Journal of Social Science Humanities and Literature, Vol.8, Issue 2, (Feb)
ISSN 2277-842X **2025**
DOI: 10.53469/jsshl.2025.08(02).08

The Application and Exploration of AI Technology in the Teaching of Marine Logistics Courses

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Abstract: ***Along with the rapid development of artificial intelligence technology, the application of AI technology in education field has drawn more and more attention. This paper means to explore AI's current situation, advantages, challenges and future development in the teaching of maritime logistics and tries to provide a theoretical support and practical guidance of the innovation of maritime logistics education.***

Keywords: AI, Marine Logistics, Course Teaching, Education Innovation.

1. LEAD-IN

1.1 Research Background and Significance

Along with the rapid development of marine logistics industry, there is an increasing demand for the talent quality. Modern marine logistics industry are not only involved into traditional shipping and logistics management, but also some newly rising fields such as intelligent technology, information technology and greenization. For example, the emergence of intelligent ship require practitioners master the ability of automatic operation and data analysis, while the port intelligent management need interdisciplinary and comprehensive knowledge. Therefore, the industry is in urgent need of high-quality and comprehensive talents good at technology, innovation and practical skills. However, the traditional marine logistics education model has a limitation in the cultivation of students' comprehensive abilities, with inadequate practical teaching resources, onefold teaching methods, and difficult to satisfy students' individual requirements.

Meanwhile, the rising of AI technology provides a new thought to solve these questions. With its powerful data analysis and custom-made service ability, AI technology is reshaping education pattern. The application of intellectual tutoring system, VR simulation teaching and learning analysis tools not only enriches teaching resources but also promotes teaching efficiency and quality. Through VR simulation technology, students may simulate complex marine logistics scene in a virtual environment, increases the practical ability. Intellectual tutoring system can provide customized support according to students' learning schedule and compensate the lack of traditional teaching.

Under such a background, the research of AI in the teaching of marine logistics courses has significant meanings. On the one hand, AI technology may efficiently promote students' comprehensive quality and satisfy the industry's requirements on high-quality talents. On the other hand, the application of AI may optimize the allocation of teaching resources, promote the innovation and development of marine logistics education. Therefore, the exploration of AI and its application in marine logistics courses' teaching may be beneficial to both the solution of traditional teaching patterns' pain spots and the support of marine logistics education's future development.

1.2 Research Purpose and Methods

This paper means to explore AI's efficient application in the teaching of marine logistics courses, aiming at optimizing teaching contents, promoting teaching effects, innovating teaching pattern and increasing students' practical abilities. In order to realize such an object, the research adopts multiple methods. First, through the literature review, the paper combs the current situation and theoretical base of AI in the teaching of marine logistics courses. Second, with the case analysis, this paper explores an in-depth the successful cases both at home and abroad, extracts and purifies the efficient application patterns. Finally, with the help of questionnaire survey, the paper understands the AI acceptability and requirement from teachers and students, acquires some empirical data. Through all the above mentioned means, this paper will provide a theoretical support and practical guidance

for the innovation of marine logistics education.

2. TEACHING ANALYSIS OF CURRENT MARINE LOGISTICS SITUATION

2.1 Systematic Survey of Marine Logistics Curriculum

The curriculum of marine logistics means to cultivate high-quality professional talents satisfying the need of modern marine logistic industry. The curriculum circles around Navigation Technology, Logistics Management, Traffic Engineering etc. pays attention to the combination of theory and practice. The major courses include Marine Navigation, Ship Handling and Collision Avoidance, Marine Meteorology and Oceanography, Ship Structure and Cargo Transportation, Navigational Instruments, Fundamentals of Ship Radio Technology, Logistics Management, Maritime Law, etc. The teaching objective is to facilitate students' mastering the knowledge in ship handling, cargo transportation and management, marine law etc., help them possess the practical skills in passage design, ship handling, and use of communication equipment, and to familiarize relevant laws and regulations.

2.1.1 The features and limitation of traditional teaching patterns

The traditional marine logistics teaching patterns focuses on the systematic teaching of theoretical knowledge, classroom lecturing, textbook learning and blackboard presentation. Practical teaching is relatively weak, mainly depending on the lab simulation equipments and the small amount of workshop practice, much limited by resources and environment. The teaching assessment is mainly dependent on the examination result, lacking a comprehensive assessment on students' practical skills and innovative thinking. Such a pattern focuses on the lecturing of fundamental knowledge, difficult to satisfy modern marine logistics industry's requirements on the practical skills and comprehensive quality.

2.1.2 Students' Learning Requirement and Characteristics

During an AI age, students' learning requirements and characteristics have got tremendous changes. They are eager for more individualized and diversified learning experience, hoping to acquire customized learning resources and real-time feedback with the help of AI technology. Meanwhile, students have an increasing demand for practical skills, expecting to get immersive learning experience from VR technology. Besides, they pay more attention on the combination and application of interdisciplinary knowledge so as to better suit the need of logistics industry.

3. SURVEY OF AI TECHNOLOGY

3.1 Basic Concept of AI Technology and Development Course

AI technology is the computer technology which imitates human intellect, including machine learning, natural language processing, computer vision, etc. Since its birth in the 50s in 20th century, AI technology has undergone the evolution from early symbolism to modern in-depth learning, with an increasing speed in merging into different industries.

3.1.1 AI's Application and Tendency in Education

Currently, AI's application in education has widely covered intellectual assessment, individual learning, AI classrooms, with real-time supervision and students' behavior analysis, and help teachers make individualized teaching patterns. In the future, AI technology will promote education to more intellectual and individualized development, including generative AI-made education contents, digital person teaching, intellectual tutoring so as further promote education efficiency and quality.

3.1.2 The Potential Value of AI Technology in the Teaching of Marine Logistics Courses

In the teaching of marine logistics courses, the application of AI technology has brought about tremendous revolution to the traditional teaching patterns. First, AI may provide individual learning experience according to students' learning schedule, interest and ability so as to satisfy different students' needs. Second, through VR technology, AI may imitate complex marine logistics scenes such as ship navigation, port manipulation and

emergency processing and facilitate students' ability of practical manipulation in VR environment. Finally, AI-driven learning analysis tools may supervise student's real-time learning behavior to realize precise teaching assessment, help students adjust teaching strategy and promote teaching results. Such applications not only enrich teaching methods, vigorously promotes students' learning interests and comprehensive quality.

4. CONCRETE APPLICATION OF AI TECHNOLOGY IN THE TEACHING OF MARINE LOGISTICS COURSES

4.1 Exploration of Intellectual Teaching Resources

Among AI-empowered marine logistics courses teaching, we can utilize AI technology to produce multi-media teaching resources such as cartoon, video and VR scene, enriching teaching contents and promoting learning interest and mutual activities. Meanwhile, intellectual recommendation system may precisely forward individualized learning resources according to students' learning schedule and demands so as to satisfy different students' learning temp and interest and improve learning efficiency.

4.2 VR Teaching

Through constructing ship handing simulation, port logistics manipulation and emergency processing simulation, AI-based marine logistics VR lab provides an immersive learning environment, in the simulation of ship navigation, students may conduct passage design and collision avoidance operation, analyze real-time meteorology and fairway information with the help of AI and optimize navigation passage. Port logistics manipulation imitation includes cargo loading and unloading, storage and management, and realize intellectual control and optimize resources allocation. Besides, marine emergency incidents include the imitation of ship collision, agrounding and fire. The advantage of VR teaching lies its safety, high efficiency and repeatability. Students may freely explore in VR environment, without worrying about the risks which may occur in the real situation.

4.3 Intellectual Tutoring and Learning Analysis

AI-empowered intellectual tutoring system provides real-time Q&A and learning guidance to students, quick in respond to students' learning requirements, and solving the difficulties. Meanwhile, learning analysis technology may supervise students' learning behavior, precisely predict learning difficulties, provide individual learning suggestion, promote learning efficiency and results. Such intellectual teaching support offers a more efficient and individualized learning experience for students.

4.4 Teaching Assessment and Feedback

AI technology may realize automatic grading and intellectual assessment of exercise, exam and practical operation, and give an objective assessment rapidly through precise grading criteria and data analysis. Meanwhile, AI system may transfer collected learning data to teaching effect feedback, providing teachers with the information of students' learning schedule, mastery of knowledge points, etc, help teachers timely adjust teaching strategy, optimize teaching contents and methods so as to realize precise teaching and continuous improvement.

5. THE ADVANTAGES AND CHALLENGES OF AI IN THE TEACHING OF MARINE LOGISTICS COURSES

5.1 Advantages

The application of AI technology in the teaching of marine logistics courses can vigorously improve teaching efficiency and quality, satisfy students' individual learning needs. Through the intellectual tutoring system and learning analysis technique, AI provides students with real-time Q&A and customized learning suggestions, with enriched teaching means, to increase students' learning interests and participation. Besides, AI-constructed VR lab can imitate the real marine logistics environment such as ship navigation, port operation and emergency procession, facilitate students to practice repeatedly in a safe and high-efficient VR scene. The combination of AI technology with the teaching patterns not only optimize the teaching process, but also create a immersive learning experience to promote the innovative development of marine logistics education.

5.2 Challenges

In the teaching of AI-empowered marine logistics courses, AI technology brings about multiple advantages as well as challenges. First, the application of AI technology requires a high technological cost and equipment investment which gives a higher need for the allocation of teaching resources. Second, the teachers have a limited ability in the mastering and application of AI technology, requiring a further improvement of their digital quality and information processing ability. Besides, the data security and privacy protection is also a major challenge to AI technology, in particular when dealing with students' learning data. Finally, the quality and suitability of AI teaching resources still need to be further improved to better satisfy the real needs of marine logistics courses' teaching.

6. CASE ANALYSIS: AI' S APPLICATION IN THE TEACHING OF MARINE LOGISTICS COURSES

6.1 AI Application Case in the Education of Marine Logistics both at Home and Abroad

Quanzhou Marine Vocational and Technical College actively promotes "AI plus Education" pattern, constructs a AI teaching platform which collects intellectual lesson-preparation, student analysis, interactive teaching, resource management. Such a platform supports the building of individual teaching pattern and real-time data feedback. Teachers may rapidly identify the blind knowledge points of students through data analysis module and provide a reference for classified teaching. Besides, the college also explores AI-assistant courses, covering the whole teaching process including intelligent problem-setting, learning tutoring, individual practice, etc, vigorously promotes teaching efficiency.

Dalian Maritime University explores with enterprises jointly marine education's online operation training platform, covering intelligent stowage, radar operation, ship handling and other modules of multiple ship types. The platform imitates the real navigation scenes through VR technology, students can operate and practice on the platform without the restrictions of time and space. Besides, the platform is also used in the training projects of Shanghai Pilot Station and other relevant training institutions.

6.2 The Application and Exploration of AI Technology in JMI Marine Logistics Courses

Jiangsu Maritime Institute (JMI) has carried out multiple innovation practices with the assistance of AI technology, in particular the construction and application of VR training eco-system of modern navigation technology. JMI relies on national smart education platform as a trial, constructs Yangtze-river Delta region's modern navigation VR training platform. The platform not only promotes both the construction level of navigation specialty and immersive VR training environment to facilitate the high-level development of navigation education.

As far as the construction and application of Chaoxing platform, JMI realizes mixed daily application of online and offline teaching with the help of Chaoxing Fanya Platform and Xuexitong APP. JMI carries out before-class preparation, in-class interaction and after-class review, etc, on the platform and fully develops the advantages of AI technology in teaching, Chaoxing Platform provides enriched teaching functions including online classroom, assessment hand-in and grading, classroom discussion, sign-up and other functions, supporting teachers to have precise teaching according to students data. Besides, the platform boasts a powerful resources data, covering multiple academic resources and curriculum materials for the benefit of teachers and students.

In general, through the combination of AI technology and Chaoxing Platform, JMI efficiently promotes teaching quality and students' learning experiences and provides a powerful support for the teaching revolution of marine logistics majors.

7. PROSPECT OF AI-EMPOWERED MARINE LOGISTICS COURSES TEACHING

Looking forward to the future of AI in marine logistics courses, the innovation and combination of technology will promote an in-depth merging of AI into courses and realize the expansion of smart teaching resources with VR training scenes so as to facilitate students' immersive learning, the innovation of teaching patters will promote marine logistics teaching from traditional classroom to smart classroom. Through AI-assistant individual learning passage design and mixed online & offline teaching, teachers' role also transform from knowledge-lecturer to

learning guider. All in all, AI will bring about a higher efficient, individual and innovative teaching experience to marine logistics education and promote education to an new era of smart age.

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