

# *Construction and Application of Mangrove Marine Science Popularization Education Platform under Data Intelligence*

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**Abstract:** The novel and robust technology has made great progress in the interaction and intelligence of mangrove marine science popularization education, and the complex human factors and high dependence of use situations in the interactive science and education platform have made substantial progress in the high-tech environment. The paper studies mangrove marine science popularization education from the perspective of knowledge engineering. Taking the construction of mangrove marine science popularization education platform in a high-tech environment as an example, it optimizes the experience of unified mangrove marine science popularization knowledge service, uses technology to build a new ecosystem of intelligent scientific education knowledge service, and promotes the high integration of mangrove culture and new technology in the era of data intelligence, Meet the needs of the masses for understanding mangrove marine popular science information and the communication needs of marine workers.

## 1. Introduction

In recent years, the blue carbon economy has become a hot topic of public concern. Mangrove wetland is an important base for marine development, which has important practical significance and long-term strategic significance for the development of marine economy. Under the current situation, it is necessary and important to fully understand the historical, natural, cultural and other original information and connotation of mangrove wetlands and strengthen marine science education through mangrove marine science popularization. The significance of strengthening marine education lies in how to strengthen marine education, enhance people's understanding of marine knowledge, and cultivate people's interest in marine undertakings. In practice, popular science education is the key to the healthy and productive growth of young people. They must learn self-confident learning, which is a key part of education and the basis for future talent innovation. However, marine science popularization is one of the most easily overlooked parts. The marine science popularization system provides a demonstration of marine knowledge for the public,

especially young people. The vigorous development of the Internet has led to the innovation in the way of knowledge dissemination, and the changes in people's access to information have changed with each passing day. Among the diversified data intelligence platform applications, the popular science education platform is a tool application that can spread scientific knowledge and enhance scientific experience [1]. Its emergence has become a new way for people to learn science daily. In recent years, with the popularity of smart phones, a variety of practical mobile software has emerged, and educational software for the public has also emerged. The data intelligent platform program developed by using web technology can meet the public's needs in network science popularization education [2]. As long as the data intelligent platform is installed, the information learning new courses can be viewed. The authors can also publish their ideas and articles anytime and anywhere to meet the needs of the majority of people to understand mangrove marine science popularization information and the communication needs of marine workers.

## **2. Construction of Mangrove Marine Science Popularization Education Platform**

In the field of "digital humanity", the paper systematically discusses the construction of mangrove science popularization service platform from the perspective of the integration of marine culture and information technology, integrates many disciplines such as pedagogy, history, geography and communication, provides information technology research tools for marine science popularization education, and designs and applies knowledge-based, visualized and gaming marine science popularization education.

### **2.1. Platform Construction Ideas**

The platform first analyses the basis, core, methods and objectives of marine popular science education, and constructs a knowledge service model of marine education according to the theoretical framework, design mode, interaction mechanism and implementation plan; Through the combination of marine education theory and practice, diversified cooperation concept, professional technical support and diversified evaluation path; The functional modules of the system platform are designed, and the marine education service software platform under information technology is constructed by using multi-dimensional information technology [3]. The marine education service software platform first uses digital technology to collect, integrate and reconstruct the original information of marine science, technology and culture, especially the history, nature and humanity of mangroves in our town, to establish a complete database of marine popular science education, and then establishes a time-space feature database of marine historical events and geographic information maps through the background synthesis technology of computers, Integrate the marine science popularization education resource package, realize the digital mangrove science popularization service platform, finally implement the mangrove science popularization service platform application project, study the operation mechanism of mangrove forest science popularization service platform, and provide marine science popularization education services for the public.

### **2.2. Platform Function Module Construction**

The platform first needs to meet the most basic requirements for implementation, that is, to modify personal information, browse articles, study courses, exercise tests, interact with authors, publish articles, like, follow and comment. Only after these basic requirements are completed, can non-functional requirements be considered, such as security requirements and scalability requirements. The learning function module includes course videos, course reviews, course PDFs,

etc. The lecturer or administrator can upload the course videos to provide students to watch. If the user participates in the course, the user can comment on the course under the corresponding course, and view the PDF file matching the corresponding course.

The article module mainly includes the function of adding, deleting, checking and modifying articles, and can also comment on articles. The article has the function of logical deletion, that is, after the article is deleted, it will enter the recycle bin instead of being completely deleted. For the articles in the recycle bin, they can be re published and completely deleted [4]. The personal information module is mainly used to add, delete, check and modify personal information. At the same time, a user focused function is added to the personal information module to improve the function of the personal information module. In this module, users can modify their personal information and view the users they follow. For the administrator module, it is the highest level of authority, and can add, delete, query and modify related tables in the database. However, for some resources, such as category tables, there are many tables associated with category tables, and the function of user-defined labels was not considered at the beginning of the design project, that is, the category table is a fixed table, which is used to distinguish the categories of different articles and courses.

### 2.3. Platform Database Construction

The platform database is a relational database, which is simple, convenient, practical, and reliable. The platform database architecture is shown in Figure 1. From top to bottom, there are network connection layer, service layer, storage engine layer and system file layer. The core layer is the service layer. The network connection layer is responsible for authorization and authentication, security management and network connection management. The service layer analyses and optimizes the data execution plan, queries and caches the data, etc. The storage engine layer is mainly used to extract and store data [5]. The system file layer stores database data in the file system and interacts with the storage engine.

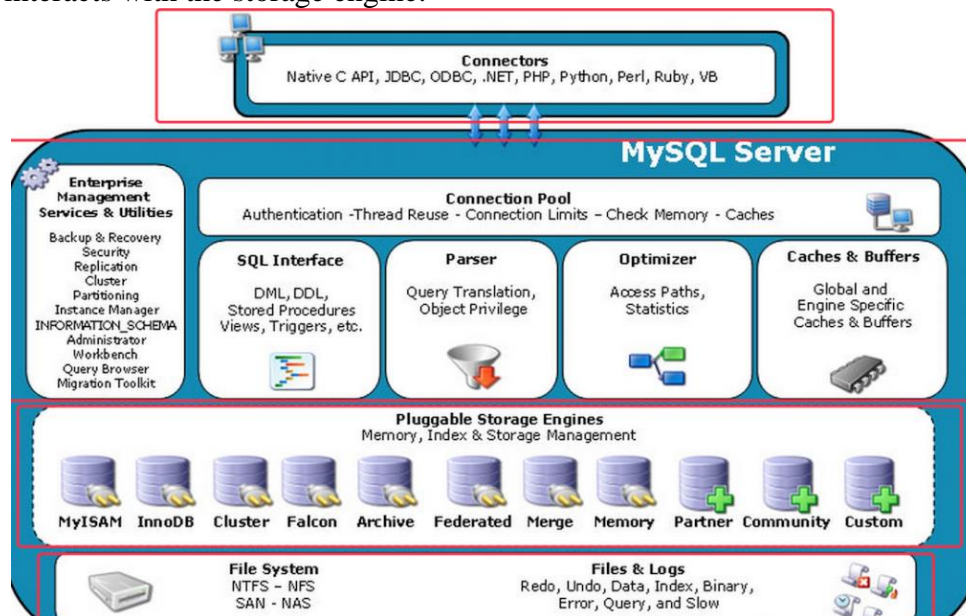


Figure 1: Structure of Mangrove Marine Popular Science Education Platform Database

Platform database design is the process of designing and establishing a database in a specific database management system according to the needs of users to meet the relevant requirements of effective data storage and processing. Mangrove marine science popularization education platform

database can reduce data redundancy, prevent data abnormal maintenance, save space and effectively access. In the requirement analysis phase, conceptual design will give priority to the results overview of the information world, and then use the database management system for more accurate changes and implementation. The main features of the conceptual model are that it can comprehensively and practically reflect the real world, and can easily understand and transform data models of various relationships, networks and hierarchies. E-R model is a very important tool for describing conceptual model [6]. The E-R model of mangrove marine science popularization education platform database is shown in Figure 2.

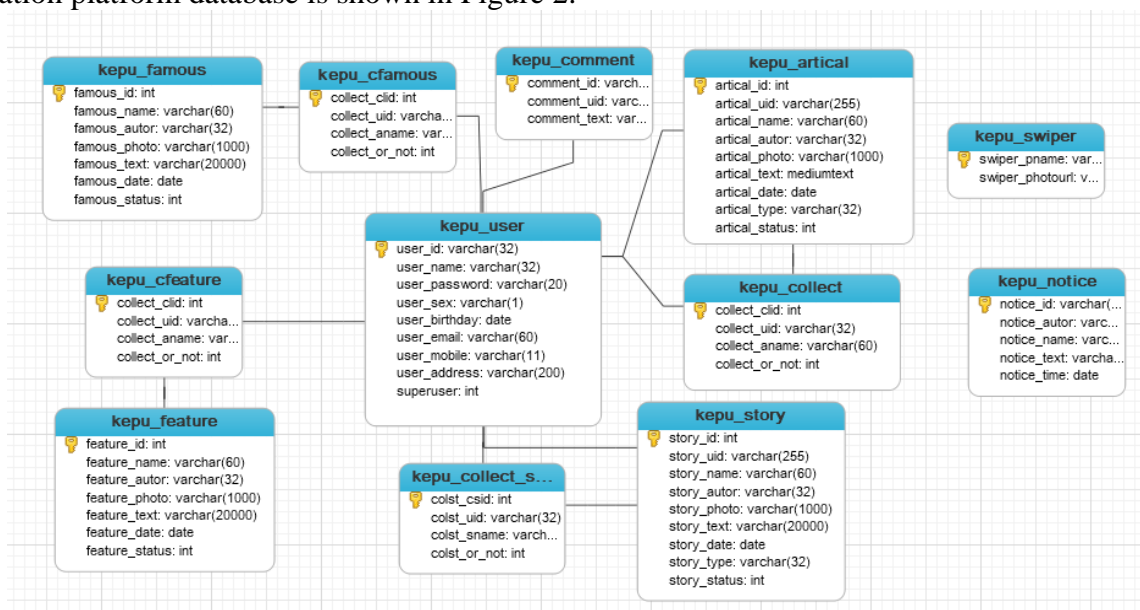


Figure 2: E-R Model of Mangrove Marine Popular Science Education Platform Database

### 3. Application of Mangrove Marine Science Popularization Education Platform

The recent learning platform in the development zone not only expands the field of mangrove knowledge learning and application, but also focuses on the application of modern scientific and technological means. In the classroom, with the combination of mangrove knowledge and modern information technology, the way to present the teaching content will be more and more novel. The platform integrates the idea of "the nearest development zone", shortens the distance between the current development level of students and the development level that students will be able to achieve, allows students to practice doing exercises, reviewing and reading every day, expands students' learning channels and improves their abilities by means of information. The platform realizes the daily exercise, classified teaching, article reading, assessment and evaluation, class management, topic management, article management and other functional modules.

#### 3.1. Mangrove Marine Science Education Platform Learning

(1) Daily exercise: students log on to the learning platform of the nearest development zone of mangrove knowledge in primary school every day. After clicking daily exercise, the system will push questions according to students' development level. After completing the questions, if students want to continue to practice, they can continue to do daily exercises or learn about the relevant knowledge points of each question type according to the classification of the questions. After that, they can answer the questions themselves. Some of the answers to the questions submitted will be evaluated and scored by the teacher, and the only answer will be directly fed back to the students. In

addition, the teacher can give suggestions according to the students' answers. The next day, the teacher will push questions according to the total accuracy of this week, giving priority to the wrong questions, and then randomly push other types of questions. Every day, until the students' accuracy of this week reaches the standard, the difficulty level of the students will be raised, so as to explore the students' potential development level, and slowly turn the students' potential development level into the actual development level, Improve their mangrove knowledge. (2) Article reading: This platform allows students to read articles in their spare time and at home break time, and make proper use of electronic equipment. And teachers can put excellent articles or scientific reports on the platform for students to read according to the actual situation. Students can also extend their knowledge after class, expand their knowledge reserves, and cultivate their discipline literacy. (3) Assessment and evaluation: After students finish the questions every day, they can view their work today and the situation in the past five days on the assessment and evaluation page. The system will count the correct rate of students' answers in this week, and push the corresponding questions to students according to this correct rate. An evaluation will be conducted at the end of each Sunday to determine whether the development level of students has changed according to the correct rate of the answers this week. If the accuracy rate reaches more than 90% this week, more difficult questions will be pushed next week. If it is less than 50%, the difficulty will be reduced and the foundation will be consolidated. Teachers can also learn about the situation through the platform, evaluate students, give guidance, help or reward, etc., pay attention to the development of students, and adjust their teaching methods.

### **3.2. Knowledge Service of Mangrove Culture, Science and Education Under Mixed Reality**

With the development of hybrid reality technology, science education knowledge service has progressed from human-computer interaction to the interaction between human and environment and the combination of human and machine [7]. As the object of presentation and interaction, science education integration products are seamlessly integrated into the physical and digital world. Compared with the human-computer interaction mode of traditional science and education integration products, hybrid reality technology provides a new method and technology for user centered situational, authentic and natural design activities. Through immersive fidelity and context driven behaviour, users can obtain an experience close to the real environment. Through 3D visualization and hybrid reality technology, with its unique sense of immersion, imagination and interaction, it has shown strong technical advantages in the mangrove natural environment science education knowledge service. Mangrove culture, natural environment and science education knowledge service under mixed reality can visualize the interaction of different situations, show the dynamic characteristics of interaction, and realize the interactive roaming, knowledge retrieval, multimodal, natural and interactive science education knowledge service and other functions of mangrove natural environment elements under the mixed reality 3D digital model [8]. Mangrove culture, natural environment and scientific education knowledge service under mixed reality. First, establish a real database of mangrove natural environment to provide data organization rules and data support for visual rendering of three-dimensional mangrove education environment; Then the virtual reality engine is developed to provide extended interfaces for data, interaction, functions and special effects to realize the visual simulation function; Finally, create the mangrove natural environment under the mixed reality, organize and encapsulate the data, and use the 3D graphics engine to create a dynamic, interactive and intelligent 3D mangrove working natural environment for users.

### 3.3. Data Driven Mangrove Culture, Science and Education Knowledge Service Analysis

Intelligent analysis and prediction are conducted through data mining to form intelligent decisions. Decisions facing different topics are more objective, scientific, reasonable and effective. Massive data is generated in the knowledge service process of mangrove culture, science and education, providing a mining basis for the rational use, secondary development, quality evaluation, etc. of information resources [9]. The analysis of scientific education knowledge service driven by data is subdivided according to the characteristics of users, giving full consideration to the differences in gender, age, region, focus and popularity, and conducting targeted distribution to achieve the effectiveness and accuracy of knowledge push. Based on the recommendation of personalized mangrove marine science popularization knowledge, users can obtain the learning methods and ways of mangrove marine science popularization awareness knowledge suitable for their own development, and complete high-quality mangrove marine science popularization awareness knowledge learning with a variety of learning forms, which can be expected to subtly influence the users to form a strong mangrove marine science popularization awareness. The data can evaluate and predict the learning situation of users, dynamically release the mangrove marine science popularization awareness indicators involving people, provide reliable basis for understanding the mangrove marine science popularization awareness of students in designated areas, and provide reference for the government to formulate regional mangrove marine science popularization education policies.

### 4. Mangrove Marine Science Education Platform Test

Software testing is an indispensable stage in the development process of the marine mangrove science popularization platform [10]. It is the last step to ensure the quality and reliability of the system and the final review of the overall system development process. Although strict technical inspections have been carried out at all stages of system development, it is expected that problems will be identified and resolved as soon as possible. It usually includes tests from the test cases prepared in the previous section, which are used as test strategies to test page friendliness, security, reliability, performance and other aspects. (1) Software source code. The source code is the initial state of the program. In order to enable the computer to run the program we input normally, we need to test the source program to find errors and ensure that the program works normally. (2) Software data. The platform needs to face a variety of people and various data inputs, so representative data needs to be selected as test cases for reliability. In addition, we also need to select special edge data for edge testing to prevent these edge data from causing unpredictable errors to the system. (3) Software operating environment. In practical applications, the running environment of the software is different for different users. When testing bugs, you should point out the current environment to better solve the compatibility problem of different devices.

### 5. Summary

With the wide application of emerging technologies, Science and Technology Mangrove Culture combines advanced science and technology such as artificial intelligence, mixed reality, human-computer interaction, cloud computing, etc. to process and optimize the content of science and education integration, thus providing users with more personalized, more intimate and more natural mangrove science education knowledge service products, and promoting the closer integration of mangrove science popularization and scientific research. This paper takes the construction of mangrove marine science popularization education platform in a high-tech environment as an example to optimize the service experience of mangrove marine science popularization knowledge,

build a new ecosystem of intelligent science education knowledge service with technology, promote the high integration of mangrove culture and new technology in the era of data intelligence, and meet the needs of the masses for understanding mangrove marine science popularization information and the communication needs of marine workers.

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