

Design and Reform of Personalized Learning Pathways for E-commerce Customer Relationship Management Courses Based on AI Technology



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Abstract: Against the backdrop of rapid development in the e-commerce industry and the growing importance of customer relationship management, the shortcomings of traditional course instruction have become increasingly apparent. AI technology offers new opportunities for achieving personalized learning and improving teaching quality. This paper focuses on the application of AI technology in e-commerce customer relationship management courses, delving into the design and reform practices of personalized learning paths. By leveraging the advantages of AI technology, it proposes strategies for constructing personalized learning paths and discusses their application effects in teaching practice. Research indicates that personalized learning paths based on AI technology can effectively enhance students' learning interest and outcomes, providing new insights and methods for teaching reforms in e-commerce customer relationship management courses.

Keywords: AI technology, e-commerce, customer relationship management, personalized learning pathways, teaching reform

Introduction

In the digital age, the e-commerce sector has shown robust growth momentum. Among these, customer relationship management, as one of the key competitive advantages of e-commerce companies, has increasingly gained prominence for its core role. However, traditional teaching methods in e-commerce customer relationship management courses have many shortcomings. With the rapid development of AI technology, integrating AI into the teaching of e-commerce customer relationship management courses and constructing personalized learning pathways has become an effective solution to address these challenges.

1. Objectives of Personalized Learning in E-Commerce Customer Relationship Management Courses

The objective of personalized learning in e-commerce customer relationship management courses is to break through the limitations of traditional standardized teaching models by integrating artificial intelligence technology and teaching resources to build a student-centered teaching system that precisely meets the diverse learning needs of students. In the rapidly evolving e-commerce industry, where customer relationship management scenarios are complex and diverse, students' knowledge bases, learning styles, and career plans vary significantly (Wang & Shao, 2025). Traditional teaching methods struggle to accommodate the diverse needs of students, whereas personalized learning leverages AI technology to conduct in-depth analyses of students' knowledge reserves, learning habits, and interest preferences. This enables the creation of customized learning pathways tailored to each individual student. For example, students with weaker foundational knowledge are provided with progressively structured modules to reinforce their

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understanding of customer data analysis and customer service processes; for students with a solid foundation and interest in cutting-edge technology, advanced content on intelligent customer service system development and big data-driven precision marketing is provided. This ensures that every student grows at a comfortable yet challenging pace, comprehensively enhancing their core professional competencies. The course aims to cultivate students' comprehensive customer relationship management capabilities in the e-commerce field, covering theoretical knowledge application, practical operations, and innovative thinking. Through personalized learning design, the course achieves a deep integration of course knowledge points with real-world business scenarios. Utilizing diverse teaching methods such as virtual simulation and case analysis, students are guided to participate in actual problem-solving processes, mastering key techniques for identifying customer needs, enhancing customer loyalty, and handling customer complaints.

2. Advantages of AI Technology Application in E-Commerce Customer Relationship Management Course Instruction

2.1 Accurate analysis of student learning data

In e-commerce customer relationship management course teaching, AI technology leverages its powerful data processing and analysis capabilities to precisely capture multi-dimensional data during the learning process, providing scientific basis for teaching optimization. In traditional teaching models, teachers primarily rely on limited information such as classroom performance, homework, and exam scores to understand students' learning situations, making it difficult to comprehensively and deeply analyze students' learning states and the root causes of issues. AI technology can collect real-time data through multiple channels such as learning platforms and smart devices, including course browsing duration, time spent on specific

knowledge points, test-taking speed and accuracy, and the frequency and content of discussions in forums. With the support of machine learning algorithms and big data analysis models, this AI system can deeply mine and integrate such data (Wang et al., 2025). On one hand, this method can identify differences in students' learning habits and preferences from large datasets. For example, by analyzing students' focus on multiple different knowledge points such as customer segmentation theory and customer lifecycle management in customer relationship management, it can assess students' learning interests. On the other hand, by establishing a student learning ability assessment model, AI can accurately identify students' strengths and weaknesses in mastering knowledge and skills related to customer needs analysis and customer service strategy formulation, and even predict future learning trends and potential issues (Wan et al., 2025).

2.2 Providing personalized learning recommendations

AI technology has revolutionized the traditional "one-size-fits-all" approach to learning resource allocation in traditional teaching models. It can design learning content for e-commerce customer relationship management courses, accurately recommend learning paths and methods, and establish a highly customized learning system tailored to individual students' characteristics and learning needs (He, 2024). When recommending learning content, AI systems analyze students' learning data in depth and combine it with the course's knowledge structure to provide guidance on customer acquisition strategies, techniques for improving customer satisfaction, and the breakdown and categorization of complex knowledge points in customer relationship management courses. They then push the most appropriate learning content based on each student's knowledge base and learning objectives. For students with weaker knowledge mastery, the system prioritizes foundational theory explanations and simple case analyses. For

students with stronger foundations, it shares cutting-edge academic research findings, complex business cases, and industry practice experiences. This ensures that the knowledge each student acquires aligns with their cognitive level while also presenting a certain level of challenge, facilitating effective knowledge absorption and skill enhancement. AI technology can balance students' learning progress, time schedules, and learning efficiency in learning path planning, enabling the dynamic generation of personalized learning paths. The system will intelligently adjust the sequence and content combination of subsequent learning based on issues students encounter in operating customer relationship management systems, handling customer complaint processes, and other knowledge points. This avoids repetitive learning of existing knowledge and provides timely guidance to help students overcome learning difficulties, thereby effectively utilizing learning resources.

3. Methods for Designing and Reforming Personalized Learning Pathways in E-Commerce Customer Relationship Management Courses Based on AI Technology

3.1 Construction of AI student learning profiles

The construction of AI student learning profiles is the key to personalized learning in e-commerce customer relationship management courses. Through multi-angle data collection and intelligent analysis, precise digital profiles can be provided for each student, comprehensively showcasing their learning characteristics and needs. AI technology integrates data from multiple channels, including learning platforms, online tests, and classroom interactions, covering student course access frequency, knowledge point mastery, assignment completion quality, test score fluctuations, and discussion forum activity levels, forming a large dataset. With the support of machine learning algorithms, the AI system performs in-depth mining and analysis of the raw data (Liang, 2024). From a cognitive perspective,

it delves into students' understanding of theoretical knowledge in customer relationship management, such as their mastery of customer value assessment models and customer segmentation strategies; From a behavioral perspective, it delves into students' learning patterns, including their preferences for learning time, the distribution of focused attention periods, and the frequency of knowledge review. Additionally, it employs sentiment analysis technology to capture emotional changes during learning to assess learning motivation and the risk of learning burnout. Through data analysis, AI labels various learning characteristics of students, constructing a visualized learning profile. For example, labels such as "inadequate understanding of customer churn warning mechanisms" can be assigned to knowledge gaps, while learning styles can be categorized with attributes such as "preference for practical operations" or "preference for theoretical derivation." These labels not only visually represent students' current learning status but also enable clustering analysis to classify students with similar learning characteristics, laying the foundation for tiered instruction and personalized guidance.

3.2 Mapping knowledge points to competency objectives

Mapping knowledge points to competency objectives is a critical step in systematically linking the content of e-commerce customer relationship management courses with teaching objectives. Its purpose is to clarify the competencies students should achieve when learning a specific knowledge point and to provide clear guidance for designing personalized learning paths. AI technology structurally decomposes customer relationship management course knowledge points based on curriculum standards and industry job requirements, collecting customer information, customer relationship maintenance strategies, and customer satisfaction surveys. Such a knowledge point is broken down into different levels: foundational concepts, principle

applications, and practical operations. Combining occupational competency standards, the AI system designs a corresponding competency goal framework for the course, which includes key skills such as customer needs analysis, communication methods with customers, and operational techniques for customer relationship management systems (Gu & Zhou, 2025). Utilizing natural language processing and knowledge graph technology, AI successfully establishes a correspondence between knowledge points and competency objectives, clearly defining the extent to which each knowledge point supports different competency objectives and the direction of development. For example, the knowledge points in the “customer segmentation model” primarily correspond to the development of customer needs analysis and data analysis competencies; while the knowledge points in the “customer complaint handling process” focus on improving customer communication and problem-solving capabilities. This mapping relationship is not static; AI can update it in real-time based on industry trends and teaching feedback. In cases where new customer relationship management models or technological applications emerge in the e-commerce industry, the AI system can quickly identify relevant knowledge points, adjust the weights of their mappings to competency objectives, and ensure that course content remains aligned with industry demands at all times (Sun, 2025). By accurately mapping knowledge points to competency objectives, teachers can clearly grasp teaching priorities, while students can clearly understand learning directions, providing a scientific basis for subsequent personalized task design and learning outcome assessment, thereby deepening course instruction from knowledge transmission to competency development.

3.3 Personalized task tiered push

Personalized task tiered push uses student learning profiles and knowledge point-ability mapping as core tools to tailor differentiated

learning tasks for students of varying levels, aiming to meet students' personalized learning needs and achieve differentiated instruction. The AI system categorizes students into three tiers—foundational consolidation, ability enhancement, and innovative expansion—based on their characteristics in terms of knowledge foundation, learning ability, and interest preferences (Huang, 2024). For students with weaker foundational knowledge, the system primarily provides teaching tasks such as basic concept explanations and simple case simulations related to customer relationship management to help students better consolidate theoretical knowledge. For students with stronger abilities, the system pushes complex business case analyses and cutting-edge industry research topics to inspire innovative thinking and practical skills. In task design, the AI combines the mapping relationship between knowledge points and ability objectives to ensure each task has a clear learning focus. For example, under the theme of “Strategies to Enhance Customer Loyalty,” we designed a task for foundational-level students titled “Analyzing the Components of a Loyalty Program for General Customers” to cultivate their deep understanding of foundational theories; for advanced-level students, we designed a task titled “Developing a Customer Loyalty Enhancement Plan for an E-commerce Platform” to hone their ability to apply knowledge and design solutions; For advanced-level students, we designed a task titled “Researching the Impact of New Technologies (such as AI Customer Service) on Customer Loyalty” to guide them in focusing on industry trends and fostering innovative thinking. AI dynamically adjusts the pacing and difficulty of task recommendations based on students' learning progress and schedules. After successfully completing a current task, the system automatically recommends higher-level learning tasks; If students encounter difficulties with a task, AI will timely push micro-lesson videos, wrong question explanations, and other auxiliary learning

resources to appropriately reduce the difficulty of subsequent tasks. By pushing personalized tasks through tiered delivery, students can experience a sense of accomplishment when completing learning tasks that match their ability levels, thereby avoiding issues such as learning fatigue or lack of motivation caused by tasks that are too difficult or too easy, and effectively improving learning outcomes and motivation.

3.4 AI-driven dynamic path optimization

The AI-driven dynamic path optimization mechanism is the core mechanism ensuring that the personalized learning paths in e-commerce customer relationship management courses can continuously adapt to students' learning needs. This is achieved through real-time monitoring of the learning process and intelligent analysis of learning data, enabling dynamic adjustments to learning paths to ensure efficiency and relevance. Throughout the students' learning journey, the AI system continuously collects data on various learning behaviors, including task completion status, knowledge mastery levels, fluctuations in exam scores, and time invested in learning. This data is then compared and analyzed against pre-set learning objectives and paths. When deviations from expected learning trajectories are detected, the AI system swiftly initiates path optimization procedures. For example, if a student is progressing slowly and making high error rates while learning the topic "Operation of Customer Relationship Management Systems," the AI system identifies potential issues with the current learning path. It then re-evaluates the student's learning status, combines the learning profile with the knowledge graph, and recommends new learning resources and methods, such as adding virtual simulation exercises or pushing instructional videos on operational techniques. Additionally, it adjusts the sequence and difficulty level of subsequent learning tasks to guide students around learning obstacles and back onto an efficient learning track. Furthermore, the AI can actively optimize the entire learning path based on

industry trends and teaching feedback. In the e-commerce field, when new customer relationship management theories, tools, or case studies emerge, the AI system swiftly integrates this knowledge into the learning process to update or replace outdated learning materials, ensuring students have access to the latest industry knowledge and practical experience. Through the analysis of massive amounts of student learning data, AI continuously summarizes optimization strategies and forms a more scientific path optimization model, enabling the learning path to iterate and upgrade continuously during dynamic adjustments. This AI-driven dynamic optimization mechanism transforms personalized learning paths from static predefined schemes into an intelligent system that evolves in real-time with changes in student progress and external environments, thereby maximizing learning outcomes and achieving educational objectives.

3.5 Creation of virtual simulation scenarios

The creation of virtual simulation scenarios involves using AI technology to build a highly realistic learning environment that replicates real-world business settings. This provides an immersive teaching platform for e-commerce customer relationship management courses, enabling students to deepen their understanding of knowledge and refine their skills through simulated practical exercises. In terms of scene construction, AI employs advanced technologies such as computer graphics, virtual reality (VR), and augmented reality (AR), combined with industry research data and standardized business processes, to build a virtual environment covering the entire process from customer inquiries, order processing, customer complaints, to after-sales service. For example, it simulates the bustling scene of a customer service center during an e-commerce promotional event, showcasing the complexities of customer relationship management through scenarios such as customers flooding in to inquire about product information, handling a surge in orders, and addressing post-sales

complaints. The AI system features intelligent interactive capabilities, giving the virtual scenarios dynamic characteristics. Based on natural language processing and emotional recognition technology, the system can simulate various types of customer issues and emotional responses, such as patient inquiries from general customers and emotionally charged complaints from dissatisfied customers. When students interact with virtual customers in the scenario, AI analyzes their speech, actions, and decisions in real-time and generates different feedback. If students use inappropriate communication strategies, virtual customers may express dissatisfaction, escalating conflicts; if handled well, the scenario will unfold in a positive direction, enabling students to understand customer psychology and needs through interaction, and develop communication skills and problem-solving abilities.

Conclusion

Designing and implementing personalized learning pathways for e-commerce customer relationship management courses based on AI technology is of practical significance. The introduction of AI technology can effectively address some issues arising from traditional teaching models, enhancing student learning outcomes and teacher instructional quality. However, in practice, personalized learning pathways still require continuous refinement and optimization to strengthen interaction and communication between teachers and students, thereby meeting the evolving demands of the e-commerce industry.

Conflict of Interest

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

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