Exploration of Student Training and Adaptive Teaching Reform for Transportation-Related Majors Under the Enabling Role of Artificial Intelligence

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Abstract: With the rapid development and widespread application of artificial intelligence (AI) technology, the traditional transportation field has been impacted and is gradually transforming towards intelligence and digitalization, which puts forward new requirements for the comprehensive literacy and technical capabilities of transportation-related professionals. However, the teaching models and talent training goals of higher vocational colleges are difficult to adapt to the demand for compound technical and skilled talents in the development of intelligent transportation. Based on this, this paper will explore the paths of student training and adaptive teaching reform for transportation-related majors from the perspective of AI empowerment, aiming to provide reference for improving the quality of talent training in transportation-related majors and promoting teaching reform.

Keywords: Artificial intelligence technology; Transportation-related majors; Adaptability; Competency development; Teaching reform

1. Introduction

Under the tide of the rapid development of AI technology, the transportation industry is undergoing profound intelligent and digital transformation. The wide application of new technologies such as intelligent scheduling, autonomous driving, smart road networks, and traffic big data analysis has reshaped the industry development pattern and job competency requirements. The operation models, management concepts, and technical systems of the traditional transportation industry have been broken, putting forward higher standards for professionals' knowledge structures, technical capabilities, and cross-border thinking [1]. As institutions for cultivating applied technical and skilled talents, higher vocational colleges should actively respond to this change, vigorously promote teaching reform and innovate talent training models, and build an education framework for the in-depth

integration of AI and transportation-related majors to cultivate compound talents suitable for the development of intelligent transportation.

2. Necessity of promoting student training and teaching reform for transportation-related majors under AI empowerment

2.1. Deepen teaching reform and improve professional education level and teaching quality

Under the dual background of the comprehensive penetration of AI technology and the increasingly fierce homogenized competition in higher education, some transportation-related majors in higher vocational colleges still adhere to traditional teaching models, lacking adaptation and integration with cutting-edge technologies, and face dilemmas such as outdated knowledge systems, reduced talent training quality, and weakened professional attractiveness [2]. With the support of AI technology, reconstructing the talent training system and continuously deepening teaching reform for transportation-related majors in higher vocational colleges can effectively expand teaching boundaries, enrich teaching content, continuously improve talent training quality and discipline construction level, build a differentiated and distinctive development path, and promote the all-round innovation of teaching concepts, teaching models, and evaluation mechanisms, guiding the major to transform from knowledge transmission to competency development [3]. In addition, it promotes the in-depth linkage between majors and industries, and between scientific research and teaching, driving colleges and universities to closely connect with the cutting-edge technologies and scientific research needs of the intelligent transportation industry, transforming new industrial technologies and achievements into teaching resources, and improving the professional education level and teaching quality.

2.2. Adapt to transportation industry transformation and provide high-quality talent support

In the new era, AI technology has deeply penetrated the technical systems, operational logic, and job structures of the traditional transportation industry, driving the industry to transform from traditional operation and maintenance to intelligent scheduling and data-driven, spawning new business scenarios and job demands, and putting forward higher requirements for the capabilities and literacy of talents in the transportation field[4]. Integrating AI technology into the teaching of transportation-related majors in higher vocational colleges can not only accurately align with the competency standards of intelligent transportation jobs, systematically cultivate students' compound capabilities, and fill the gap of compound talents in the industry but also realize the synchronous development of talent training and industry development, align the output rhythm of transportation-related professionals with the iteration of intelligent transportation technology and the pace of industrial upgrading, and provide core talent support for industrial technological innovation and sustainable development.

2.3. Break the limitations of traditional teaching systems and adapt to industry talent demands

The teaching system of transportation-related majors has problems such as rigid teaching content, unclear talent training goals, and single teaching models, which are difficult to adapt to the demand for compound talent training in the new era. Innovating talent training goals and promoting adaptive teaching reform based on AI technology can optimize the curriculum system, innovate teaching models, and improve evaluation mechanisms,

realizing the in-depth integration of AI and the teaching of transportation-related majors, making the teaching process more in line with the practical needs of intelligent transportation, and fundamentally improving the pertinence and effectiveness of professional education [5]. At the same time, combining AI technology with the teaching of transportation-related majors can integrate content such as traffic flow prediction, intelligent road network optimization, autonomous driving collaboration, and traffic emergency disposal into the teaching system, helping students improve their digital literacy, and systematically cultivating their technical sensitivity, application capabilities, and innovative thinking, ensuring that talents can quickly adapt to industrial technological updates and provide the industry with core forces with both professional heritage and technical advantages [6].

3. Challenges brought by AI technology to teaching reform and student training for transportation-related majors

3.1. Ambiguous talent training orientation

The demand for talents in the transportation industry presents diversified, intelligent, and cross-border characteristics. Under this new situation, using AI technology to cultivate outstanding talents who can adapt to the digital and intelligent development trends of the future transportation industry has become an important task for higher vocational colleges. However, at present, some colleges and universities lack a clear understanding of the talent training orientation for transportation-related majors under AI, leading to ambiguous talent training directions and difficulty in improving students' overall competitiveness [7]. In the process of formulating talent training goals, teachers in some colleges and universities are unable to accurately distinguish the competency requirements of different talent types such as technical R&D, technical application, and comprehensive management, nor have they clarified the integration focus between AI technology and transportation-related professional capabilities, resulting in students lacking AI technology and information literacy and being difficult to adapt to the needs of segmented industry jobs.

3.2. Insufficient adaptability of teachers' professional capabilities

In the traditional teaching system, some teachers in higher vocational colleges still focus on courses such as traffic engineering and transportation coordination, mostly with solid traditional transportation theories and teaching experience. Over time, problems such as outdated knowledge structures, imperfect teaching systems, and backward teaching thinking will arise, making it difficult to systematically master AI technology and intelligent tools. Specifically, some teachers of transportation-related majors lack a systematic understanding of the core principles, technical methods, and application scenarios of AI, and have a shallow understanding of cutting-edge technologies such as big data analysis, machine learning, and intelligent algorithms, making it difficult to deeply integrate them with the core courses of transportation-related majors, resulting in the disconnection between technology and majors [8]; in addition, some teachers of transportation-related majors lack the opportunity to deeply contact cutting-edge technologies and practical scenarios in the front line of the industry, making the teaching content disconnected from industry reality, and leading to the difficulty in effectively implementing teaching reform empowered by AI.

3.3. Imperfect construction of teaching systems

The curriculum system is a key carrier for promoting the deepening of teaching reform and innovating talent

training goals. The traditional curriculum system is usually centered on a single discipline, leading to rigid curriculum settings, teaching content, and teaching models, lacking dynamics and extensibility combined with AI technology, and making it difficult to achieve the goal of compound talent training. Specifically, in terms of teaching content, the teaching content takes textbooks as a fixed carrier, with the limitation of slow updates, making it difficult to keep up with the iteration rhythm of AI technology and the intelligent transportation industry, and insufficiently absorbing new technologies, methods, and norms in intelligent transportation scenarios [9]; in terms of curriculum settings, the curriculum layout is centered on professional courses, positioning courses related to AI technology as elective or supplementary courses, which are difficult to integrate with the core courses of transportation-related majors; in terms of teaching models, the traditional teaching model is dominated by theoretical lectures, lacking intelligent and scenario-based teaching carriers, and unable to provide students with a practical platform for applying AI technology to solve actual transportation problems.

4. Strategies for student training and adaptive teaching reform for transportation-related majors under AI empowerment

4.1. Reconstruct the professional curriculum system to accurately adapt to industrial transformation needs

On the one hand, higher vocational colleges need to break disciplinary barriers, establish a progressive curriculum teaching structure, and gradually improve the student training system. The basic layer should take core literacy cultivation and knowledge system construction as the core goals, retain the core courses of transportation-related majors, consolidate students' theoretical foundation in fields such as traffic engineering, transportation management, and road network planning [10], and systematically add general technical courses such as Fundamentals of Artificial Intelligence, Introduction to Big Data, and Basics of Intelligent Algorithms to lay the foundation for students to adapt to job needs; the integration layer should combine disciplinary characteristics, strengthen the in-depth integration of AI and transportation-related majors, design AI-driven transportation-related professional courses, construct an interdisciplinary curriculum system, and focus on strengthening students' professional basic capabilities and AI application capabilities; the expansion layer closely follows the trend of industrial technological iteration, sets courses such as cutting-edge topics in intelligent transportation and technical innovation seminars, connects with cutting-edge fields such as autonomous driving, smart road networks, and traffic big data mining, and cultivates students' technical sensitivity and innovative potential.

On the other hand, break the limitation of rigid traditional teaching content, connect with the technological iteration and job demand changes in the intelligent transportation industry, timely absorb new technologies, methods, and norms, integrate cutting-edge application scenarios and practical problems of intelligent transportation into teaching content, and solve the problem of outdated content [11]; at the same time, optimize the curriculum credit ratio, strengthen the weight of core integrated courses and practical courses, reduce the proportion of single theoretical courses, avoid AI content becoming a supplementary module, and make integrated teaching a core part of the curriculum system.

4.2. Increase training and support efforts to improve teachers' professional teaching capabilities

Teachers' professional teaching capabilities are directly related to the implementation of student training and adaptive teaching reform. In the context of the rapid development of AI technology, teachers' professional

capabilities need to be continuously optimized with industrial development. Therefore, higher vocational colleges need to increase training efforts to improve teachers' overall teaching capabilities. First, based on the knowledge foundation and teaching pain points of teachers of transportation-related majors, colleges and universities should adopt activities such as thematic seminars, interdisciplinary exchanges, and blended training to help teachers build a systematic cognitive framework of AI technology, focus on core AI theories and tool operations, such as basic big data analysis, machine learning principles, introduction to intelligent algorithms, and related technical tool operations, to help teachers improve their teaching capabilities and tool operation capabilities [12]. At the same time, focus on the application principles and integration paths of AI in core traffic scenarios, guide teachers to accurately grasp the internal connection points between intelligent technologies and core courses such as traffic engineering, transportation management, and road network planning, and learn to explore the integration points between technology and professional teaching, avoiding problems such as disconnection between technology and majors and fragmented content in teaching.

Second, establish a linkage mechanism between training and practice, closely combine training content with school-based teaching research and classroom practice, encourage teachers to apply what they have learned in training to integrated curriculum design and classroom teaching, thereby strengthening teachers' capabilities in teaching plan design, teaching scenario construction, and teaching method innovation, and promoting them to achieve teaching thinking transformation [13]; finally, incorporate student training effectiveness and teaching reform achievements into teachers' performance appraisal, professional title evaluation, and professional development evaluation systems, strengthen the incentive orientation, and stimulate teachers' initiative to participate in empowerment training and teaching reform.

4.3. Build a practical teaching platform to strengthen students' technical and skill application capabilities

Practical teaching is a key carrier for cultivating students' comprehensive capabilities and improving professional literacy, and also an important proposition to help higher vocational colleges achieve in-depth adaptive teaching reform. The essence of building a practical teaching platform lies in constructing a systematic, full-element, and intelligent teaching ecosystem, breaking the limitations of fragmented resources and single platforms in original practical links, and comprehensively cultivating students' applied technical skills [14]. First, higher vocational colleges can increase investment in intelligent equipment, build training bases suitable for intelligent transportation scenarios, introduce resources such as traffic big data analysis platforms, intelligent road network simulation systems, and autonomous driving simulation equipment, provide students with a standardized and repeatable practical environment, and help them proficiently master the application methods of AI technology tools in traffic scenarios.

Second, focus on the cultivation of students' job capabilities, cooperate with high-quality enterprises, co-build practice bases, introduce real enterprise projects and work scenarios, and carry out practical teaching activities, allowing students to contact front-line technical application scenarios and needs in the industry, making up for the gap between on-campus training and actual work, and improving job adaptability; third, teachers can rely on AI technology to establish a traffic simulation practice system, integrate complex scenarios, such as traffic control under extreme weather and intelligent disposal of sudden accidents, and let students use intelligent tools to solve problems, thereby strengthening their knowledge mastery and technical skills [15]. In addition, teachers need to actively carry out diversified practical teaching activities, such as project-based, scenario-based, and task-based practical teaching, design practical projects oriented to real problems in the field

of intelligent transportation, and guide students to carry out independent inquiry and collaborative practice using AI technology and transportation-related professional knowledge, thereby improving their technical application, team collaboration, and problem-solving capabilities.

5. Conclusion

In summary, AI empowerment provides core motivation for student training and teaching reform for transportation-related majors. By reconstructing the curriculum system, improving teachers' capabilities, and building practical platforms, we can realize the unification of talent training and the development of the intelligent transportation industry, transport compound talents with both professional heritage and technical advantages for the industry, and help the high-quality transformation of the transportation industry.

Disclosure statement

The author declares no conflict of interest.

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