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Research on the Reform of the Teaching Mode of Transportation Specialized Courses Based on AI Technology

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Abstracts: As an important support for the development of modern society, the teaching quality of the transportation profession directly affects the development level of the industry. However, the current teaching mode has many problems, such as outdated teaching content, single teaching methods, lack of personalized guidance, etc., which can not meet the demand for transportation talents in the new era. With the rapid development of AI technology, its application in the field of education provides new ideas and methods to solve these problems. Through the introduction of AI technology, a comprehensive reform of the teaching mode of transportation professional courses can be realized, and the teaching effect and students' learning quality can be improved. This paper will discuss in detail the necessity, specific measures, and expected results of the reform of the teaching mode of transportation professional courses based on AI technology.

Keywords: AI technology; transportation major; course teaching mode; reform;

Introduction

Transportation is the infrastructure and important support for national economic development. An efficient transportation system can promote the circulation of goods, the coordinated development of the regional economy, and the optimal allocation of resources, and enhance the overall economic efficiency. With the acceleration of urbanization and the development of globalization, the impact of transportation on social production and people's lives is deepening, improving people's quality of life, and also promoting the development of tourism, logistics, and other related industries. In addition, the transportation industry is currently facing the challenges of intelligent, green, and sustainable development. Therefore, the talents cultivated in transportation majors need to have the knowledge and skills to cope with modern development and promote technological innovation and management optimization of the industry.

1. Problems Existing in the Teaching Mode of Transportation Professional Courses

1.1 Imperfect professional curriculum system

In the current higher education system, the transportation profession cannot fully meet the industry's demand for complex skills and knowledge in terms of curriculum content and teaching depth. Transportation is a comprehensive discipline covering multiple fields of natural sciences, social sciences, and technology, and due to the limitations of course time and credits, it is difficult for colleges and universities to cover the knowledge of all these fields in a limited teaching time. Emerging fields in the transportation profession, such as intelligent transportation systems and intelligent transportation, involve the application of modern information technology such as big data analysis, cloud computing technology, IoT, and AI, which puts a greater demand on teaching content and methods. teaching content and methods put forward higher requirements (Wei, 2024). The existing education

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model usually favors theoretical teaching and neglects training with practical work skills, and when students complete their studies and enter the workplace, they find that their skills cannot be directly applied to solving practical problems, and they need additional on-the-job training in order to be truly competent in their work. For example, in the design and operation of intelligent transportation systems, students need to be able to practically operate modern traffic management software and tools for traffic flow analysis and prediction, but these skills are often ignored in traditional courses.

1.2 Textbook content fails to keep up with the times

In rapidly developing professions such as transportation, timely updating of teaching materials and real-time teaching content become one of the key factors in the quality of education. The transportation industry is experiencing a technological revolution, and the deep integration with 5G communication, mobile Internet, Internet of Things, artificial intelligence, and other technologies is reshaping the operation of the transportation system, bringing a wave of technological innovation and model innovation (Zhang et al., 2022). However, the development and publication cycles of textbooks are often long, posing significant challenges in reflecting the latest developments in the industry. Due to the time lag in the process of writing, reviewing, and publishing, the latest technological advances, regulatory changes, and industry standards are difficult to quickly incorporate into teaching materials, which affects the modernity and relevance of the teaching materials, and may also lead to a disconnect between the educational content and the actual needs of the industry. In addition, the traditional teaching mode of relying on paper textbooks is particularly inadequate in the current technological environment. Paper textbooks certainly have their advantages of stability and systematic, but in the rapidly changing technological field, it is difficult to provide flexibility and instant updates, resulting in an obvious gap between the education students receive and the market and the latest technological practices.

1.3 Insufficient funding

Emerging technological fields in transportation, such as vehicle-road collaboration, vehicle-vehicle collaboration, automated driving, and intelligent transportation represent the future development direction of the transportation industry and are also important innovation points within the industry today. However, due to the advanced and complex nature of these technologies, the equipment and software to implement the technologies require expensive investments. Modern transportation technologies such as autonomous driving and Telematics involve high-cost equipment and systems, such as prototypes of self-driving cars, high-precision sensors, communication equipment, etc. The introduction and maintenance of these technologies require huge investments, and the software and data processing platforms required to simulate the technologies need to be updated frequently and at a high cost. Therefore, universities often face the problem of insufficient funds when building similar laboratories and training bases. Even if universities can invest in the construction of relevant laboratories, since these technologies are rapidly updated and the equipment and software will soon become obsolete, they will need to continuously invest in updating and upgrading the practical training facilities to keep the teaching and learning resources up-to-date and useful, which is continuous financial pressure for most universities (Ding, 2022). In addition, the actual technology application environment often involves complex practical operations and variable environmental factors, while the laboratory environment in schools is relatively restricted, making it difficult to fully simulate the real industry environment, and students may not be able to directly adapt to the actual work needs of the industry and there is a disconnect between theory and practice even if they have completed the corresponding practical training courses on campus.

1.4 Insufficient problem-solving ability of students

In the teaching of transportation majors, despite the efforts to improve students' core competencies, there are still significant difficulties in cultivating students' ability to solve complex engineering problems. The fundamental reason lies in how the education system can effectively cultivate students' systematic thinking and transform theoretical knowledge into practical ability to solve actual engineering problems. Transportation is a field involving multidisciplinary knowledge and technology, including civil engineering, mechanical engineering, information technology, and management. Each sub-field has its complexity, and the traditional education model tends to be divided by disciplines, making it difficult for students to gain training and experience in integrating multidisciplinary knowledge into the learning process. This compartmentalized learning approach may result in students being unable to effectively integrate and apply knowledge when faced with real-world interdisciplinary engineering problems. The solution to complex engineering problems does not only depend on technical knowledge but also requires strong systems thinking skills. Systems thinking requires individuals to be able to understand how various factors interact in a system and how these interactions affect the behavior and performance of the entire system (Wang, 2020). However, the current education system emphasizes more on the learning of single points of knowledge rather than how to connect these points to solve larger system-level problems. As a result, students may be deficient in understanding the dynamic and nonlinear properties of complex systems, and the engineering problems that exist in the work process are often open-ended, highly uncertain, and complex, requiring students to make decisions with incomplete information, but engineering problems in college textbook materials are usually more well-defined and the outcomes are relatively certain, and the training in this environment may not fully prepare students to face real-world challenges.

2. Reform Path of Transportation Professional Course Teaching Mode Based on AI Technology

2.1 Development of teaching resources

The main pain points in the current traditional teaching mode of transportation majors include outdated teaching content, difficulty in meeting diversified learning needs, and insufficient interactivity and attractiveness of teaching resources. To address these pain points, intelligent courseware and teaching materials can provide effective solutions. Traditional courseware and teaching materials are often slow to update and cannot reflect the latest scientific research results and industry dynamics promptly, while intelligent courseware and teaching materials based on AI technology can be updated in real-time, automatically incorporate the latest academic research and technological development, ensure the cutting-edge and practicality of the teaching content, flexibly adjust the depth and breadth of the content according to the different teaching objectives and students' needs, and provide a multi-level knowledge system to meet the learning needs of students at different levels. learning needs of students at different levels (San, 2018), enhance the interactivity and attractiveness of teaching resources, combine multimedia resources, such as video and animation, to make the teaching content more vivid and imaginative, and stimulate students' learning interest and initiative, and also set up real-time interactive links, such as online quizzes, instant feedback, and classroom discussions, to increase students' participation and interactivity. In addition, universities can also apply AI technology to develop intelligent teaching platforms to improve the personalization and adaptability of course teaching, analyze students' learning progress, preferences, and understanding, and provide customized learning resources and paths. For example, the Civil Aviation University of China actively integrates AI technology in the reform of the teaching mode of transportation majors and gamifies learning tasks by developing the Tulip Intelligent Learning Platform (TULIP), which creates a multi-dimensional, multi-level learning platform by closely combining classroom theory and practical operation, with virtual simulation tasks as

the core. The TULIP platform combines classroom theory and practical operation and creates a multi-dimensional, multi-level interactive learning environment, including in-class learning and also expanding to outside the classroom, making the learning scenario both virtual and real, and enhancing students' situational awareness. In addition, the introduction of the intelligent tutor "Xiaobei" function further optimizes the management of the learning process, provides students with instant feedback and learning support, and helps students optimize their learning strategies and cultivate their independent and lifelong learning abilities by analyzing their learning data, marking an important step in the transformation of higher education to digitalization and intelligence. On the other hand, AI technology can also be applied to create virtual simulation training rooms, which use computer vision, simulation modeling, and machine learning algorithms to create highly realistic transportation simulation environments. In the transportation professional courses, students can simulate the actual operation of vehicle-road coordination and automatic driving through virtual reality technology, experience the coping strategies and management schemes under different traffic conditions (Zhou et al., 2017), practice and verify their theoretical knowledge repeatedly in a safe, low-cost environment, simulate complex traffic accident handling and emergency response, and help students have stronger resilience and problem-solving skills when facing real scenarios. The study is designed to help students to have better resilience and problem-solving skills when facing real scenarios.

2.2 Update and optimization of course content

In the context of rapidly developing science and technology, the course content of transportation majors should be made to better reflect the progress of modern science and technology and the needs of the industry, to comprehensively improve the theoretical literacy and practical ability of students. Teachers can introduce the latest theories and practices related to AI into the curriculum of transportation majors, introduce the core theories of AI such as deep learning, neural networks, computer vision, etc., and explain them in combination with practical cases to understand their specific applications in the field of transportation. Combined with practical projects, such as traffic flow prediction, intelligent signal control, and the development of automatic driving systems, theoretical knowledge is transformed into practical skills to enhance students' competitiveness in this industry. The complexity and diversity of the transportation profession determine that it needs to be deeply integrated with several disciplines such as computer science, machine learning, data science, etc. It is possible to offer a transportation course in big data analysis, which combines the knowledge of statistics, data mining, and machine learning to analyze and solve actual transportation problems, or to introduce a course on computer programming and software development, to equip the students with the writing and optimization of transportation simulation models and algorithms ability (Niu, 2017) to meet the challenges of future ITS. The integration of existing course content with AI technology is the core of course modernization, such as adding the explanation of AI applications in intelligent traffic signal control systems in traffic management courses; and introducing AI-based traffic demand forecasting and optimization methods in traffic planning courses.

2.3 Innovations in teaching methods

The teaching of transportation courses can adopt modern teaching methods such as flipped classrooms and project-driven ones, increase the proportion of experimental and practical teaching, and improve the teaching effect and students' learning experience. The flipped classroom is a revolutionary teaching method, that transfers the knowledge transmission link of traditional classroom teaching to the front of the class, and students use online resources and AI-driven intelligent teaching platforms for independent learning. In the classroom, the teacher acts more as a guide and facilitator, organizes discussions, Q&A, and in-depth explorations, improves students' independent learning ability and participation, and provides targeted tutoring to address the problems

encountered by students in the process of independent learning. The project-driven teaching method is to introduce real projects based on AI technology so that students can apply what they have learned in real situations and solve complex transportation problems (Yu, 2016). For example, in the intelligent transportation system course, students can participate in the design and development of intelligent signal control systems, traffic flow prediction models, and other projects, which are in line with the cultivation objectives of modern engineering education.

2.4 The scientificization of teaching evaluation

The conscientization of teaching evaluation is an important link to improving the teaching effect and students' learning quality, and intelligent evaluation and feedback can effectively solve the problems of a single evaluation method and untimely feedback. Traditional teaching evaluation often relies on midterm and final exams, with a long evaluation cycle, making it difficult to identify and solve students' learning problems promptly. However, the application of AI technology and the development of an intelligent assessment system can monitor and evaluate the student's learning process in real-time, and based on various forms such as online quizzes, assignments, and classroom interactions, it can comprehensively and instantly capture the learning dynamics of the students, and generate detailed learning reports and feedback, so that the students can learn about their learning progress and deficiencies promptly, and make targeted improvements and enhancements (Li et al., 2014). Learning data analysis and personalized guidance can solve the problems of traditional teaching that are difficult to comprehensively reflect students' learning and lack of personalized guidance, analyze the data of students' learning time, the correct rate of questions, types of errors, and learning habits identify students' strengths and weaknesses and provide personalized learning advice and guidance. For students who encounter difficulties in the learning process, the system can recommend relevant learning resources and practice questions to gradually overcome the difficulties; for students with faster learning progress, the system can provide higher difficulty challenge tasks to stimulate learning potential. In addition, intelligent assessment and feedback, as well as learning data analysis and personalized guidance can also provide teachers with accurate teaching support. Teachers can use the learning data report generated by the system to fully understand the learning situation of each student, discover common problems and common needs, and then adjust the teaching content and methods in a targeted manner. For example, if there are knowledge points that are difficult for most students to understand, teachers can arrange more classroom time for detailed explanation and practice; For the specific problems of individual students, teachers can arrange one-on-one tutoring and assistance to provide more personalized teaching services.

2.5 Deepening school-enterprise cooperation

Transportation majors have strong practicality, but the traditional teaching mode often lacks real practice scenes, which makes students face greater challenges in actual operation, colleges, and universities should cooperate with enterprises to build internship bases to provide students with real working environments and practice opportunities, such as in the internship base of the intelligent transportation system, to experience the collection, analysis and application of traffic data, and to master the specific application methods of AI technology in traffic management. Specific application methods. The current scientific research projects of universities often have the problem of limited funds and resources, while enterprises have rich practical experience and resources, joint scientific research and project cooperation, universities and enterprises can achieve complementary advantages, jointly carry out cutting-edge technology research and innovation projects, cooperate with enterprises to set up research projects (Zhao & Yang, 2013), organize teachers and students to participate in the research and development process of the actual project, carry out research on automated driving, intelligent traffic management system and other aspects of the research,

to jointly overcome technical problems and promote the technological progress of the industry.

Conclusion

In summary, the reform of the teaching mode of transportation professional courses based on AI technology is an effective measure to cope with the current teaching pain points and an inevitable choice to comply with the development trend of the times. The introduction of intelligent courseware and teaching materials makes the teaching content more cutting-edge and vivid, the intelligent evaluation and feedback system improves the timeliness and comprehensiveness of evaluation, and the learning data analysis and personalized guidance provide students with more targeted learning support. With the help of AI technology, the teaching mode of transportation majors will be more scientific, efficient, and personalized, and can better cultivate high-quality talents who can adapt to the future needs of the development of intelligent transportation, and should continue to pay attention to the development of AI technology, and actively explore more applications of it in the field of education, to promote the continuous innovation and optimization of the teaching mode.

Conflict of Interest

The author declares that he has no conflicts of interest to this work.

References

Wei, W. (2024). Research on the construction of a "Dual-teacher" teacher team of transportation majors in higher vocational colleges and universities empowered by digital technology. *Times Automobile*, *2024*(08), 38–40.

Zhang, S., Mou, K., & Chang, L. (2022). Cultivation practice of innovative and entrepreneurial ability of transportation professionals under the background of information technology. *China Logistics and Purchasing*, *2022*(17), 67–69.

Ding, X. (2022). how to do a good job in the construction of professional and technical talents in transportation systems in the new era. *Employment and Security*, *2022*(01), 154–156.

Wang, A. (2020). Analysis of the status quo and suggestions of professional and technical talents in grassroots transportation system . *Business News*, *2020*(21), 192–193.

San, Z. (2018). Research on the deep integration of teaching reform and information technology in the transportation profession. *Science and Technology Innovation Herald*, *15*(24), 240–241.

Zhou, G., Mao, L., & Wu, D. (2017). Application of simulation technology in experimental teaching of transportation specialty. *Logistics Engineering and Management*, *39*(17), 158–160, 187.

Niu, M. (2017). Problems and Countermeasures Analysis of Professional and Technical Talent Work in Huzhou City Transportation System . *Wireless Interconnection Technology*, *2017*(12), 131–132.

Yu, Y. (2016). Integration of information technology and teaching reform of transportation professions. *Technology Outlook*, *26*(36), 341.

Li, X., Han , R., & Deng, H. (2014). Discussion on the deep integration of information technology and teaching reform of transportation specialty. *China Power Education*, *2014*(11), 59–60.

Zhao, J., & Yang, J. (2013). Application of virtual simulation technology in practical teaching of transportation . *Western Transportation Science and Technology*, *2013*(11), 70–71.

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