DOI: 10.53469/jerp.2025.07(10).08

Research on the Construction of a Digital Resource Repository for Marine English for Shipbuilding and Repair Based on Blended Learning

Xiaoli Hu, Honghua Hu

Jiangsu Maritime Institute, Nanjing 211170, Jiangsu, China

Abstract: ***This paper conducts an in-depth study on the construction of a digital resource repository for Marine English for Shipbuilding and Repair (hereinafter referred to as MESR) against the backdrop of blended learning. Firstly, starting from the characteristics and advantages of blended learning, it outlines the concept and role of a digital resource repository for MESR. Subsequently, through the analysis of teaching needs and learner demands, the requirements for constructing such a resource repository are clarified. On this basis, strategies for constructing a digital resource repository for MESR based on blended learning are proposed, including content development strategies and technical support strategies. Specifically, content development strategies encompass the integration of materials such as textbooks, teaching cases, and instructional videos; technical support strategies propose corresponding technical solutions for the resource repository's construction from the perspectives of network technology, database technology, and virtual reality technology. Finally, the research findings are summarized, and future development directions for the MESR digital resource repository are suggested. This research holds significant theoretical and practical value for enhancing the effectiveness of MESR teaching and promoting the application of digital educational resources.***

Keywords: Blended Learning, Marine English for Shipbuilding and Repair, Digital Resource Repository, Needs Analysis, Construction Strategies**.**

1. Introduction

In the context of today's globalized era, the shipping industry, as a crucial support for international trade, plays a vital role in the stability and prosperity of the global economy. MESR, as the lingua franca in the shipping field, is a key tool for effective communication among crew members and between crew and port personnel. Strong MESR skills not only ensure the safety and efficiency of vessel navigation but also facilitate the smooth operation of international shipping services [1]. Therefore, enhancing the MESR proficiency of seafarers is of extremely important practical significance.

Traditional MESR teaching models often have certain limitations. In traditional classrooms, teaching resources are relatively limited, teaching methods are relatively singular, and it is difficult to fully meet the diverse learning needs of students [2]. Simultaneously, due to constraints of time and space, learners cannot study anytime and anywhere, significantly impacting learning flexibility and autonomy. Furthermore, traditional teaching models are also insufficient in cultivating learners' practical abilities, making it challenging for learners to apply acquired MESR knowledge in authentic contexts.

With the rapid development of information technology, the blended learning model has emerged. Blended learning combines traditional face-to-face teaching with online instruction, fully leveraging the advantages of both. It can provide rich and diverse teaching resources to meet the personalized needs of different learners; learners can arrange their study according to their own time and pace, enhancing learning flexibility and autonomy; meanwhile, through online interactions and practical simulations, it can better cultivate learners' practical and application abilities.

As an important support for blended learning, digital resource libraries play an irreplaceable role in MESR teaching. A well-developed MESR digital resource repository can integrate various high-quality teaching resources, including textbooks, courseware, audio, video, cases, etc., providing learners with comprehensive, multi-level learning support [3]. Through the digital resource repository, learners can conduct simulated training in virtual environments, improving their English listening, speaking, reading, and writing skills, as well as their practical application abilities.

Based on this, conducting research on the construction of a MESR digital resource repository based on blended learning holds significant theoretical and practical value. This study aims to deeply analyze the characteristics and advantages of blended learning and MESR digital resource libraries, explore the actual needs of MESR teaching and learners, and subsequently propose scientific and reasonable resource repository construction strategies, providing strong support for improving the quality of MESR teaching and learners' English proficiency. Through this research, it is expected to promote the reform and innovation of MESR teaching and foster the cultivation and development of talents in the shipping industry.

2. Overview of Blended Learning and the MESR Digital Resource Repository

2.1 Characteristics and Advantages of Blended Learning

As an emerging teaching model, blended learning integrates the advantages of traditional teaching and online learning, demonstrating unique charm and value in the field of MESR teaching. It breaks the constraints of time and space, providing students with a more flexible and personalized learning experience [4].

The characteristics of blended learning are quite significant.

Firstly, it features diversity in teaching methods. By combining face-to-face classroom teaching with online learning, teachers can flexibly choose appropriate teaching methods according to the teaching content and students' learning situations. For example, when explaining professional vocabulary and grammar knowledge of MESR, traditional classroom teaching can be adopted to ensure students receive timely guidance and feedback; while for oral practice and case analysis, online platforms can be utilized for students' self-directed learning and group discussions. Secondly, blended learning emphasizes the student's central role. Students can independently arrange their study time and content according to their own learning progress and needs, enhancing learning initiative and proactiveness [5]. Simultaneously, online learning platforms also provide abundant learning resources, such as video tutorials, e-books, online tests, etc., meeting students' diverse learning needs. Furthermore, blended learning is characterized by strong interactivity. Through tools like online discussions, forums, and instant messaging, students can engage in real-time communication and interaction with teachers and classmates, share learning experiences and insights, and solve problems encountered in their studies.

The advantages of blended learning are also noteworthy. In terms of teaching effectiveness, blended learning can improve students' academic performance and language skills [6]. Through diverse teaching methods and rich learning resources, students can gain a deeper understanding and mastery of MESR knowledge and skills, improving oral expression and listening comprehension abilities. Meanwhile, blended learning can also cultivate students' autonomous learning ability and teamwork spirit, laying a solid foundation for their future development. In terms of teaching efficiency, blended learning can save teaching time and costs. Teachers can conduct teaching management and resource sharing through online platforms, reducing repetitive labor and time waste inherent in traditional teaching [7]. Additionally, blended learning can expand the scale of teaching, benefiting more students. In terms of teaching adaptability, blended learning can meet the learning needs and characteristics of different students. For students with stronger learning abilities, more extended learning resources and challenging tasks can be provided; whereas for students with learning difficulties, more tutoring and support can be offered.

In summary, with its unique characteristics and significant advantages, blended learning brings new opportunities and challenges to MESR teaching. In future teaching practices, we should fully leverage the advantages of blended learning, continuously explore and innovate teaching methods and models, to improve the quality and level of MESR teaching.

2.2 Concept and Role of the MESR Digital Resource Repository

The MESR digital resource repository is a new type of resource collection constructed against the backdrop of rapid information technology development to meet the teaching and learning needs of MESR. It digitizes traditional MESR teaching resources, integrates materials in various forms such as text, images, audio, and video, forming a systematic, comprehensive, and easily searchable and usable resource platform.

Conceptually, the MESR digital resource repository is a database that utilizes modern information technology to collect, organize, store, and manage various types of knowledge and information related to MESR. It covers multiple aspects including maritime professional vocabulary, grammar, oral expressions, listening materials, industry standards, laws and regulations, aiming to provide rich resource support for the teaching, learning, and research of MESR. These resources exist in digital form, allowing users to access and use them anytime and anywhere via the internet, breaking the constraints of time and space [8].

The MESR digital resource repository plays important roles in multiple aspects. In teaching, it provides teachers with abundant teaching materials. Teachers can select appropriate teaching content from the resource repository based on teaching objectives and students' actual situations, such as vivid video cases and authentic industry dialogues, making classroom teaching more lively and interesting, and enhancing students' learning motivation. Simultaneously, the resource repository can also help teachers update teaching content, keep pace with the development trends of the shipping industry, and improve teaching quality.

For learners, the MESR digital resource repository is a high-quality platform for self-directed learning. Students can autonomously choose learning content and methods according to their own learning progress and needs. For example, students with weak foundations can systematically study basic vocabulary and grammar explanations from the resource repository; while students wanting to improve speaking and listening can use the extensive oral practice materials and listening audio in the resource repository for targeted training. Furthermore, the resource repository also provides interactive communication functions, allowing students to share learning experiences and insights with other learners on the platform for mutual improvement.

In the development of the shipping industry, the MESR digital resource repository is also of great significance. It helps cultivate professionals who meet industry demands, improves the English proficiency and professional competence of practitioners, and promotes international exchange and cooperation [9]. Simultaneously, the construction of the resource repository also drives the reform and innovation of MESR teaching, providing strong intellectual support for the sustainable development of the shipping industry.

In summary, the MESR digital resource repository plays an irreplaceable role in MESR teaching and industry development. By continuously improving and optimizing the construction of the resource repository, it can better meet the needs of teaching and learning, promote the enhancement of MESR teaching standards, and the development of the shipping industry.

3. Needs Analysis for Constructing the MESR Digital Resource Repository

3.1 Analysis of Teaching Needs

In MESR teaching, in-depth analysis of teaching needs is crucial for constructing a digital resource repository based on blended learning. By analyzing the needs in terms of teaching objectives, teaching content, and teaching methods, precise direction can be provided for the resource repository's construction.

From the perspective of teaching objectives, MESR teaching aims to cultivate students' ability to effectively communicate in English in ship-related scenarios, while enabling them to master professional MESR knowledge and skills [10]. This requires the resource repository to provide rich learning resources that closely align with actual work scenarios to help students achieve these goals. For instance, in specific work contexts such as ship navigation, engine room management, and cargo operations, students need to accurately understand and use relevant English commands and professional terminology. The resource repository should cover resources like dialogues, documents, and charts from these scenarios, helping students familiarize themselves with English communication patterns in practical work.

Regarding teaching content, MESR involves numerous professional fields, including navigation technology, marine engineering, shipping business, etc. The resource repository needs to comprehensively cover knowledge in these fields and keep pace with industry development trends, updating content promptly. Traditional textbooks often suffer from untimely updates, whereas a digital resource repository can flexibly supplement and update teaching content. For example, with the continuous emergence of new ship technologies, the resource repository should promptly add relevant professional English materials, allowing students to access the latest industry knowledge. Furthermore, the presentation forms of teaching content should also be diversified, including not only textual materials but also multimedia resources such as audio and video, to meet the needs of students with different learning styles [11].

In terms of teaching methods, blended learning integrates the advantages of online and offline teaching. Online teaching can provide a platform for self-directed learning, allowing students to learn at their own pace; offline teaching can facilitate face-to-face communication and practical operation. The resource repository needs to be compatible with this teaching method, providing course modules and interactive tools suitable for online learning, as well as resources required for offline teaching, such as case studies and simulation training. For example, online functions can include online tests and discussion forums, facilitating students to check learning outcomes and exchange insights; offline, cases from the resource repository can be used for group discussions and role-playing, enhancing students' practical application abilities.

In summary, through the analysis of teaching needs regarding teaching objectives, content, and methods, the focus and direction for constructing the MESR digital resource repository have been clarified. Only by meeting these teaching needs can the resource repository truly fulfill its role in MESR teaching, improving teaching quality and student learning outcomes.

3.2 Analysis of Learner Needs

In the process of constructing a MESR digital resource repository based on blended learning, the analysis of learner needs is a critical link, providing clear direction for the resource repository's construction to ensure it meets the actual needs of learners to the greatest extent.

From the perspective of learning goals, different learners have different pursuits. Some learners hope that by studying MESR, they can successfully pass relevant vocational qualification exams, such as the English proficiency tests stipulated by the International Maritime Organization, to obtain a stepping stone for entering the shipping industry. Other learners focus more on improving their English communication skills in actual work, for example, being able to communicate fluently with foreign crew members in scenarios such as ship navigation, cargo handling, and equipment maintenance [12]. This requires the resource repository's content design to cover the vocabulary, grammar, listening, and speaking practice required for exams, as well as a large number of dialogues and cases from real work scenarios.

In terms of learning time and methods, the working characteristics of the shipping industry determine that learners' study time is relatively fragmented and irregular. Seafarers may only have time to study during voyages or while resting in port, which requires the resource repository to possess flexibility and convenience. Learners hope to access the resource repository anytime and anywhere via mobile devices for fragmented learning [13]. Simultaneously, they also desire diversified learning methods; besides traditional text and image materials, they hope for multimedia resources such as audio and video to increase the interest and effectiveness of learning. For example, watching videos of ship operations accompanied by English explanations can allow learners to understand and master relevant knowledge more intuitively.

Learners' English foundation is also an important factor to consider. The English proficiency of practitioners in the shipping industry varies; some may only have basic English knowledge, while others may possess higher English skills. The resource repository should provide tiered learning content. For learners with weak foundations, start with basic vocabulary and grammar knowledge, and gradually advance; for learners with higher English proficiency, provide more challenging professional literature, academic papers, etc., to meet the needs of learners at different levels.

Furthermore, learners also hope the resource repository can provide interactive communication functions. They can exchange insights, share learning experiences with other learners during the learning process, and also seek advice from teachers or professionals. This interactive communication can not only enhance learning motivation but also promote knowledge sharing and dissemination.

In summary, when constructing a MESR digital resource repository based on blended learning, fully considering the needs of learners is crucial. Only in this way can a resource repository truly aligned with learner needs, conducive to improving the quality of MESR teaching and learners' English proficiency, be built.

4. Construction Strategies for the MESR Digital Resource Repository Based on Blended Learning

4.1 Content Development Strategies for the Resource Repository

In the construction of a MESR digital resource repository based on blended learning, content development strategies are crucial, as they directly determine whether the resource repository can meet the needs of teaching and learners, and promote the effective implementation of MESR teaching.

First, emphasis should be placed on the systematicity and comprehensiveness of resources. MESR covers multiple fields and scenarios, such as ship navigation, engine room management, cargo transport, etc. The resource repository needs to include comprehensive content ranging from basic vocabulary and grammar knowledge to professional industry terminology and communication scenarios. For example, in terms of vocabulary, it should not only include general nautical terms but also specific professional vocabulary for different types of ships (e.g., container ships, tankers). For grammar knowledge, explanations should be combined with the actual usage of MESR, covering common sentence structures and expressions [14]. Simultaneously, resources should be classified and organized according to different themes and difficulty levels for easy access and use by teachers and learners.

Secondly, the practicality and targeted nature of resources should be emphasized. Resource content selection and design must be closely integrated with the actual work requirements of the shipping industry. A large number of authentic MESR communication cases can be collected, such as daily communication among crew members, business exchanges with port staff, etc., and produced into audio and video materials. These authentic cases can enable learners to better understand the application of MESR in real scenarios, improving their language communication skills. Furthermore, personalized learning resources should be provided for different learning objectives and target groups. For instance, for novice seafarers, focus on basic English knowledge and simple business communication; for experienced seafarers, provide more in-depth professional knowledge and strategies for handling complex scenarios [15].

Moreover, the timeliness and dynamism of resources must be ensured. The shipping industry develops rapidly, with new technologies, regulations, and business processes continuously emerging. This requires the resource repository's content to be updated promptly. Regularly collect and organize the latest industry information and incorporate it into the resource repository. For example, with the introduction of new regulations by the International Maritime Organization, promptly update the relevant English expressions and interpretations. Simultaneously, encourage teachers and learners to provide feedback on problems and needs discovered during use, and adjust and optimize the resource repository content based on this feedback.

Additionally, attention should be paid to the diversity of resources. Besides traditional text materials, resource formats should be enriched, such as images, animations, games, etc. Pictures can intuitively display ship equipment and operation procedures; animations can vividly demonstrate complex nautical principles and operational processes; games can increase learning attractiveness, enhancing learner engagement and motivation. For example, designing vocabulary spelling games, situational dialogue simulation games, etc., allows learners to study MESR in a relaxed and pleasant atmosphere.

Finally, the integration and sharing of resources should be strengthened. Integrate high-quality resources from different sources to avoid duplication and waste of resources. Simultaneously, establish a resource sharing mechanism to promote resource exchange and sharing among teachers and learners. An online platform can be used to realize resource uploading, downloading, and exchange, forming an open and shared learning environment.

Through the implementation of the above content development strategies, a high-quality and practical MESR digital resource repository can be constructed, providing strong support for blended learning and enhancing the quality and effectiveness of MESR teaching.

4.2 Technical Support Strategies for the Resource Repository

In the construction of a MESR digital resource repository based on blended learning, technical support strategies play a vital role, serving as key factors in ensuring the efficient operation of the resource repository, enhancing user experience, and achieving teaching objectives.

First, it is essential to select an appropriate Database Management System (DBMS). The DBMS is the core for data storage and management in the resource repository. Considering the diverse data types in the MESR digital resource repository, including text, audio, video, etc., a DBMS with strong data processing capabilities and good compatibility needs to be chosen. For example, MySQL is an open-source relational database management system known for its high performance, stability, and ease of maintenance, capable of meeting the needs for large-scale data storage and fast querying in the resource repository. Simultaneously, it supports multiple programming languages, facilitating integration with other systems.

Secondly, emphasis must be placed on security technical safeguards for the resource repository. The MESR digital resource repository contains a large amount of teaching resources and learner information; safeguarding this data is paramount. On one hand, data encryption technology should be adopted to encrypt sensitive data, preventing data from being stolen or tampered with during transmission and storage. For example, using SSL/TLS protocols to encrypt data transmission ensures data security during network transmission. On the other hand, a comprehensive access control mechanism should be established, setting different access permissions for different users, so that only authorized users can access corresponding resources. Concurrently, regular data backups should be performed to prevent data loss.

Furthermore, advanced search technologies should be employed. To facilitate learners in quickly and accurately finding the required resources, the resource repository needs to possess powerful search functionality. Full-text search technology can be adopted to index the text content within the resource repository, enabling fast keyword searches. Additionally, intelligent search technology can be introduced to provide personalized search result recommendations based on learners' search history and preferences. For example, using machine learning algorithms to analyze learners' search behaviors, predicting resources learners might be interested in, and prioritizing them in search results.

Moreover, cross-platform compatibility of the resource repository must be achieved. With the development of mobile internet, learners increasingly prefer using mobile devices for learning. Therefore, the resource repository needs to support multiple platforms, including desktop and mobile ends. Responsive design technology can be employed to make the resource repository's interface adapt to different device screen sizes, providing a consistent user experience for learners. Simultaneously, corresponding mobile applications should be developed, allowing learners to access the resource repository anytime, anywhere on their mobile devices.

Finally, an effective technical maintenance and update mechanism must be established. Technology evolves rapidly; the resource repository needs continuous technical upgrades and maintenance to maintain its performance and functional advancement. A professional technical team should be formed to regularly inspect and maintain the resource repository, promptly identifying and resolving technical issues. Simultaneously, attention should be paid to new technologies and trends within the industry, timely applying them to the resource repository's construction, and continuously improving its technical level.

In summary, through strategies such as selecting an appropriate DBMS, ensuring resource repository security, utilizing advanced search technologies, achieving cross-platform compatibility, and establishing effective technical maintenance and update mechanisms, strong technical support can be provided for the MESR digital resource repository based on blended learning, promoting the development of MESR teaching.

5. Conclusion

This study focuses on the construction of a MESR digital resource repository based on blended learning, aiming to address issues such as dispersed resources and singular teaching methods in traditional MESR teaching, thereby enhancing teaching effectiveness and the learner experience. Through the discussion of the characteristics and advantages of blended learning and the concept and role of the MESR digital resource repository, the theoretical basis and practical significance of the research have been clarified.

During the needs analysis phase, teaching needs and learner demands were thoroughly examined. From the perspective of teaching needs, traditional MESR teaching models struggle to meet the modern shipping industry's requirements for professional English proficiency, necessitating the use of a digital resource repository to provide diverse teaching materials and flexible teaching methods. Regarding learners, they desire the ability to autonomously select learning content and time based on their own learning progress and needs, which a digital resource repository can precisely fulfill.

In terms of construction strategies, the content development strategy emphasizes systematicity, targeted nature, and practicality. It should cover not only basic MESR knowledge such as vocabulary, grammar, and listening but also provide professional content related to MESR communication and ship operations based on actual work scenarios. The technical support strategy focuses on the stability, usability, and compatibility of the technology, ensuring the resource repository operates stably across different devices and network environments, providing a convenient learning experience for learners.

Overall, the construction of a MESR digital resource repository based on blended learning is feasible and necessary. It provides new ideas and methods for MESR teaching, contributing to the improvement of teaching quality and learners' comprehensive English abilities. However, this study still has certain limitations. For example, the content update and maintenance mechanisms of the resource repository require further refinement to ensure the timeliness and accuracy of resources. Technologically, while current capabilities meet basic teaching needs, how to better utilize technologies like artificial intelligence and big data to enhance the resource repository's intelligence level requires further exploration.

In the future, continuous attention should be paid to the development trends of the shipping industry and changes in learner demands, constantly optimizing the content and functionality of the resource repository. Cooperation with maritime enterprises should be strengthened to obtain more English application cases from actual work, enriching the resource repository's materials. Simultaneously, increased research and application of new technologies should be pursued to improve the resource repository's intelligence level, providing higher-quality support for MESR teaching.

Acknowledgments

This research is a phased achievement of Jiangsu Maritime Institute Teaching Construction Project "Marine English for Shipbuilding and Repair Repository Database (2025)". We extend our gratitude to the project team members and all participating students for their support and contributions.

References

[1] Feng, J. (2024). Construction and Practical Research on a Digital Learning Model for Community English Education Based on Tiered Cooperation. Overseas English, (16), 82-84.

[2] Anwar, S. (2023). Construction of a Maritime Knowledge Graph [Master's thesis]. Dalian Maritime University, Liaoning, China.

[3] Feng, J. (2024). Research on the Construction of Community Education English Courses in the Digital Context. English Square, (2), 104-107.

[4] Hou, T. J. (2022). Knowledge Graph Construction for Ship Fault Diagnosis [Master's thesis]. Nanjing University of Aeronautics and Astronautics, Jiangsu, China.
[5] Zhou, P. Y. (2024). Research on the Construction of the "Four-Haves" Classroom in Higher Vocational English. Shipbuilding Vocational Education, 12(6), 51-54.
[6] Meng, W. J. (2022). Construction and Simulation of Kinematic Model for Ship Propulsion Shafting [Master's thesis]. Zhejiang Ocean University, Zhejiang, China.
[7] Gu, Y. (2024). From Recording to Revitalization: The Construction and Promotion Path of Digital Resource Libraries for Intangible Cultural Heritage Arts. Footwear Technology and Design, 4(17), 33-35.
[8] Han, H. Y. (2022). Construction and Research of an Emergency Evacuation Model for Ship Personnel. Dalian Maritime University, Liaoning, China.
[9] Zhang, W. C., & Wang, Q. (2022). Construction and Practice of a Blended Teaching Model for Higher Vocational Maritime English Based on "Two Communications and Three Platforms". Journal of Wuhan Institute of Shipbuilding Technology, 21(4), 93-97.
[10] Xie, Y. F. (2023). Construction and Application of a Remote Sensing Image Resource Library for River Landforms in High School Geography. Jiangxi Normal University, Jiangxi, China.
[11] Liu, S. Q. (2023). Research on Active Reflector Platform Construction and Digital Monitoring. Qingdao University of Technology, Shandong, China.
[12] Zhang, W. C. (2023). Construction of an Innovative Blended Teaching Model for Higher Vocational Maritime English. Overseas English, (9), 232-234.
[13] Yao, X. Y. (2023). Construction of a Digital Management System for R&D Expenses in Company A. North Minzu University, China.
[14] Yi, M., & Cheng, J. X. (2024). A Study on the Professional Identity Construction of English Student-Teacher Interns. Overseas English, (17), 97-99.
[15] Xu, N. (2024). Construction and Application of a Multi-Dimensional Enterprise Digital Capability Measurement System. University of Electronic Science and Technology of China, Sichuan, China.