provided in Figure 11—Figure 25, it can be seen that the overall effect of the Chinese Traditional Trail game is relatively good, the basic functions can be successfully implemented, and there is a certain degree of educational significance, which can achieve the basic objectives of the development. The visual effect of the game still needs to be improved. Meanwhile, the game's user interface and level design must be further optimized to make the game more attractive.

Future Conception of Application

If the number of people interested in the Chinese Traditional Trail game grows, I will expand the range and variety of maps. The variety of maps can be not only limited to traditional Chinese gardens and common indoor areas, but more varied maps can also bring a more comprehensive experience to the users. It will also be possible to present a wider variety of items. As the size of the maps increases, the quests in the game can be more diversified so that the user can efficiently gain knowledge through the quests.

CONCLUSIONS

With the progress and development of science and technology, people have higher and higher pursuits and expectations for education methods and approaches. The rapid progress of science and technology has provided a good platform and various ideas for realizing more efficient education methods. Nowadays, more and more people engaged in the education industry tend to improve people's learning efficiency from the perspective of interest. The technique of combining video games with education is gradually being widely used. This project provides users with a lot of knowledge and information about traditional Chinese culture and customs in the form of a game, and the 3D visual effect can provide users with more accurate information and a more immersive gaming experience. The free-exploration game format can better enhance players' interest. At the same time, the challenge and reward mechanism can promote the learning efficiency and motivation of the users. Chinese Traditional Trail's unique game format and sound visual effects can increase users' interest and spread knowledge and information more efficiently than traditional educational games.

Advantages of the Developed System

Chinese Traditional Trail is built with 3D models, which provides a better visual experience than traditional 2D games, and at the same time, it can better reproduce the appearance of the environment and objects to be introduced, which can disseminate the relevant knowledge more efficiently and rigorously. Chinese Traditional Trail adopts a free-exploration game format to provide users with more room for manipulation, which can effectively improve the game's attractiveness. Chinese Traditional Trail's free-exploration gameplay provides users with more room for maneuvering, which effectively enhances the attractiveness of the game, and Chinese Traditional Trail's challenge format promotes the player's learning, which is highly efficient. Chinese Traditional Trail provides detailed instructional videos for novice players, which is user-friendly for most users.

Limitations of the Developed System

Chinese Traditional Trail currently has a small map interface, which limits the knowledge that can be transmitted by the game. The game also has fewer types of maps, only two types of maps, which limits the scope of knowledge that can be presented.

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