

# Construction of Training Course System—The Synergistic Efforts of Traditional Chinese Culture and Artificial Intelligence

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## Abstract

Driven by the dual impetus of the high-quality development and intelligent transformation of the railway industry, the continuing education course system for railway employees is facing an urgent need for quality improvement and upgrading. Taking multiple railway employee training courses of Guangzhou Railway Polytechnic as the research object, this paper combines data from 267 valid questionnaires, focuses on the core innovation point of “the synergistic efforts of Traditional Chinese Culture and Artificial Intelligence”, and explores the construction path of the continuing education course system for railway employees. The research finds that the average score of courses integrating Traditional Chinese Culture and Artificial Intelligence is higher than the overall average score of courses, and the core reason is that the course content accurately meets the training needs and work practices. By exploring the internal logic of their synergy, this paper constructs a characteristic course system of “culture shaping the soul + intelligence empowering” from three dimensions: curriculum module reconstruction, teaching mode innovation, and evaluation system optimization, providing practical reference for the high-quality development of continuing education in the railway industry.

## Keywords

Railway Employee Training, Course System, Traditional Chinese Culture, Artificial Intelligence, Synergistic Efforts

## 1. Introduction

With the intensive introduction and in-depth advancement of policies such as the “National Vocational Education Reform Implementation Plan” and the “14th

Five-Year Plan for Railway Development”, the intelligent transformation process of the railway industry has continued to accelerate, and a development pattern centered on intelligent construction, intelligent equipment, and intelligent operation has gradually taken shape. This has put forward more stringent requirements for the renewal of knowledge structure and the improvement of skill levels of railway employees. As a key link connecting industry development and employee growth, the scientificity, pertinence, and forward-looking nature of the continuing education course system directly determine the quality of training, and are also important factors affecting the high-quality development of the railway industry (Cui, 2024). At present, the traditional railway training course system generally has three major pain points: first, the content lag is significant. Some courses still focus on traditional technologies and management models, and insufficiently cover the application of new technologies such as intelligent EMU operation and maintenance and big data scheduling; second, the teaching mode is single and rigid, mainly based on “classroom teaching”, lacking practical training and immersive experience, which is difficult to match the cognitive laws of adult learning; third, the cultural infiltration function is missing. The curriculum design ignores the cultivation of professional literacy, and fails to effectively connect the excellent concepts in Traditional Chinese Culture with the professional requirements of the railway industry, resulting in the lack of systematic support for the cultivation of core literacy such as employees’ sense of responsibility and dedication, which is difficult to meet the dual development needs of “excellent technology + comprehensive literacy” for railway employees in the new era (Liu, 2025).

From the perspective of the macro trend of industry development, China’s railway has steadily entered a new stage of intelligent development, and the integration depth of intelligent technology with various links of railway operation has continued to improve. The full-scale commissioning of intelligent EMUs, the extensive coverage of intelligent operation and maintenance systems, and the regular operation of big data scheduling centers have not only reshaped the core processes of railway operation, but also put forward new challenges to employees’ intelligent technology operation capabilities, data interpretation and analysis capabilities, and emergency response innovation capabilities. According to the “2024 Railway Industry Development Report” released by China State Railway Group Co., Ltd., as of the end of 2024, the national railway operating mileage has exceeded 165,000 kilometers, of which the high-speed railway operating mileage exceeds 45,000 kilometers, accounting for 27.3%, ranking first in the world; the coverage rate of intelligent equipment in various fields of railway has increased by 62% compared with 5 years ago, and intelligent testing equipment in the field of high-speed railway operation and maintenance has achieved coverage of more than 90% of key parts. The rapid popularization of intelligent equipment has shortened the skill update cycle of employees from 5 - 8 years in the past to 2 - 3 years, and the demand for skill updates has shown explosive growth. At the same time, as a key infrastructure industry related to national economy and people’s

livelihood, safe operation has always been an insurmountable red line. This core attribute determines that railway employees not only need to have excellent professional skills, but also need to cultivate a firm sense of responsibility, a rigorous work attitude, and selfless dedication. The cultivation of these core professional qualities is precisely inseparable from the in-depth infiltration of Traditional Chinese Culture—the excellent cores in Traditional Chinese Culture, such as the concept of integrity, craftsmanship spirit, and family and country feelings, are highly consistent with the railway industry’s operation policy of “safety first, prevention first, and comprehensive management” and the work standard of “excellence and no mistakes”, and are the spiritual foundation for cultivating a high-quality railway employee team.

Against this background, Guangzhou Railway Polytechnic has explored integrating courses related to Traditional Chinese Culture and Artificial Intelligence in multiple training courses, forming a construction idea of “culture shaping the soul + intelligence empowering”. Based on 267 valid survey data from multiple training courses such as Guangzhou Passenger Transport Section, Chengdu Bureau, and Hohhot Bureau, this paper systematically analyzes the core value of the two types of courses, explores the realization path of their synergistic efforts, breaks through the traditional single course construction model, achieves the dual goals of “skill improvement + literacy cultivation”, and provides an innovative plan for the optimization of continuing education courses in the railway industry.

## **2. Current Situation of Training Course Evaluation: Courses on Traditional Chinese Culture and Artificial Intelligence Become Core Highlights**

This survey (**Appendix**) covers fields such as railway passenger transport management, vocational education management, and power supply system maintenance. An online questionnaire survey was adopted to collect 267 valid questionnaires, ensuring the authenticity and comprehensiveness of the data. To ensure the representativeness of the survey samples and the reliability of the data, the survey samples cover railway employees of different age groups, specific job types, and working years, with detailed information as follows. Statistical analysis shows that the overall evaluation of current training courses is good, among which courses related to Traditional Chinese Culture and Artificial Intelligence perform particularly prominently, becoming the core factor driving up the overall evaluation.

### **2.1. Result of Survey Samples**

The survey samples cover railway employees of different age groups, specific job types, and working years. The sample structure is reasonable and representative, with detailed information as follows: 1) Age distribution: 113 employees aged 25 - 35, accounting for 42.3%; 95 employees aged 36 - 45, accounting for 35.6%; 50 employees aged 46 - 55, accounting for 18.7%; 4 employees under 25 and 5 em-

employees over 55, accounting for 3.4% in total. The samples are mainly young and middle-aged employees, which is consistent with the main demand for skill update and literacy improvement in the railway industry. 2) Specific job distribution: 103 employees in passenger transport service positions, accounting for 38.6%, including passenger attendants, passenger transport team leaders, passenger transport dispatchers, high-speed railway attendants, etc.; 66 employees in vocational education management positions, accounting for 24.7%, including vocational education clerks, full-time trainers, training management specialists, etc.; 59 employees in power supply system maintenance positions, accounting for 22.5%, including power supply maintenance workers, power dispatchers, intelligent power supply equipment operation and maintenance personnel, etc.; 39 employees in other positions, accounting for 14.2%, including freight dispatchers, track inspection workers, railway communication maintenance personnel, etc., covering all core and key positions of railway operation. 3) Working years distribution: 100 employees with 1 - 5 years of work experience, accounting for 37.1%; 80 employees with 6 - 10 years of work experience, accounting for 29.9%; 63 employees with 11 - 20 years of work experience, accounting for 23.6%; 24 employees with more than 20 years of work experience, accounting for 9.4%, covering new employees, post backbones, and senior technical/management employees, which can fully reflect the training needs and cognitive characteristics of employees at different development stages.

## **2.2. Good Foundation for Overall Course Evaluation**

Statistical analysis based on 267 valid questionnaire data shows that the overall evaluation of current railway employee training courses is good, laying a solid foundation for the subsequent optimization and upgrading of courses. From the evaluation dimension, the average score of students' overall satisfaction with the courses is 80 points (out of 100 points), among which the average scores of the three core dimensions of "practicality of course content", "rationality of teaching arrangement", and "professional level of teachers" are 79.2 points, 81.5 points, and 82.3 points respectively, all at a good level. Specific feedback shows that 83.5% of students believe that the existing training courses can basically meet the needs of post-skilling improvement, and 78.7% of students recognize the teaching organization and implementation process. At the same time, the survey also collected basic optimization suggestions, such as 65.2% of students hoping to increase the duration of practical training, and 58.1% of students suggesting enriching the teaching presentation form. These feedbacks provide targeted directions for the subsequent construction of the "culture + intelligence + professionalism" three-dimensional course system.

## **2.3. Courses on Traditional Chinese Culture and Artificial Intelligence Drive Up Overall Evaluation**

The average score of the two types of courses reaches 85 points, 5 points higher

than the overall average score of courses. The core reason is that they accurately meet the dual needs of students for “skill improvement + literacy cultivation”. Courses related to Artificial Intelligence focus on intelligent application scenarios in the railway industry and are highly practical. For example, the NPS values of courses such as “Integration of Artificial Intelligence and Modern Passenger Transport Business” and “AI Empowers Management Capability Improvement” all exceed 80%, effectively helping students improve work efficiency. Courses on Traditional Chinese Culture are rich in form and strong in experience. For example, courses such as “Baduanjin” and “On-site Learning of Red Education” have an average score of over 9.3 points (converted from 5-point scale), and the highest NPS value reaches 93.1%, effectively making up for the shortage of insufficient cultural infiltration in traditional training. The survey shows that 62.55% of students believe that “the combination of the two types of courses makes the training more in-depth and warm”, confirming the feasibility and value of their synergistic efforts.

### **3. Internal Logic of Synergistic Efforts: Two-Way Empowerment of Culture Shaping the Soul and Intelligence Empowering**

The synergistic efforts of Traditional Chinese Culture and Artificial Intelligence in the course system are not a simple superposition of content, but an organic integration based on the characteristics of the railway industry and the development needs of employees. The core logic lies in constructing a two-way empowerment system of “culture shaping the soul to strengthen literacy and intelligence empowering to improve skills”, which accurately meets the dual development needs of employees for “professional ability + professional literacy”. It can be analyzed from three levels:

#### **3.1. Traditional Chinese Culture Lays a Value Foundation for the Application of Intelligent Technology**

The core responsibility requirement of the railway industry of “safety first” has a natural value fit with the core connotation of Traditional Chinese Culture, and this fit lays the foundation for their synergy in the course system. The core cores in Traditional Chinese Culture, such as integrity culture, craftsmanship spirit, family and country feelings, and harmony concept, are accurately connected with the professional requirements of railway employees: integrity culture corresponds to the integrity service standards in railway ticket management and passenger service, requiring employees to adhere to professional ethics and eliminate irregular operations; craftsmanship spirit corresponds to the refinement requirements in equipment maintenance and technical operation and maintenance, advocating employees to pursue excellence and eliminate omissions; family and country feelings correspond to the sense of responsibility in railway transportation guarantee, encouraging employees to take on heavy responsibilities in key tasks such as

Spring Festival travel and emergency rescue; harmony concept corresponds to the coordination requirements in cross-post and cross-departmental collaboration, helping to improve operational efficiency. Through diversified forms such as case teaching, scenario simulation, and on-site experience, traditional cultural courses achieve cultural infiltration, which can not only strengthen employees' professional identity and sense of responsibility, but also provide value guidance and behavioral constraints for the standardized application of intelligent technology. From the perspective of practical logic, intelligent technology is a "tool carrier" to improve efficiency, but the effect of technology application depends on the attitude and concept of users—intelligent testing equipment can accurately identify potential faults, but it requires employees to complete equipment operation and data verification with a rigorous attitude; intelligent scheduling systems can optimize transportation plans, but it requires employees to respond to emergencies with a sense of responsibility. Without the support of corresponding professional literacy, intelligent technology may instead trigger safety risks due to operational omissions and lack of responsibility. The sense of responsibility and rigorous attitude cultivated by Traditional Chinese Culture can precisely make up for the "human limitations" in technology application, effectively avoiding risks such as operational errors and data misjudgment. At the same time, concepts in Traditional Chinese Culture, such as "harmony in diversity" and "unity is strength" can be transformed into practical abilities through course links such as collective learning and team collaboration projects. 73.21% of participating students reported that team experience activities in traditional cultural courses (such as collaborative practice of traditional folk customs, simulation of red task tackling, etc.) have effectively improved their cross-post collaboration awareness, laying a foundation for solving multi-departmental collaboration problems in railway operation. It should be emphasized that the core values in Traditional Chinese Culture are highly consistent with the development concept of the railway industry of "safety first and service first", which is the spiritual core for cultivating a high-quality employee team and the value foundation for the synergistic efforts of the two types of courses.

### **3.2. Artificial Intelligence Provides Technical Support for Cultural Inheritance and Training Effectiveness**

With data-driven as the core, Artificial Intelligence technology provides comprehensive technical support for the inheritance and innovation of Traditional Chinese Culture and the improvement of training effectiveness, realizing the dual value of "technology empowering training and technology activating culture". In terms of improving training precision, the recommendation algorithm of Artificial Intelligence can construct "student portraits". By collecting multi-dimensional data such as students' job types, working years, skill shortcomings, and learning preferences, personalized course recommendation of "one size fits all" is realized. Taking the practice of the training course at Guangzhou Passen-

ger Transport Section as an example, by analyzing students' daily work data (such as service complaint types, emergency response records) and previous test results, the system accurately pushes the combined courses of "Basic Operation of Intelligent Passenger Transport System" and "Traditional Service Etiquette Specifications" for new passenger attendants, and pushes advanced courses such as "Application of AI Passenger Demand Prediction" and "Culture Empowers Service Upgrade" for senior passenger attendants. This personalized recommendation model has increased the course completion rate of students from 68.2% to 91.6%, and the learning efficiency has increased by 31.2%, effectively solving the problem of insufficient course adaptability caused by the "one size fits all" traditional training. In terms of the inheritance and innovation of Traditional Chinese Culture, Artificial Intelligence technology breaks the time and space limitations of traditional cultural communication. With the help of VR/virtual simulation technology, it restores red education scenes (such as the revolutionary historical scenes of railway construction) and traditional craft scenes (such as the traffic culture scenes of ancient post stations), allowing students to immerse themselves in the cultural connotation. In the training course at Hohhot Bureau, the "Jingzhang Railway Construction Scene" was restored through VR technology, and students experienced the innovative tackling process of Zhan Tianyou's team as "virtual participants", which not only deepened the understanding of the craftsmanship spirit, but also increased the course memory retention rate by 42.1% compared with traditional lecture-based courses. In addition, the big data analysis capability of Artificial Intelligence provides an objective and scientific basis for the evaluation of training effects. The system can real-time collect data such as students' course learning duration, practical operation accuracy rate, and interaction participation, generate dynamic evaluation reports, accurately locate the weak links in curriculum design (such as low accuracy rate of a certain type of practical course, insufficient interaction in a section of cultural explanation), provide data support for curriculum optimization, and realize the full-cycle closed-loop management of "training-evaluation-optimization".

The synergy between Traditional Chinese Culture and Artificial Intelligence courses ultimately focuses on matching the actual needs of each position, forming a two-way support of "technology improvement and literacy cultivation". This synergy effect presents a differentiated practical form in different positions. The specific explanation is combined with two typical position cases as follows:

In addition to the above cases, vocational education management positions, power supply maintenance positions, etc. all show similar synergy effects: students from the training course at Chengdu Bureau Passenger Transport Section reported that through course learning, the passenger satisfaction of their team increased from 92.1% to 96.7%, complaints decreased by 41%, and the comprehensive satisfaction rate reached 92.3%; students from the power supply system training course at Hohhot Bureau used AI diagnostic tools combined with a rigorous

work attitude, reducing the average fault diagnosis time by 35% and the fault recurrence rate by 28%. It can be seen that the two types of courses do not exist in isolation, but form complementary synergy around the core needs of positions, and finally achieve the educational effect of “1 + 1 > 2”, accurately matching the actual development needs of each position.

#### **4. Reconstruction Path of Training Course System under the Guidance of Synergistic Efforts**

Based on the internal logic of their synergy and students' needs, the course system is reconstructed from three core dimensions: curriculum modules, teaching modes, and evaluation systems, and supporting guarantee mechanisms are provided to ensure implementation, so as to achieve the training goal of “culture shaping the soul + intelligence empowering”.

##### **4.1. Reconstruct Curriculum Modules: Build a “Culture + Intelligence + Professionalism” Three-Dimensional System**

The Traditional Chinese Culture soul-shaping module adopts a differentiated setting mode of “general + special”, which not only ensures the comprehensive coverage of cultural connotation, but also realizes the accurate connection with post needs. General cultural courses are offered to students of all positions, with 2 core courses set: “Excellent Traditional Chinese Culture and Railway Spirit” focuses on core concepts such as integrity, dedication, and responsibility, and interprets their internal connection with the core values of the railway industry of “safety first and service first”; “Inheritance of Red Railway Culture” strengthens students' family and country feelings and industry identity by sorting out the red historical context of the railway industry (such as the construction of Jingzhang Railway and the tackling of Chengdu-Chongqing Railway). Special cultural courses are accurately designed according to position characteristics: passenger transport positions focus on “service quality improvement” and offer 2 courses: “Integration of Traditional Service Etiquette and Modern Passenger Transport Service” and “Baduanjin and Physical and Mental Regulation of Employees”; vocational education management positions focus on “teaching empowerment” and offer 2 courses: “Practice of Integration of Traditional Chinese Culture and Vocational Education” and “Craftsmanship Spirit and Training of Trainer Literacy”; power supply maintenance positions focus on “safety soul-shaping” and offer 2 courses: “Responsibility Culture and Power Supply Safety Practice” and “Red Tackling Spirit and Emergency Response”. All cultural courses are equipped with practical links such as case discussion and scenario simulation to avoid “theoretical indoctrination” and ensure that cultural connotation is truly internalized (Deng, 2025).

The Artificial Intelligence empowerment module follows the design idea of “foundation first, special breakthrough, and practical landing”, taking into account both general cognition and special post needs. The general basic course sets

“Overview of Artificial Intelligence Foundation and Railway Industry Application”, which systematically explains the core principles and technical system of Artificial Intelligence, and helps all students establish basic cognition and eliminate technical fear by combining application cases of intelligent equipment in the railway industry. Special skill courses are accurately split according to positions to realize “one position, one policy”: passenger transport positions offer “Practical Operation of Intelligent Passenger Transport Service System” and “AI Passenger Demand Analysis and Service Push”; vocational education management positions offer “Application of AI Training Demand Diagnosis Tools” and “Operation and Management of Intelligent Training Platforms”; power supply maintenance positions offer “Operation Specifications of Intelligent Power Supply Equipment” and “Application and Practical Operation of AI Fault Diagnosis Systems”. All Artificial Intelligence courses are equipped with no less than 4 class hours of practical training, carried out relying on virtual simulation training platforms or real equipment, to ensure that students can transform technical knowledge into practical abilities.

The core module of professional skills takes “integration and optimization, integration and innovation” as the core, reconstructs and upgrades traditional professional courses, and deeply integrates elements of Traditional Chinese Culture and Artificial Intelligence into teaching content. The specific optimization path is divided into three steps: first, content integration, sorting out the core professional skills of each position, eliminating backward content, and supplementing cutting-edge content related to the application of intelligent technology; second, element integration, integrating traditional cultural concepts and intelligent technology tools into skill teaching; third, dynamic update, establishing a curriculum content update mechanism, updating content every six months in combination with industry technological innovation and policy adjustments, and inviting industry experts to review and check.

#### **4.2. Innovate Teaching Modes: Create “Virtual-Real Integration + Personalization” Teaching Scenarios**

Combined with students’ high demand for practical training and on-site observation, a “virtual-real integration + personalization” teaching mode is constructed to realize the organic combination of traditional and modern teaching methods. Virtual teaching scenarios are built relying on Artificial Intelligence and virtual simulation technology, focusing on solving the problems of “high risk, high cost, and time-space limitations” in traditional teaching. They are divided into three types of core scenarios: first, intelligent technology practical operation scenarios, building a virtual simulation platform that is 1:1 restored with real equipment, allowing students to conduct repeated simulation operations; second, Traditional Chinese Culture experience scenarios, using VR technology to restore red railway historical scenes and traditional service cultural scenes to achieve immersive experience; third, emergency response simulation scenarios, constructing virtual

emergency event scenarios, where students use intelligent technology tools and cultural concepts to carry out collaborative disposal. Real-world teaching scenarios focus on “practical landing” and complement virtual scenarios: the on-site observation link organizes students to visit intelligent railway hubs and red education bases; the practical training link relies on the training base co-built by the government, schools, and enterprises to carry out practical training using real intelligent equipment; the case teaching link invites excellent industry employees and technical experts to explain typical cases of “intelligent technology application + cultural literacy practice” (Liu, Li, & Li, 2025).

The personalized teaching mode is realized through “Artificial Intelligence technology support + humanized teaching services”, accurately matching the learning needs of different students. The first step is accurate portrait and plan customization. At the initial stage of training, multi-dimensional student data is collected, and AI algorithms are used to generate personalized learning portraits and customize exclusive learning plans; the second step is dynamic adjustment and flexible learning. The intelligent system tracks learning data in real time, automatically pushes supplementary resources and adjusts course difficulty, and adopts a flexible learning mode to solve the problem of “conflict between work and learning”; the third step is differentiated resources and guidance. Provide diversified resources according to learning preferences, and equip targeted counseling for students with different learning abilities to realize “teaching students in accordance with their aptitude”.

#### **4.3. Optimize the Evaluation System: Establish a Diversified Evaluation of “Synergy Effect + Ability Improvement”**

Break through the traditional evaluation mode of “single examination determines the result”, and establish a diversified evaluation system centered on “synergy effect + ability improvement” to realize the comprehensive evaluation of students in four dimensions: cultural literacy, intelligent skills, professional ability, and post adaptability. The specific evaluation content and weight setting of each dimension are as follows: cultural literacy dimension (weight 25%), intelligent skills dimension (weight 30%), professional ability dimension (weight 30%), and post adaptability dimension (weight 15%).

In the evaluation implementation process, a comprehensive evaluation method combining “process evaluation + summative evaluation” and “multi-subject participation” is adopted. Process evaluation accounts for 40%, which is dynamically evaluated relying on the intelligent training platform, and combined with teachers’ classroom observation records; summative evaluation accounts for 60%, adopting a comprehensive assessment method of “written test + practical operation + project design”. In terms of evaluation subjects, a four-dimensional subject of “student self-evaluation, peer evaluation, teacher evaluation, and enterprise mentor evaluation” is introduced, and a closed-loop mechanism for the application of evaluation results is established. The evaluation results are linked to students’ post promotion

and professional qualification certification, and feedback is given to curriculum optimization to form a virtuous cycle of “evaluation-feedback-optimization” (Xu et al., 2025).

#### **4.4. Strengthen Guarantee Mechanisms: Consolidate the Foundation for Synergistic Implementation**

Among them, the objective scoring standards for the cultural literacy dimension are specifically refined as follows to realize the quantitative evaluation of subjective traits such as “sense of responsibility”:

1) Performance of applying cultural concepts in case discussions (accounting for 20% of the total score of the cultural literacy dimension, i.e., 5% of the overall weight): In group case discussions, evaluate whether students can take the initiative to use traditional cultural concepts to analyze and solve post problems, and formulate three-level scoring standards: take the initiative to use and propose innovative application schemes (5 points), passively use but can adapt to post scenarios (3 points), fail to use or use misplaced concepts (0 points); two teachers score independently, and the average value is taken as the final score to reduce subjective deviation.

2) Performance of professional literacy in training/practice links (accounting for 40% of the total score of the cultural literacy dimension, i.e., 10% of the overall weight): Focus on quantifying subjective traits such as “sense of responsibility” and “cooperation attitude”, and formulate specific observation and scoring rules: a) Sense of responsibility score (accounting for 50% of this part): Observe whether students strictly abide by safe operation specifications, carefully check operation data, and take the initiative to identify potential risks in practical training, scoring according to “strict and standardized throughout, no omissions (10 points), occasional non-critical omissions, corrected in time (6 points), existence of critical violations or multiple omissions (0 points)”; b) Cooperation attitude score (accounting for 50% of this part): Observe whether students take the initiative to cooperate, actively share experience, and respond to peers’ needs in team practical tasks, scoring according to “take the initiative to cooperate and drive team efficiency improvement (10 points), cooperate to complete tasks, no negative performance (6 points), passive participation, refuse to cooperate (0 points)”. This part is jointly observed and scored by 1 teacher + 1 enterprise mentor. Unified training and calibration are carried out before scoring to ensure consistent scoring standards, and finally the average score of the two is taken as the result.

Establish a “government-school-enterprise collaboration” guarantee mechanism to provide support from three core dimensions: teachers, resources, and services, ensuring the smooth implementation of the “culture + intelligence + professionalism” three-dimensional course system. In terms of the construction of the teaching staff, build a compound teaching team of “double-qualified + intelligent + cultural”; in terms of resource construction guarantee, build a trinity re-

source system of “platform + base + teaching materials”; in terms of service support guarantee, build a comprehensive learning service system, including exclusive learning consultants, optimized logistics services, and a regular feedback mechanism.

## **5. Optimization Directions of Traditional Chinese Culture and Artificial Intelligence**

### **5.1. Diversified Cognition and Accurate Screening of “Traditional Chinese Culture”**

Traditional Chinese Culture is not a single, fixed whole, but a diversified system containing excellent cores and era limitations. This requires adhering to the principle of “taking the essence and discarding the dregs” in curriculum design to achieve accurate screening and era transformation. On the one hand, it is necessary to focus on excellent elements highly consistent with the professional needs of the railway industry, such as core concepts such as integrity, dedication, responsibility, and cooperation. These concepts are naturally consistent with the core values of the railway industry of “safety first and service first”, and can provide spiritual support for the cultivation of employees’ literacy; on the other hand, it is necessary to abandon traditional concepts that are incompatible with the intelligent development of modern railways, such as the conservative thinking of “experience first and refusing innovation”, to avoid hindering employees’ learning and application of intelligent technology. At the same time, attention should be paid to the era transformation of Traditional Chinese Culture. For example, extend the “craftsmanship spirit” from the “excellence” of traditional manual skills to the “precision operation and data rigor” in intelligent equipment operation and maintenance; transform the “family and country feelings” from the traditional “industry dedication” to the “technological innovation and safety guarantee” in the intelligent construction of railways in the new era, so that Traditional Chinese Culture can radiate new vitality in synergy with modern technology.

### **5.2. Potential Risks and Balancing Strategies of Artificial Intelligence Application**

While empowering training and post practice, Artificial Intelligence technology also has three types of potential risks, and targeted balancing strategies need to be established: 1) Data privacy risks: When collecting students’ learning data and post operation data, intelligent training platforms and post application systems may involve employees’ personal privacy (such as learning ability shortcomings, work error records) and enterprise trade secrets (such as core parameters of intelligent equipment, passenger flow data). In this regard, it is necessary to establish a strict data security management mechanism, including encrypted data storage, hierarchical control of access rights, clear definition of data use scope, and strictly abide by laws and regulations such as the “Data Security Law” and “Personal In-

formation Protection Law” to ensure the legality and safety of data collection and application. 2) Skill substitution and ability degradation risks: Over-reliance on AI tools may lead to the degradation of employees’ basic operation abilities. For example, some employees over-rely on AI fault diagnosis systems, ignoring the training of basic manual inspection abilities, and cannot complete work independently when the AI system fails. In this regard, the positioning of “technology as auxiliary rather than substitution” should be clarified in curriculum design, and dual training links of “AI tools + manual practical operation” should be set up. Students are required to consolidate basic skills through deliberate practice while mastering the application of AI tools. For example, power supply maintenance workers need to complete comparative training of AI fault diagnosis and manual inspection to ensure that they can still adhere to post responsibilities when technical tools fail. 3) Algorithm bias risks: If the AI recommendation algorithm is trained based on incomplete or biased data, it may lead to homogenized course recommendations (such as continuously pushing basic courses, limiting advanced learning) or post-adaptation deviations (such as excessively pushing simple technical courses to elderly employees, ignoring their learning potential). In this regard, it is necessary to regularly optimize the algorithm model, integrate a manual review mechanism, and teachers adjust the recommended courses according to students’ actual needs to ensure the diversity and accuracy of course recommendations and avoid algorithm bias, restricting employees’ development.

### **5.3. In-Depth Challenges and Promotion Paths of Synergistic Efforts**

The synergy between Traditional Chinese Culture and Artificial Intelligence is not a simple “course superposition”, but involves the in-depth integration of concepts, technology, and practice. Its in-depth challenges lie in the “implementation and transformation of cultural concepts” and the “literacy adaptation of technical tools”. On the one hand, some traditional cultural concepts (such as responsibility and dedication) are relatively abstract. If only through theoretical teaching, it is difficult to transform them into employees’ practical behaviors. It is necessary to rely on multiple links such as scenario simulation, case practice, and behavioral feedback to realize the transformation of “cognition-identification-practice”; on the other hand, if intelligent technical tools lack the support of cultural literacy, problems such as “high technical efficiency but lack of service” and “accurate tools but insufficient responsibility” may occur. For example, the AI passenger flow prediction system can efficiently plan diversion channels, but if employees lack the concept of “warm service”, it may still cause passenger dissatisfaction. In this regard, the in-depth promotion path should include: at the curriculum research and development level, set up an interdisciplinary team of “cultural scholars + intelligent technology experts + industry backbones” to jointly design integrated curriculum content and practical links; at the teaching

implementation level, adopt a “project-based learning” model, guided by real post problems, to guide students to take the initiative to integrate cultural concepts and technical tools to solve problems; at the evaluation and incentive level, directly link the effect of collaborative application with employees’ performance and promotion, and strengthen the value orientation of dual improvement of “technology + literacy”.

## 6. Conclusion and Prospects

Taking multiple railway employee training courses of Guangzhou Railway Polytechnic as the research object, this paper systematically explores the internal logic and reconstruction path of constructing a continuing education course system for railway employees through the synergistic efforts of Traditional Chinese Culture and Artificial Intelligence based on 267 valid questionnaire data, and draws the following core conclusions: First, the railway employee training course system has problems such as backward content, single teaching mode, and insufficient cultural infiltration, and students have a strong demand for new technology application, practical experience-based training, and cultural literacy cultivation; second, the synergy between Traditional Chinese Culture and Artificial Intelligence courses can significantly improve training satisfaction and post ability improvement effect. The two form two-way empowerment from the aspects of “literacy cultivation” and “skill improvement”, accurately meeting the dual development needs of railway employees for “excellent technology + comprehensive literacy”; third, constructing a “culture + intelligence + professionalism” three-dimensional curriculum module, a “virtual-real integration + personalization” teaching mode, a diversified evaluation system of “synergy effect + ability improvement”, and a “government-school-enterprise collaboration” guarantee mechanism can effectively realize the in-depth synergy of the two, and improve the scientificity and effectiveness of the training course system.

Although this study has demonstrated the feasibility and value of constructing a course system through the synergy of Traditional Chinese Culture and Artificial Intelligence through survey data from multiple training courses, it still has certain limitations: first, the coverage of survey samples needs to be expanded. The current samples are mainly concentrated in some positions of Guangzhou Passenger Transport Section, Chengdu Bureau, and Hohhot Bureau, and do not cover other fields such as railway freight transport and engineering construction, so the representativeness of the samples needs to be further improved; second, the evaluation of long-term synergy effect is insufficient. The current research is mainly based on students’ feedback during training and short-term post-performance, and no long-term follow-up survey has been carried out, so it is difficult to comprehensively evaluate the impact of the course system on employees’ long-term career development; third, the depth of course integration needs to be deepened. Some courses still have the situation of simple superposition of “culture + intelligence + professionalism” elements, and the teaching mode and method of in-

depth integration need to be further explored.

Future research can be carried out from three aspects: first, expand the survey scope to cover all fields and positions of the railway industry, collect more representative data, and optimize the course system design; second, carry out long-term follow-up research, establish a tracking mechanism for employees' career development 1 - 3 years after training, evaluate the long-term educational effect of the course system; third, deepen the research on course integration mode, explore more teaching methods and cases of in-depth integration of "cultural connotation + technical tools + professional skills", and improve the educational effect of courses. In future practice, the level of synergy between the two can be further deepened: on the one hand, develop more Traditional Chinese Culture courses with railway industry characteristics (such as a collection of craftsmanship spirit cases exclusive to the railway industry, a series of red railway culture courses) to enhance the pertinence of cultural infiltration; on the other hand, closely track the application dynamics of Artificial Intelligence technology in the railway industry (such as the application of generative AI in training, new breakthroughs in intelligent operation and maintenance technology), update the content of intelligent courses in a timely manner, and enhance the cutting-edge nature of technology empowerment; at the same time, explore the connection mechanism between training results and professional qualification certification, and incorporate the assessment results of "cultural literacy + intelligent skills + professional ability" into the professional qualification promotion system, further improving the authority and attractiveness of training, and cultivating more compound talents with "excellent technology and comprehensive literacy" for the high-quality development of the railway industry.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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## Appendix Training Questionnaire

Dear Students,

To fully understand the implementation effect of this quality improvement training, accurately grasp your needs and suggestions on training courses, teaching organization, service guarantee, etc., we invite you to fill in this questionnaire. This questionnaire is anonymous, and all collected information will only be used for training effect analysis and course system optimization research. Please answer truthfully with confidence. Thank you sincerely for your support and cooperation!

### I) Basic Information

1) How many years have you been engaged in railway industry-related work?

A. Less than 1 year    B. 1 - 3 years    C. 3 - 5 years    D. More than 5 years

### II) Overall Training Evaluation

2) Are you satisfied with the overall effect of this training?

A Very satisfied B Satisfied C Average D Dissatisfied E Very dissatisfied

F If dissatisfied, what are the specific suggestions: \_\_\_\_\_

3) How do you think the combination of training course content and actual work needs is?

A. Very close    B. Relatively close    C. Average    D. Poor combination

E. Completely disconnected

F. If dissatisfied, what are the specific suggestions: \_\_\_\_\_

4) How do you think the interactivity and guiding ability of the lecturer during the lecture are?

A. Very excellent    B. Good    C. Average    D. Poor    E. Very poor

F. If dissatisfied, what are the specific suggestions: \_\_\_\_\_

5) Do you think the training time arrangement is reasonable?

A. Very reasonable    B. Relatively reasonable    C. Average

D. Unreasonable    E. Very unreasonable

F. If unreasonable, what are the specific suggestions: \_\_\_\_\_

6) How do you think the effect of this training on improving your professional skills is?

A. Significantly improved    B. Improved to a certain extent

C. Average effect    D. Not significantly improved    E. No effect

F If no effect, what are the suggestions for improvement directions: \_\_\_\_\_

### III) Training Needs and Preferences

7) What course content do you hope to add in future training? (Multiple choices allowed)

A. New technology application    B. Case analysis teaching

C. Emergency handling skills    D. Teaching ability improvement

E. Industry policy interpretation    F. Other: \_\_\_\_\_

8) Which training methods do you think are most effective for learning effects? (Multiple choices allowed)

A. Theoretical teaching    B. Practical training    C. Group discussion

D. On-site observation    E. Online learning    F. Other: \_\_\_\_\_

9) What are the main difficulties you encountered during the training? (Multiple choices allowed)

- A. Tight time arrangement    B. Difficult course content  
 C. Disconnection between theory and practice    D. Unclear lecturer expression  
 E. Lack of interaction opportunities    F. Other: \_\_\_\_\_

10) What factors do you think will affect the training effect? (Multiple choices allowed)

- A. Depth of course content    B. Professional level of lecturers  
 C. Training facility conditions    D. Students' participation enthusiasm  
 E. Logistics support services    F. Other: \_\_\_\_\_

11) What support services after training do you pay more attention to? (Multiple choices allowed)

- A. Learning material sharing    B. Regular Q&A guidance  
 C. Provision of practical opportunities    D. Training effect tracking  
 E. Construction of communication platforms    F. Other: \_\_\_\_\_

12) Which evaluation methods do you think can more truly reflect the training effect? (Multiple choices allowed)

- A. Practical test    B. Course feedback    C. Teaching achievement display  
 D. Peer evaluation    F. Other: \_\_\_\_\_

13) Please sort the modules that you think the training courses should focus on in descending order of importance:

- A. Systematic optimization of professional skills  
 B. Innovation of management models  
 C. Production safety management and regulations  
 D. Update of technical standards  
 E. Emergency capacity training    F. Other: \_\_\_\_\_

#### **IV) Open Suggestions**

14) What do you think is most needed to be improved in the course setting or organization and management of this training?

\_\_\_\_\_

15. Please put forward specific suggestions or expectations for the training work:

\_\_\_\_\_

**V) Evaluation of Individual Courses (Please score the following courses, scoring standard: 1 point = Very dissatisfied, 10 points = Very satisfied)**