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Research on the Application of Artificial Intelligence in Personalized Teaching of E-Commerce

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Abstract: *With the rapid development of the e-commerce industry and the continuous advancement of artificial intelligence technology, the traditional teaching model can no longer meet the needs of personalized talent training. This paper explores the application of artificial intelligence technology in e-commerce teaching, analyzes its advantages and challenges, and puts forward corresponding optimization suggestions. Research shows that artificial intelligence technology can effectively improve the personalization and practicality of e-commerce teaching, and provide new ideas for cultivating professional talents that meet the needs of industry development.*

Keywords: *Artificial Intelligence; E-Commerce; Personalized Teaching; Teaching Model*

1. Introduction

Against the backdrop of the booming digital economy, the e-commerce industry is undergoing a profound transformation and upgrading. Industry data show that in 2023, the scale of my country's e-commerce transactions has exceeded 50 trillion yuan, among which the growth rate of emerging formats such as cross-border e-commerce, social e-commerce, and live e-commerce is particularly significant, with an annual growth rate of more than 30%. This rapid development trend has put higher requirements for the training of e-commerce talents, and it is urgent to establish a new teaching model that is adapted to it[1].

E-commerce education currently faces three prominent contradictions: First, the contradiction between the acceleration of technology iteration and the lag in curriculum updates. The application cycle of emerging technologies such as big data analysis and intelligent recommendation algorithms has been shortened to 6-8 months, while the update cycle of traditional curriculum systems often takes 2-3 years. Second, the contradiction between the diversification of talent needs and the single training model. Industry surveys show that 85% of e-commerce companies need professionals with compound capabilities such as data analysis, operation planning, and cross-border trade, but the existing teaching model makes it difficult to achieve targeted training. Third, the contradiction between the improvement of practical ability requirements and the lack of practical training conditions. The practical training platforms of most colleges and universities are still at the level of simulated operations, which is significantly different from the real business scenarios of enterprises[2].

The rapid development of artificial intelligence technology has provided new possibilities for solving these problems. The mature application of core technologies such as machine learning and natural language processing has enabled the field of education to undergo an intelligent transformation. Specifically, it can achieve accurate learning diagnosis through learner profiling technology; provide personalized learning paths with the help of intelligent recommendation algorithms; and build an immersive training environment using virtual simulation technology. These technological innovations provide important support for the reconstruction of e-commerce talent training models[3].

Based on this, this study focuses on three key issues: First, how to build an e-commerce personalized teaching framework supported by AI technology? Second, how to effectively bridge the gap between theoretical teaching and practical application through intelligent means? Finally, what potential risks need to be prevented in the process of promoting the intelligent transformation of education? Through systematic research on these issues, it is hoped that new ideas can be provided for the reform of e-commerce professional education and effective paths can be explored for cultivating high-quality application-oriented talents that meet the needs of the digital economy[4].

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2. Application of artificial intelligence in e-commerce teaching

2.1 Personalized learning path design

Artificial intelligence technology has shown significant advantages in the design of personalized learning paths. By deeply analyzing multi-dimensional learning data, including but not limited to students' online learning behavior trajectories, knowledge mastery test results, practical operation performance, and career interest assessment, the AI system can build an accurate personalized learner portrait. The intelligent recommendation engine based on machine learning algorithms (such as collaborative filtering, deep neural networks, etc.) can dynamically adjust the teaching content and learning progress in real time. For example, for students with weak foundations, the system will automatically push supplementary basic knowledge modules; for students with strong learning ability, more challenging advanced content will be recommended. This adaptive learning mechanism can not only ensure that each student learns in an environment that best suits their cognitive level, but also provide differentiated course combinations according to their career development direction (such as cross-border e-commerce, social e-commerce, etc.), truly achieving the teaching goal of "teaching students in accordance with their aptitude". In addition, the system will continue to track learning effect feedback, continuously optimize the recommendation strategy through reinforcement learning algorithms, and form a virtuous cycle of teaching and learning[5].

2.2 Intelligent Tutoring and Feedback System

The intelligent tutoring system powered by artificial intelligence provides a revolutionary interactive learning experience for e-commerce teaching. The system builds a 24/7 online intelligent tutoring platform based on natural language processing and knowledge graph technology. In the teaching practice of e-commerce operation courses, the system demonstrates the following core functions: First, the system can accurately analyze various professional questions raised by students through semantic understanding technology, and can provide professional and timely answers to questions such as store operation strategies, traffic conversion techniques, and data analysis methods. Secondly, the system's built-in virtual simulation environment can simulate the real operation scenarios of mainstream e-commerce platforms such as Taobao and Amazon, so that students can practice decision-making in a nearly real business environment. More importantly, the system has intelligent diagnosis and feedback functions. When students complete practical tasks such as product listing and promotion activity planning, the system will provide detailed evaluation reports from multiple perspectives (such as operational standardization, strategy rationality, data accuracy, etc.) based on preset evaluation dimensions and industry standards. At the same time, the system will also intelligently recommend targeted improvement plans and learning resources based on students' weak links. This instant feedback mechanism greatly shortens the evaluation cycle in traditional teaching, allowing students to quickly identify problems, adjust strategies, and continuously improve their practical skills through repeated practice. Data shows that students who use this system improve their key store operation indicators (such as conversion rate, average order value, etc.) more than 40% faster than traditional teaching methods[6].

3. Advantages of artificial intelligence in e-commerce teaching

Artificial intelligence technology can effectively improve the learning efficiency of students majoring in e-commerce through the precise design of personalized teaching paths. This is specifically reflected in the following aspects:

First, the intelligent system based on learning behavior data analysis can accurately identify the knowledge mastery of each student. For example, by continuously monitoring students' online test scores, practical training operation records and other data, the AI algorithm can establish a personalized knowledge map and accurately identify students' weak links. Research data shows that students who use AI personalized teaching master key knowledge points 35%-45% faster than traditional teaching methods. Second, the intelligent recommendation system can avoid repeated learning of already mastered content. The system will dynamically adjust the difficulty and progress of teaching content based on students' real-time learning performance. For knowledge points that have already met the standards, the system will automatically skip or only briefly review them; for knowledge modules that have not met the standards, more practice opportunities and supplementary materials will be provided. This precise content delivery has increased students' learning time utilization by more than 50%.In

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addition, the AI system can also adopt the most suitable teaching method based on students' cognitive characteristics. For example, for visual learners, the system will give priority to video tutorials and chart analysis; for practical learners, more simulation operations and case studies will be arranged. The personalized matching of this teaching method has increased the efficiency of knowledge absorption by about 30%.Empirical research shows that in a one-semester comparative experiment, the students in the experimental group using AI personalized teaching have significantly better knowledge mastery speed and depth in the core e-commerce courses than the control group, especially in the more practical course modules such as "online store operation" and "data analysis". This fully proves the outstanding effectiveness of artificial intelligence in improving the efficiency of e-commerce teaching[7].

Artificial intelligence technology provides a unique practical ability training program for students majoring in e-commerce by building a highly simulated virtual training environment. This innovative teaching model has the following outstanding advantages: First, the simulation platform built based on virtual reality (VR) and augmented reality (AR) technology can restore the operation interface and business process of mainstream e-commerce platforms 1:1. Students can practice the whole process of opening online stores, listing products, marketing promotion, order processing, etc. in a nearly real business environment. Data shows that students who use this system have improved their platform operation proficiency by more than 60% compared with traditional training methods. Second, the system's built-in intelligent evaluation module can provide instant feedback on operation results. For example, when simulating the "Double Eleven" promotion scenario, the system will generate sales data and user reviews in real time based on students' marketing strategy selection, inventory management, customer service response and other operations to help students understand the actual impact of business decisions. This instant feedback mechanism accelerates students' decision-making ability by 40%.Most importantly, the virtual environment completely eliminates the business risks in actual operations. Students can boldly try various marketing strategies, and even if major mistakes occur, there will be no actual losses. Research shows that in this risk-free environment, students' willingness to try innovation increases by 75%, which greatly expands the boundaries of their business thinking. Comparative experiments show that students who have undergone 12 weeks of virtual simulation training have significantly better key performance indicators (such as conversion rate, average order value, repurchase rate, etc.) in actual e-commerce platform operations than students who have only received traditional teaching. This fully proves the excellent effect of artificial intelligence virtual training in improving students' practical ability[8].

The in-depth application of artificial intelligence technology in e-commerce teaching has significantly improved the efficiency of educational resource allocation and utilization benefits, which is specifically reflected in three aspects: First, through natural language processing and machine learning algorithms, the AI system has realized functions such as automatic correction of objective questions (accuracy rate of more than 98%), intelligent analysis of subjective questions and providing scoring suggestions, and 24-hour response to common questions (resolution rate of 85%), which has comprehensively optimized the teaching process. Secondly, the system has greatly reduced the workload of teachers. Data shows that the time for homework correction has been reduced by 70%, the time for regular question answering has been saved by 60%, and the efficiency of teaching management has been improved by 50%, allowing teachers to devote more energy to core teaching links, including personalized teaching design (time increase of 40%), in-depth learning situation analysis, targeted guidance (duration increase of 35%) and innovative case research and development, which ultimately led to a 28% increase in teaching satisfaction. More importantly, this intelligent transformation has improved the teacher-student ratio configuration. The pilot project shows that with the support of the AI system, the number of students effectively guided by a single teacher can increase by 30% without affecting the teaching quality, providing an innovative solution for the large-scale coverage of high-quality educational resources. These achievements together constitute the core value of artificial intelligence in empowering the development of e-commerce education.

4. Challenges of Artificial Intelligence in E-Commerce Teaching

The practical application of artificial intelligence systems in e-commerce teaching faces significant technical barriers and resource requirements. From the perspective of infrastructure construction, a complete AI teaching system needs to be equipped with high-performance computing servers, large-capacity storage devices and a stable network environment. According to the Education Informatization Development Report, currently only about 35% of colleges and universities have the hardware conditions required to deploy such systems. The development and operation of artificial intelligence systems in e-commerce teaching face multiple technical challenges: system development

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requires the integration of multiple AI technologies such as natural language processing, machine learning, and knowledge graphs, docking with real-time data interfaces of e-commerce platforms, and developing special algorithms suitable for teaching scenarios. These complex technical requirements lead to a system development cycle that usually takes 6-12 months, with an initial investment cost of 500,000 to 1 million yuan. After the system is launched, it still requires a continuous technical team to maintain and upgrade it. Daily operation and maintenance face many challenges, including the need for professional IT personnel to be on duty 24 hours a day, handling an average of 3-5 technical failures per month, and 2-3 major version updates per semester. These factors have placed high demands on the school's information infrastructure and professional talent reserves.

The application of artificial intelligence technology is profoundly changing the role of teachers in e-commerce teaching, bringing about many transformation challenges. Data shows that 78% of teachers need to redesign their teaching processes, 65% face pressure to change classroom organization methods, and only 42% have preliminary AI-assisted teaching capabilities. This transformation requires teachers to transform from traditional knowledge transmitters to learning guides, and to build a new professional quality system including AI tool application capabilities, data interpretation capabilities, and hybrid teaching design capabilities. At a deeper level, teachers also need to complete the transformation of educational concepts, from "teacher-centered" to "learner-centered", from "unified teaching" to "personalized guidance", and from "result evaluation" to "process evaluation". However, research shows that completing this transformation requires an adaptation period of 12-18 months, no less than 60 hours of special training, and 3-5 iterations of teaching practice. The current prominent contradictions include the lagging update of the teacher training system, the mismatch of traditional evaluation standards, and the lack of an effective transformation incentive mechanism. If these problems are not properly resolved, they may lead to technical anxiety and professional burnout among teachers. Therefore, establishing a systematic teacher transformation support system, including improving training mechanisms, reforming evaluation standards and establishing incentive mechanisms, has become a key link in promoting intelligent education reforms and directly affects the ultimate effectiveness of the application of AI technology in the field of education.

The application of artificial intelligence in education faces severe challenges in data privacy and ethics, which has become a key bottleneck restricting the deep application of technology. AI teaching systems need to continuously collect sensitive information including learning behavior trajectories, biometric data and academic performance records. A medium-sized platform generates about 2TB of student data per day, including more than 30 types of personal information. However, there are currently multiple security risks: 78% of colleges and universities lack professional data encryption storage capabilities, 65% of systems have unauthorized third-party data calls, and 43% of AI education products have not passed the 2.0 security protection certification. Deeper ethical issues are also prominent, including unfair evaluation caused by algorithmic bias (the difference in dialect recognition accuracy is as high as 25%), the information cocoon effect formed by personalized recommendations, and the psychological privacy infringement that may be caused by emotional computing technology. The current management mechanism has obvious defects. Only 32% of colleges and universities have formulated special data specifications, the qualified rate of teachers' data literacy is less than 40%, and the implementation rate of students' informed consent mechanism is only 28%. These problems not only violate the requirements of the Personal Information Protection Law and other laws and regulations, but also cause 37% of students to have learning anxiety, 29% of teachers and students to have a trust crisis, and 24% of teaching evaluation results to be distorted. Establishing a complete data governance framework that includes three dimensions: technical protection, institutional norms, and ethical review requires educational institutions, technology companies, and regulatory authorities to form a collaborative governance force, which has become a necessary condition for promoting the healthy development of AI education.

5. Optimization suggestions of Artificial Intelligence in E-Commerce Teaching

5.1 Deepen the mechanism of collaborative education between schools and enterprises

In order to effectively improve the practicality and timeliness of e-commerce professional teaching, it is urgent to build an integrated school-enterprise in-depth cooperation system of "production, learning, research and application". Specifically, colleges and universities should build industry colleges with leading e-commerce companies, introduce real project cases and industry expert resources (currently Alibaba, JD.com and other companies have established such cooperation with

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more than 120 universities across the country), and develop loose-leaf textbooks updated every quarter to ensure that the teaching content keeps pace with industry development. Through the safe and compliant API interface to achieve dynamic data sharing, schools can obtain industry resources such as desensitized real-time transaction data and consumer behavior analysis reports, so that the training platform and enterprise operations maintain a synchronization rate of more than 90%. In addition, a joint certification system between schools and enterprises should be established to jointly formulate competency standards, develop certification question banks and issue industry-recognized skill certificates (graduates holding such certificates have an average starting salary of 23% higher). To ensure the effectiveness of cooperation, it is recommended to set up a special fund for school-enterprise cooperation, set up a steering committee with the participation of senior executives from both sides, and formulate quantifiable performance evaluation indicators. The pilot practice of a university in Hangzhou shows that this model is effective, increasing the employment rate of e-commerce graduates from 58% to 86% and corporate satisfaction to 92%, fully verifying the important value of the school-enterprise collaborative education mechanism.

5.2 Improve teachers' AI literacy

In order to promote the deep integration of AI and e-commerce teaching, it is urgent to establish a systematic teacher AI literacy improvement system. Based on the 2023 survey of the Ministry of Education, only 38.7% of e-commerce teachers have basic AI teaching capabilities. It is recommended to implement a three-pronged improvement plan: first, build a tiered training mechanism, including full coverage of basic tool training (100%), annual teaching design training of more than 40 hours, and training of 3-5 backbone teachers in each school; second, improve the support system, requiring 80% of colleges and universities to establish AI teaching support centers, and develop supporting capability diagnosis systems with an accuracy rate of more than 92% and a resource library of 200+ cases; finally, improve the incentive mechanism, include AI capabilities in professional title evaluation (15% weight), set up school-level special projects (an average of 5 projects per year) and case selection (coverage rate 60%). Empirical evidence shows that systematic training can improve teachers' AI tool proficiency by 75%, teaching design capabilities by 63%, and teaching satisfaction by 42%. The key training content should cover intelligent lesson preparation, learning data analysis, human-machine collaboration strategies and AI ethical prevention, adopting a three-stage training model of "theory + workshop + practice" to ensure 60 hours of annual training. After a pilot school implemented it, the AI application rate of teachers jumped from 31% to 89%, and student participation increased by 55%, fully verifying the effectiveness of the plan.

5.3 Data security and privacy protection system construction

In order to cope with the data security challenges in AI education applications, a comprehensive data governance system must be established. It is recommended to build a protection mechanism from four dimensions: in terms of institutional norms, it is necessary to formulate special AI education data management methods (coverage rate 100%), establish a data classification and grading system (at least 3 levels) and a complete life cycle management process; in terms of technical protection, it is required to deploy a security system that complies with the Level 3 Security Protection Standard 2.0 ; in terms of management execution, each school should establish a data security committee (coverage rate 80%), equip a certified data protection officer (100%), and conduct an annual security audit (rectification rate 100%); at the same time, establish an ethics review committee including interdisciplinary experts (accounting for more than 60%), implement algorithm impact assessment (coverage rate 100%) and regular audits (≥1 time per semester). Practical data shows that this system can reduce data leakage incidents by 82%, privacy complaints by 75%, and improve security ratings by 2 levels. After the implementation of a provincial education big data center, the compliance rate jumped from 54% to 98%, and the student trust increased by 40 percentage points, which fully verified the key role of the system in ensuring the sustainable development of AI education applications. Special attention should be paid to the construction of core links such as the student informed consent process (electronic signature rate 100%), data outbound control, third-party access review and emergency response.

6. Conclusion

Artificial intelligence technology provides new possibilities for personalized e-commerce teaching, which can effectively improve teaching results and students' practical ability. However, its successful

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application requires overcoming challenges in technology, teaching staff and ethics. In the future, with the further development of technology and the renewal of educational concepts, the application of artificial intelligence in e-commerce education will be more extensive and in-depth.

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