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Research on the Reform of Hybrid Teaching Content in Transportation Engineering Courses under the Background of Smart Transportation

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Abstract: Smart transportation is a key direction and trend in the development of China's public transportation sector. Under this background, new opportunities for the development of transportation engineering education have emerged, necessitating the active promotion of hybrid teaching in transportation engineering courses. This approach aims to achieve innovation in teaching content and enhance the quality and effectiveness of education. Therefore, to improve the quality of transportation engineering education, this paper conducts research and exploration on the reform of hybrid teaching content. It proposes several measures, including constructing a dynamic teaching content system, strengthening faculty education and training, improving teaching facilities and technical support, and reinforcing students' self-discipline in learning. These initiatives aim to promote the reform of transportation engineering courses under the current smart transportation background and enhance the overall level and quality of education.

Keywords: Smart transportation; Transportation Engineering course; Hybrid teaching

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1. Introduction

With the rapid development of smart transportation, China's transportation industry is undergoing unprecedented changes. Smart transportation not only helps improve the efficiency of public transportation but also provides more convenient public transportation services [1]. In this context, vigorously promoting the reform of hybrid teaching content for transportation engineering courses has become crucial. Through this initiative, online and offline teaching modes can be deeply integrated, highlighting innovation in the education and teaching process and promoting continuous optimization and enhancement of students' learning effectiveness and quality. Therefore, it is necessary to focus on the reform of hybrid teaching content to vigorously promote changes in transportation engineering courses, thereby strengthening the quality and effectiveness of course education and improving students' professional levels and abilities.

2. Overview of smart transportation

Smart transportation is a new model of public transportation development based on networks such as the Internet and the Internet of Things, with smart road networks, smart equipment, smart travel, and smart management as its components. Its most prominent features are information exchange, real-time monitoring, collaborative management, and the integration of people and things. Smart transportation covers multiple dimensions, such as smart monitoring of public traffic flow, smart control of traffic signals, smart vehicle navigation, smart parking management, and smart road safety control. In this process, artificial intelligence technology is integrated to enhance the management and operation level of the transportation system and promote the intelligentization of traffic management practices [2]. The core value of smart transportation lies in using network information technology to transform and obtain public transportation information and conduct substantive analysis. Then, based on big data analysis results, smart scheduling and optimal control of public traffic flow are performed. This reduces the probability of congestion in public transportation, improves the efficiency and convenience of public transportation, provides high-quality public travel services, and enhances the level and quality of public transportation management [3].

3. Significance of hybrid teaching reform in transportation engineering courses in the context of smart transportation

In the context of smart transportation development, vigorously constructing a hybrid teaching model for transportation engineering courses is of great significance and value. It can promote innovative changes in transportation engineering course instruction and provide students with a more convenient and novel learning experience, thereby enhancing the quality of talent cultivation in transportation engineering. Specifically, the significance of the hybrid teaching model reform in transportation engineering courses in the context of smart transportation can be summarized as the following two points:

3.1. Improving teaching effectiveness and student learning experience

In the context of smart transportation, vigorously promoting hybrid teaching reform in transportation engineering courses is of utmost importance and value. It can help improve teaching effectiveness, optimize the student learning experience, and ultimately enhance the quality of talent cultivation [4]. In traditional transportation engineering courses, teachers often adopt a simple classroom indoctrination teaching method, where students are in a relatively passive learning position and do not actively explore and create knowledge, leading to poor learning outcomes. Constructing a hybrid teaching model can comprehensively utilize online and offline teaching channels, enhancing students' autonomy in learning. Students can watch related videos of transportation engineering courses, participate in online discussions, and complete online assignments through online channels. This process allows students to preview and review professional knowledge beforehand. In offline sessions, students can participate in offline practical activities and group discussions, transforming the offline classroom into a problem-solving-centered teaching format. This effectively enhances the student learning experience and improves the teaching effectiveness and quality of transportation engineering courses.

3.2. Adapting to the development needs of the smart transportation industry

In the context of smart transportation, China's transportation industry has a growing demand for high-quality talent. However, traditional transportation engineering courses often focus on theoretical knowledge, neglecting to specifically strengthen students' practical skills and innovative literacy. This results in poor talent

cultivation, which is clearly not adapted to the current development trends and talent cultivation needs of the smart transportation industry. Vigorously promoting hybrid teaching content reform can deeply integrate online and offline education channels. It can also incorporate cutting-edge technical knowledge from the smart transportation field into transportation engineering courses, effectively integrating course content with practical transportation projects. This process highlights the comprehensive application of theoretical knowledge in practical projects and enables students to more fully understand and master professional knowledge in transportation engineering courses, deeply grasping the underlying principles and practical application models [5]. Additionally, promoting teaching reform in transportation engineering courses based on hybrid teaching can facilitate targeted talent cultivation according to the development needs of the smart transportation field. This not only improves the level and effectiveness of talent cultivation but also fully aligns with the development trends and demands of the smart transportation industry.

4. Challenges of hybrid teaching content reform in transportation engineering courses in the context of smart transportation

4.1. Updating teaching content and integrating cutting-edge technologies

In the context of smart transportation, the hybrid teaching content reform in transportation engineering courses faces the challenge of updating teaching content and integrating cutting-edge technologies. Overcoming this challenge becomes a critical factor in determining the quality of education and teaching. With the rapid development of network information technology in China, the field of smart transportation is booming, and various new technologies and concepts are emerging. As a subject closely related to smart transportation, the transportation engineering course must keep up with the pace of the times during the hybrid teaching content reform, integrating industry-tested technologies into teaching. However, the current teaching content has a certain lag and does not incorporate industry-leading technologies and knowledge, making it difficult to effectively promote the orderly progress of hybrid teaching content reform and strengthen the quality and effectiveness of talent cultivation.

4.2. Improving the information technology literacy of the teaching team

To effectively integrate smart transportation expertise into the hybrid teaching content reform of transportation engineering courses, a high-quality teaching team is needed. This requires teachers to not only possess a wealth of information and knowledge but also to have a deep understanding of the development of the smart transportation field and be familiar with the linkage between online and offline teaching. This poses higher requirements on teachers' teaching professionalism. However, in reality, some teachers in colleges and universities have limited understanding and application of new technologies and tools. These teachers are more accustomed to traditional classroom teaching with blackboard writing and are relatively unfamiliar with the use of online teaching platforms and multimedia teaching equipment. This situation makes the hybrid teaching content reform of transportation engineering courses face certain difficulties.

4.3. Enhancing teaching facilities and technical support

In the context of smart transportation, the hybrid teaching content reform of transportation engineering courses faces teaching difficulties brought about by the improvement of teaching facilities and technical support. This is mainly because some colleges and universities often face problems such as incomplete teaching facilities and insufficient technical support, making it difficult to promote teaching reform in an orderly manner [6]. For

example, some colleges and universities have aging teaching facilities, which makes it difficult to effectively implement the hybrid teaching model. Some classrooms often have outdated multimedia teaching equipment and insufficient network bandwidth, making it challenging to ensure the smooth progress of online teaching and promote teaching reform in transportation engineering courses.

4.4. Cultivating students' self-discipline and learning initiative

In the context of smart transportation, the hybrid teaching content reform of transportation engineering courses faces challenges in cultivating students' self-discipline and initiative, which has become a major difficulty in teaching reform. In practice, the hybrid teaching content reform requires the comprehensive use of online and offline channels to promote teaching. The online learning stage requires students to have stronger self-discipline and actively participate in the learning and exploration of professional knowledge. However, due to students' lack of self-discipline in learning, problems such as inattention and procrastination in online learning may arise. Especially for students with weak self-management abilities, they often fail to concentrate on online learning, making it difficult to achieve good learning results [7].

5. Suggestions and countermeasures for hybrid teaching content reform of transportation engineering courses in the context of smart transportation

5.1. Constructing a dynamic teaching content system and integrating the latest knowledge of smart transportation

To effectively promote the reform and innovation of transportation engineering course education, it is necessary to continuously improve the educational model based on the current background of smart transportation, utilizing both online and offline channels to achieve hybrid teaching reform. Therefore, it is important to keep up with the times and continuously innovate in education and teaching. Constructing a dynamic teaching content system and deeply integrating the latest knowledge of smart transportation are crucial measures that can effectively facilitate the reform of hybrid teaching content. Hence, it is essential to actively establish a dedicated teaching content update mechanism, such as regularly reviewing the current teaching content of transportation engineering courses and actively integrating cutting-edge technical knowledge from the field of smart transportation. This ensures that student learning remains synchronized with industry developments, aligning with industry trends and directions [8]. Especially in the context of the continuous development and innovation of China's intelligent transportation systems, intelligent driving technology, and big data technology, teachers need to actively integrate this knowledge during the teaching content innovation phase. Through various methods such as case studies and project practices, students are guided to learn and explore, helping them develop a deep understanding of smart transportation and improving the quality of education and teaching.

5.2. Strengthening education and training of the teaching team to enhance information technology literacy and teaching ability

Education and training for the teaching team are crucial, as they can help build a high-quality, professional teaching team to promote the hybrid teaching content reform of transportation engineering courses, aligning education and teaching with social transportation development trends [9]. Therefore, it is necessary to vigorously strengthen the education and training of the teaching team, focusing on improving teachers' information technology literacy and teaching abilities. For example, professional training can be regularly organized for teachers to participate in. Through professional training, teachers' information technology abilities can

be enhanced, enabling them to use online platforms to promote teaching and improve their online teaching abilities. Practical training should include knowledge of online teaching platform operations, virtual simulation technology applications, and multimedia teaching courseware production. This ensures that teachers are proficient in online teaching, building a high-quality teaching team to promote the construction of a hybrid teaching model and effectively drive innovation in the teaching content of transportation engineering courses.

5.3. Improving teaching facilities and technical support to ensure smooth implementation of hybrid teaching

In the context of smart transportation, promoting the reform of teaching content for transportation engineering courses also requires significant improvements in teaching facilities and technical support to ensure the smooth implementation of hybrid teaching. In practice, it is essential to ensure adequate online teaching facilities and equipment. Therefore, it is necessary to actively purchase advanced online teaching platforms and multimedia teaching equipment, providing sufficient objective support for teachers to conduct online teaching and meeting students' needs for online learning [10]. Additionally, it is important to strengthen campus network construction by enhancing network bandwidth and improving network stability. This ensures smoother online learning processes, preventing network environmental issues from affecting students' learning and facilitating the orderly progress of hybrid teaching content reform for transportation engineering courses.

5.4. Strengthening students' self-discipline in learning and stimulating their interest in active learning

The reform of hybrid teaching content in transportation engineering courses also requires students to possess stronger self-discipline and demonstrate good subjective initiative. Therefore, promoting hybrid teaching reform in the context of smart transportation should also focus on strengthening students' interest in learning, so that students can form good self-discipline and actively carry out learning and exploration of transportation engineering courses. Firstly, teachers need to assist students in developing detailed study plans and schedules and regularly organize discussions on professional course knowledge for students. This allows students to learn time management and develop good self-discipline while advancing their learning plans. Additionally, teachers should focus on creating a positive learning environment and atmosphere, such as fostering a positive class atmosphere to motivate students to actively participate in online and offline hybrid learning. This not only drives students to actively learn in a good learning atmosphere but also cultivates their interest in learning, helps strengthen the reform effect of transportation engineering courses, and improves the quality of teaching and educating.

6. Conclusion

In summary, in the context of smart transportation, the reform of hybrid teaching content for transportation engineering courses is crucial. Through this reform, online and offline teaching modes can be deeply integrated, leading students to innovatively learn and explore transportation engineering knowledge. This helps students adapt to the development trend and direction of smart transportation, enabling them to master rich professional knowledge and enhance their professional skills. Therefore, based on the challenges faced by the current reform of hybrid teaching content in transportation engineering, this paper proposed multiple measures, such as building a dynamic teaching content system, cultivating teachers' information technology and capabilities, providing hybrid teaching facilities and technical support, and fostering students' initiative and self-discipline.

These measures aim to facilitate the orderly reform of hybrid teaching content in transportation engineering courses and enhance the quality and effectiveness of talent cultivation.

Disclosure statement

The author declares no conflict of interest.

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