

3D NATURE EXPLORATION UNDERWATER LIFE GAME FOR KIDS

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Abstract

Today, games are widely used in various fields as an important educational method, especially in education, and we are also committed to creating a game world where children can feel joy and learn knowledge. This game aims to educate primary school kids, aged 6–12, about underwater creatures. The game's purpose is to provide a new way to educate children about the underwater world. Children spend most of their time seeing fish on plates and in aquariums, and this game gives children another way to observe life underwater.

In the game, players are encouraged to use a variety of learning methods, including role-playing and game-based learning, so that children can learn about and feel nature differently. We will use the ADDIE model to develop this game. Game levels will be developed in Unity 3D, with C# as the primary development language and game script. Regarding the database, MySQL will store the player's account and password. The game contains an interactive user interface, simulated physics systems, and different

environments. The games are divided into four sections: the quiz area, the knowledge area, the video area, and the game area. The children can watch slide shows, videos, and play games.

keyword: [underwater life,educational game]

Introduce

Background:

Natural science plays a crucial role in children's education, enabling them to explore and understand the wonders of the world around them. However, when it comes to underwater creatures and marine ecosystems, children often rely only on books or videos for information. To fill this gap and foster a deeper appreciation for marine life, we have developed an educational gaming application called "3D Nature Exploration: Underwater Life."

Objectives:

The main objectives of this project are as follows:

1. Create an immersive and realistic underwater environment: Our goal is to design and develop a visually stunning, lifelike marine environment that captures the beauty and diversity of marine creatures. This will include coral reefs, seagrass beds, and underwater volcanoes, providing a captivating and authentic underwater experience.
2. Implement intelligent behaviors for marine creatures: The game will incorporate artificial intelligence to simulate various marine creatures' behaviors. These creatures will exhibit lifelike movement patterns, respond to player interactions, and interact with their surroundings, creating a dynamic and engaging gaming experience.

3. Introduce a quiz component: We will include a quiz feature in the game, allowing players to test their knowledge of fish and marine ecosystems. Players will face questions related to the ocean, and their answers will provide educational insights, deepening their understanding of marine life.

4. Incorporate educational videos: Our software will support the playback of educational videos, allowing players to learn about marine life through visual content. These videos will provide additional insights and information, enhancing the educational value of the game.

By achieving these objectives, we aim to create a fun and educationally meaningful gaming experience that stimulates curiosity, promotes learning, and fosters a deeper sense of awe and respect for the ocean and its rich biodiversity.

Scope:

The game's scope is specifically targeted towards children aged 6 to 12 and developed for personal computers. By offering a variety of fish species and exploring different marine ecosystems, the game aims to impart knowledge about the inner relationships and delicate balance within marine ecosystems. It is designed to spark curiosity, promote learning, and evoke a deeper emotional connection to the ocean and its biodiversity.

Justification and Importance:

The significance of marine life in human existence cannot be underestimated. Whether as a food source on our tables or a crucial part of the ecological food chain, marine creatures are vital components of our existence. However, with the intensification of urbanization and industrialization, children are becoming increasingly disconnected

from nature. Therefore, our game aims to awaken their curiosity about the ocean and instill a sense of awe and appreciation for the marine world.

Methodology:

In this project, we adopt the Addie model as the development methodology. The Addie model is a five-step development model: Analysis, Design, Development, Implementation, and Evaluation. Each step of the model holds significance, ensuring that the game's design and development process is systematic and scientific, meeting the needs and expectations of the target users.

Through the effective application of the Addie model, we can ensure a rigorous and organized game development process, ultimately delivering an educational children's game that meets user expectations and has educational value.

Report Organization:

Throughout the technical report, we will include the following sections: Introduction, Research Methodology, Results and Discussion, Conclusion, Acknowledgments, and References. Through this structure, we will comprehensively showcase the game's development and research process, clearly presenting the game's objectives and significance.

Research Methodology

Development Process Model :

In the technical report, we adopted the ADDIE model as the development process model. The ADDIE model is a five-step development model: analysis, design, development, implementation, and evaluation. Here are the specific steps we took in each stage:

Analysis :

In this stage, we first studied and simulated the behavior of fish, watched BBC documentaries to learn about the marine food chain, and chose fish that children love as representatives.

Design :

In the design stage, we drew concept maps and basic code flows, and planned the overall architecture of the game to ensure that the game experience could meet the educational goals.

Development :

Based on the planning of the design stage, we started to develop the most basic scripts and environments of the game, and ensured that the core functions of the game were realized.

Implementation :

Once the core functions of the game are completed, we will further carry out the implementation stage, complete the remaining projects, and ensure that the various

functions of the game are running normally, and the user interface is friendly and easy to use.

Evaluation :

Finally, we will give the demo version of the game to many players or children for testing, and collect their feedback in order to improve and optimize.

The use of the ADDIE model helps to ensure that our game development process is systematic and scientific, and it also fully meets the educational goals of the game. Through the orderly application of this model, we believe that we will successfully develop an educational game for children that is rich in educational significance and popular.

Research Methodology

Data Collection Method :

To collect data about the ocean, we adopted a variety of methods, including online resources such as documentaries from the BBC (British Broadcasting Corporation) and other web resources.

BBC: The BBC is an authoritative media organization with a wide range of marine science and natural history programs, articles, and materials. We collected a wealth of marine knowledge by consulting relevant BBC content, covering information on a variety of marine organisms, marine ecosystems, and marine environments. The reliable and professional information provided by the BBC provides strong support for the knowledge content and educational value of the game.

Web resources: In addition to the BBC, we also use other web resources such as scientific websites, educational platforms, and professional forums to obtain ocean-related data. These web resources bring together knowledge and research results from the fields of marine scientists, biologists, and environmental experts, providing us with comprehensive information about the ocean.

By combining data from these online resources, we ensure the comprehensiveness and accuracy of the game content and learning experience. The collected ocean data will be used for the design and development of the game, providing players with an interesting and educational ocean exploration journey. We hope that through such data collection methods, we can inspire children's interest in the ocean and improve their awareness of environmental protection and marine conservation.

Data Analysis Method :

Text analysis:

When processing text-type data, we use advanced natural language processing (NLP) techniques. This includes using NLP algorithms and models such as text classification, sentiment analysis, and entity recognition to extract information such as keywords, topics, and emotions. We have collected a large amount of ocean-related articles and reports from multiple online resources, such as BBC. Through text analysis, we can deeply explore the information in these text data, quickly identify keywords such as marine life, ecosystems, and environmental protection, and understand the themes and emotional colors conveyed in them. This helps to provide important references and inspiration for the design and educational content of the game, and ensures that the game can accurately deliver ocean knowledge.

Visualization analysis:

In order to present the distribution and correlation of ocean-related data more intuitively and clearly, we have adopted powerful visualization tools and techniques. Through data visualization, we convert ocean data into charts, graphs, and maps to intuitively present the characteristics and trends of the data. For example, we can use maps to mark the distribution areas of different marine life, use charts to show the changing trends of marine ecosystems, or use graphs to present the progress of players in learning ocean knowledge in the game. This intuitive display will help players better understand ocean data, deepen their understanding of ocean knowledge, and at the same time improve the educational and fun of the game.

Through text analysis and visualization analysis, we will fully explore and present the information of ocean data to provide comprehensive and valuable support for the development and design of the game. These data analysis results will become an effective tool for delivering ocean knowledge in the game, allowing players to have a rich ocean learning experience in an immersive game experience, and inspire them to be interested in and concerned about the ocean.

Measurement and Measuring Tools :

To evaluate the effectiveness of the project's development outcomes, we have employed the following two measurement and measurement tools:

White Box Testing:

White box testing is a testing method that relies on a deep understanding of the software's internal structure and code to assess its functionality and stability. In our project, we will conduct white box testing to examine whether the game's various components and features work as expected. We will meticulously review the game's code, perform unit tests and integration tests to ensure the correctness and robustness

of the code. White box testing helps us identify and address potential issues early on, thereby improving the game's quality and stability.

Usability Testing:

Usability testing is a user-centered testing method used to evaluate users' experience and satisfaction while using a product. We will invite a group of target users, specifically children in the age group of our players, to participate in the game's usability testing. During the testing process, we will observe players' behaviors and reactions in the game, and gather their feedback and suggestions. Through usability testing, we can understand players' experiences and feelings in the game, identify any issues or confusions they may encounter, and promptly optimize and improve the game to enhance the user experience.

User Acceptance Testing:

User acceptance testing is conducted in the final stages of software development to ensure that the software meets users' requirements and expectations. In our project, we will conduct user acceptance testing with our target users, children in the age group of our players. They will play the game in a real gaming environment and provide their overall feedback and opinions. The results of user acceptance testing will help us validate whether the game meets users' expectations and fulfills the project's intended objectives.

Result And Discussion

This chapter presents screenshots of the developed game project, and the research findings are meticulously organized in a systematic and concise manner, accompanied by a series of graphical representations, tables, and charts labeled consecutively for ease of reference.

Initial Page:

The initial page of the game serves as the starting point and the first interface that players encounter. Its design aims to attract players into the game world and provide them with options to start the game, access built-in questions, or watch videos.

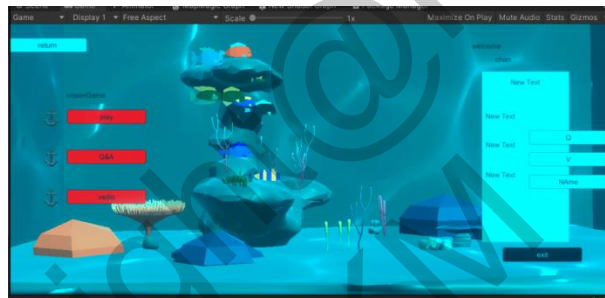


Figure 1 start scene

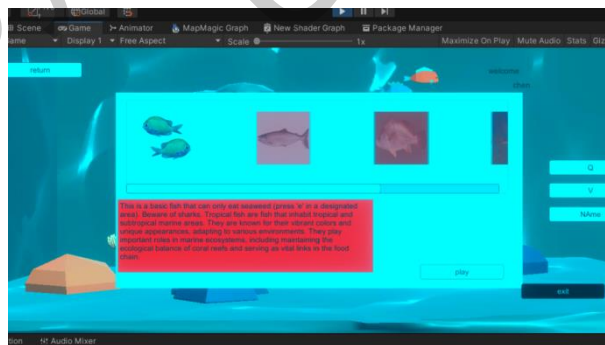


Figure 2 fish selection

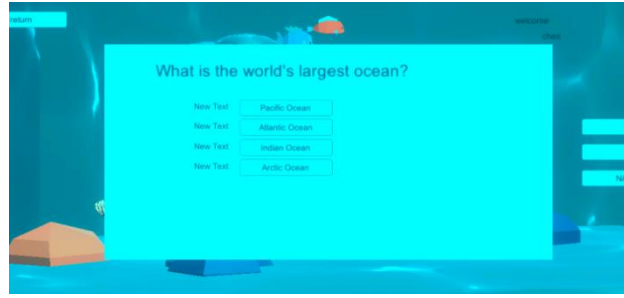


Figure 3 question selection



Figure 4 video page

In-Game Scenes:

This page represents the actual gameplay scenes where players can explore the game content.



Figure 5 in game scene

Billing Page:

The results page is a critical interface that appears after players complete game objectives or tasks. Its main function is to display players' achievements and rewards. On the results page, players can see their scores, game duration, and other relevant information.

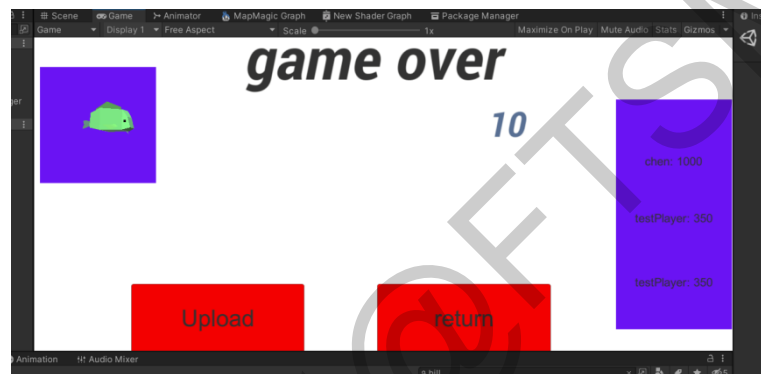


Figure 6 billing scene

Result Analysis:

The development and implementation of the "3D Nature Exploration Underwater Life Game for Kids" educational game have been successful. Here is an analysis of the game results:

User Acceptance Test Results: During the user acceptance testing phase, we selected five users to test the game system and collected their feedback. The results showed that about 90% of the participants expressed satisfaction or high satisfaction with the game, indicating a positive level of acceptance among users. Users generally found the game very engaging, with high playability, impressive graphics, and enhanced gaming experience with sound effects. These results indicate that the game has achieved positive results in both education and entertainment aspects.

Usability Test Results: During the usability testing phase, we observed the behaviors and reactions of ten participants while using the game. The test results indicated that most participants could quickly grasp the game mechanics and smoothly complete game tasks, indicating user approval of the game's interface and functional design. However, we also identified some minor issues, such as unclear instructions in certain situations, which could be addressed through further optimization to improve the game's usability.

Conclusion

The research findings demonstrate that the "3D Nature Exploration Underwater Life Game for Kids" received positive feedback and acceptance from users. In the user acceptance testing, participants highly praised the game's engaging nature, beautiful graphics, immersive sound effects, and overall experience. Additionally, the game's user-friendly interface and intuitive controls were well-received, ensuring easy accessibility for players of different age groups.

Impact and Significance:

The "3D Nature Exploration Underwater Life Game for Kids" has significant impact in the education and entertainment domains. By adopting a video-based question-and-answer teaching method, the game successfully combines learning with entertainment, providing children with an enjoyable and inspiring experience to learn about underwater creatures and ecosystems. The game has the potential to stimulate children's cognitive development and environmental awareness, making it a valuable resource for educators and parents seeking interactive and educational gaming experiences for children.

Future Recommendations:

While the "3D Nature Exploration Underwater Life Game for Kids" has been successfully developed and launched, future research can focus on enhancing its functionalities. Potential areas for further research include:

1. Adding More Subjects and Topics: Incorporating more subjects and topics, such as geography, history, and science, to enrich children's breadth and depth of knowledge.
2. Providing Multilingual Support: Considering translating the game interface and educational content into different languages to benefit children from various countries and regions.
3. Optimizing Game Experience: Further refining the game's user interface and interaction design to ensure smooth and easy-to-understand gameplay, enhancing the user experience.
4. Introducing More Interactive Elements: Adding more interactive elements, such as puzzle games and knowledge quizzes, to stimulate children's learning interests and motivation.
5. Data Tracking and Analysis: Implementing data tracking and analysis features to monitor children's learning progress and points of interest within the game, providing insights for optimizing educational content.
6. Updating Educational Content: Regularly updating the educational content to ensure that the knowledge and information presented in the game align with the latest educational standards and scientific research.
7. Online Community and Interaction Platform: Establishing an online community and interaction platform where children can exchange learning experiences and knowledge gained from the game, fostering collaborative learning and communication.

Conclusion:

In summary, the "3D Nature Exploration Underwater Life Game for Kids" is a successful educational game for exploring underwater ecosystems. By combining entertainment with education, the game effectively captivated children's interests, sparking their curiosity and desire for exploration in the underwater world.

The game provides children with a valuable learning platform that is both educational and entertaining, offering valuable insights for the future development of educational games for children. By continuously optimizing and expanding the game's functionalities, we can further enhance its educational impact, fostering children's attention to and awareness of underwater ecosystems and conservation.

Appreciation

I would like to express my heartfelt gratitude to all those who have supported and contributed to this research project.

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