

# Research on AI-Enabled Practical Teaching Innovation of “Customer Relationship Management” Under Resource Constraints: A Case Study of Ordinary Second-Tier Universities

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**Abstract:** Faced with the profound reshaping of business forms by artificial intelligence (AI), the practical teaching of the traditional “Customer Relationship Management” (CRM) course urgently needs upgrading in dynamics, digitalization, and intelligence. Based on the dual realistic conditions of “limited software and hardware resources” and “business students lacking basic programming skills” in ordinary second-tier universities, this study explores a low-cost teaching innovation path centered on inclusive and open-source AI tools. The paper constructs a new “three-dimensional integrated” practical teaching system, focusing on three core dimensions: data intelligence insight, interactive intelligent simulation, and process intelligent optimization. It deeply integrates generative large language models (such as DeepSeek), Python (AI-assisted generation), and cloud-based open-source CRM tools, and reconstructs teaching and evaluation methods through project-based learning. The study further analyzes the core challenges in the reform, such as teachers’ technological anxiety, lack of localized data, and academic integrity issues, and proposes systematic countermeasures based on interdisciplinary communities, school-enterprise resource co-construction, and process-oriented evaluation reform. This paper provides a “low-threshold, high-adaptability, and application-oriented” curriculum intelligent transformation plan for similar application-oriented universities, which has important practical reference value for cultivating compound marketing talents adapting to the intelligent business era.

**Keywords:** Artificial intelligence; Customer relationship management; Teaching reform; Application-oriented undergraduate

**Online publication:** June 3, 2026

## 1. Introduction

Big data and artificial intelligence are profoundly reshaping business marketing models <sup>[1]</sup>. Customer Relationship Management (CRM) has evolved into a strategic function driven by data intelligence for decision-making and personalized interaction for experience shaping <sup>[2]</sup>. Enterprise talent demand tends to be compound capabilities with “data literacy, AI tool application ability, and human-machine collaboration

thinking”<sup>[3]</sup>.

However, the practical teaching of CRM in ordinary second-tier universities has a significant “lag”. Restricted by funds, schools are unable to configure expensive commercial teaching sandtables; teaching is often limited to static cases or shell operations without data, leading to “separation of knowledge and practice” among students, who struggle to adapt to the intelligent operation of enterprises. Teaching reform is imperative<sup>[4]</sup>. The popularization of generative AI (such as DeepSeek) and open-source ecosystems has provided an “inclusive” solution<sup>[5]</sup>. This study aims to solve the core problem: in second-tier universities with limited resources and students lacking a programming foundation, how to systematically integrate AI tools to build an effective intelligent marketing competency training system.

## **2. Feasibility of AI-enabled CRM teaching**

### **2.1. Core concepts**

The core of intelligent CRM (sCRM) lies in using technologies such as machine learning and natural language processing to realize customer behavior prediction, automated communication, and personalized services. In the teaching of ordinary application-oriented undergraduates, AI is not taught as an “underlying algorithm course”, but as a “cognitive tool” and “situational simulation platform”. The goal is to enable business students to use AI’s analysis and generation capabilities through “natural language interaction” to solve real business problems, using advanced office software, and cultivate business logic and human-machine collaboration skills through “learning by doing”.

### **2.2. Reform feasibility**

The feasibility of the reform is based on the democratization process of technology. Firstly, the accessibility of cost and hardware. Domestic large language models represented by DeepSeek, Kimi, and Doubao provide free or extremely low-cost cloud services, eliminating the need for schools to configure expensive high-performance computing rooms, and various open-source systems also support lightweight deployment. Secondly, the high alignment with the characteristics of business students in second-tier universities. Business students in second-tier universities are active in thinking and willing to practice, but generally lack a computer programming foundation (weak mathematical and coding skills). In the past, requiring them to learn Python directly for data processing was often frustrating. Today, through the “code generation” or “advanced data analysis” functions of generative AI, students only need to master business logic and prompts to let AI write code and conduct data analysis<sup>[6]</sup>. This has completely broken the barrier for business students to apply data technology. In addition, the school’s existing local industry-university cooperation network can also provide desensitized localized business data for teaching, enhancing the authenticity of teaching.

## **3. Construction of an innovative AI-integrated CRM practical teaching system**

### **3.1. Reconstruction of teaching objectives**

The new system aims to cultivate students’ core capabilities in the following aspects:

- (1) Intelligent data insight: able to use AI assistance to clean, analyze, and visualize customer data to extract business insights.
- (2) Human-machine collaborative planning ability: proficient in using prompt engineering to design human-machine collaborative customer interaction processes and personalized communication content<sup>[7]</sup>.

- (3) Systematic business thinking: able to examine the customer life cycle from a panoramic perspective and design automated customer flow mechanisms.

## **3.2. “Three-Dimensional Integrated” innovative teaching content design**

### **3.2.1. Dimension 1: Data intelligence and customer insight (Relying on AI-assisted low-code data analysis)**

This dimension focuses on quantitative decision-making capabilities. Considering the programming weaknesses of second-tier students, this link abandons traditional “hard coding” teaching and turns to “business logic-led + AI-assisted implementation”<sup>[8]</sup>. Taking the project “Cross-border E-commerce Customer Value Stratification and Retention Based on RFM Model” as an example, teachers first provide a de-identified dataset containing customer transaction records from multiple countries, and students use AI to perform the analysis. Students do not need to write code by hand, but learn how to issue precise instructions to large models such as DeepSeek (e.g., “Please act as a data analyst, use Python’s Pandas library to clean the uploaded data, handle missing values, and calculate RFM indicators”). Afterwards, students are guided to ask AI to cluster customer groups using the K-Means algorithm and generate code for Seaborn visualization charts. Students copy the code to a cloud environment (such as Google Colab or local Jupyter) for running verification. Finally, based on the chart output, students write a business report and formulate differentiated secondary marketing strategies for “high-value at-risk customers” and “potential customers”.

### **3.2.2. Dimension 2: Interactive intelligence and personalized communication (Relying on generative AI tools such as DeepSeek)**

This dimension aims to train students’ ability to use AI to build cross-cultural and personalized customer interactions. Taking the project “Construction of Intelligent Customer Service Script Library and AI Role-Playing Simulation for Export Enterprises” as an example, the scenario is set as “online multilingual consultation for products exported by a local manufacturing enterprise”, requiring students to sort out key “product knowledge Q&A”. Firstly, students learn to design structured prompts, such as setting roles (“You are a professional cross-border equipment technical consultant”), injecting knowledge bases (“According to the following parameters...”), and limiting outputs (“Reply in professional and friendly English, explaining point by point”). Afterwards, confrontation testing and iteration are conducted. Group members perform role-playing: one plays a demanding overseas customer, and the other uses DeepSeek configured with prompts for real-time replies<sup>[9]</sup>. According to the accuracy and cross-cultural adaptability of the replies, prompts are continuously revised to deeply understand the boundaries of “human-machine collaboration”.

### **3.2.3. Dimension 3: Process intelligence and panoramic customer journey optimization (Integrating open-source tools and process-oriented thinking)**

This dimension requires students to optimize end-to-end customer experience from a systematic perspective. Taking the project “Automated Design of B2B Sales Lead Nurturing Process” as an example. Firstly, students use free Draw.io to draw a customer journey map from “customer visiting the official website” to “signing a trade contract”, identifying key touchpoints (such as downloading white papers, subscribing to emails, and submitting inquiries). Afterwards, design automated flow rules (e.g., IF the customer downloads a white paper, automatically send relevant product case emails after a 2-day delay). Finally, in the free open-source CRM module deployed by teachers, students actually enter leads, configure simple sales funnel stages, and

intuitively feel how the system connects the aforementioned “data” and “interaction” to form a management closed loop.

### **3.3. Teaching methods and organization**

To effectively implement the above content, teaching methods must be reformed simultaneously. The study adopts a model combining “AI-based Project-Based Learning (AI-PBL)” and “flipped classroom”. Before class, teachers issue project task packages (including background, requirements, and tool guides), and student groups explore and practice using open-source tools after class <sup>[10]</sup>. For example, in the data intelligence dimension, students need to complete data cleaning and basic analysis before class. During class, classroom time is mainly used for “intensive teaching, discussion, and review”. Teachers give intensive lectures on core difficulties (such as K-Means principles and prompt design principles), each group presents phased results and accepts inquiries, and teachers and students conduct in-depth discussions on common problems (such as unsatisfactory clustering results and AI reply deviations) to find solutions. The teacher’s role is completely transformed into a learning facilitator, technical coach, and thinking guide. After class, students improve project reports based on classroom feedback and submit personal reflection logs, recording their re-understanding of the value of AI tools, ethical dilemmas encountered, and their thinking.

### **3.4. Dynamic process-oriented evaluation system**

Matching the new teaching objectives and content, the evaluation system needs to shift from focusing on results to focusing on processes and ability performance, fully covering multi-dimensional abilities such as “tool application, design innovation, systematic thinking, and critical reflection”. At the same time, to prevent students from over-relying on AI to “generate assignments with one click”, the evaluation system must weaken the inspection of the final text format and turn to the assessment of “process logic”. Process-oriented practical records account for 30%, requiring students to submit a “prompt iteration log” of conversations with AI (showing the modification process from initial rough instructions to final precise instructions) to prove their in-depth thinking. Data/business analysis reports account for 30%, evaluating the alignment between data analysis results and business strategy suggestions. Project roadshows and defenses account for 30%, examining students’ true understanding of system processes through on-site defenses. Reflection logs account for 10%, focusing on students’ ethical thinking on AI tools (such as data privacy and algorithm hallucination issues).

## **4. Implementation path, potential challenges and countermeasures**

### **4.1. Core challenges**

There are mainly four aspects of challenges:

- (1) Teachers’ “technological anxiety” and ability bottlenecks. Most business teachers lack a computer background, have a fear of embracing AI tools, and do not know how to identify and integrate complex AI tools <sup>[11]</sup>.
- (2) Insufficient student autonomous learning motivation. Some second-tier students are accustomed to passive knowledge reception, and when facing highly exploratory and error-prone AI collaboration projects, they are prone to frustration in the early stage or directly use AI to “perfunctorily complete tasks”.
- (3) The risk of academic misconduct and evaluation distortion. The powerful writing ability of generative AI makes the traditional assessment method of “submitting papers/reports at the end of the semester”

ineffective.

- (4) Underlying hardware and network environment constraints. The school's public computer rooms are outdated, and some system installations are restricted; students' personal computer configurations vary.

## 4.2. Countermeasures

To address the above challenges, countermeasures can be carried out in the following four aspects:

- (1) Teacher development: Building interdisciplinary communities and "micro-certification" training. Schools should organize "practical-oriented" AI teaching workshops, focusing on training "prompt engineering" and "cloud-based lightweight tool deployment". Encourage marketing teachers to pair with computer teachers: computer teachers provide underlying technical support and server configuration, while business teachers control business logic to achieve complementary advantages <sup>[12]</sup>.
- (2) Learning situation guidance: Building cognitive ladders to resolve "difficulty and laziness". Targeting student characteristics, the first class must include an "ice-breaking" session to stimulate students' "sense of pleasure" and interest by showing how AI completes massive data cleaning in seconds. In the early stage of the project, teachers should provide highly templated "prompt formulas" and "standard code frameworks" as scaffolding to lower the threshold. After students build confidence, the openness of tasks is gradually increased.
- (3) Resource infrastructure: "Cloud-first" strategy and local scenario co-construction. In terms of technical route, fully adopt "browser-based" cloud solutions (such as DeepSeek web version, Kimi, Google Colab) to completely get rid of dependence on high-configured computer rooms. In terms of data resources, relying on the school's existing local industry-university cooperation bases, sign confidentiality agreements to obtain real B2B/B2C desensitized sales data and establish a unique "localized teaching dataset".
- (4) Institutional innovation: Reshaping the academic integrity contract of "human-machine collaboration". At the beginning of the course, establish an "AI Usage Convention" with students: AI use is encouraged, but must be transparently disclosed. Students are required to include an "AI Assistance Statement" in their assignments (indicating the tools used, versions, and specific auxiliary links). An offline on-site questioning session is added to the defense link to directly test students' mastery of underlying business logic, making "clear distinction between humans and machines, highlighting the core value of humans" a teaching consensus.

## 5. Conclusion and outlook

Targeting the resource constraints and student learning characteristics of the "Customer Relationship Management" course in ordinary second-tier application-oriented universities, this study systematically constructs a new practical teaching system centered on "in-depth integration of inclusive open-source AI tools". The greatest theoretical and practical contribution of this system is breaking the traditional misunderstanding that "high-level practical teaching must rely on high investment in software and hardware". By introducing large models such as DeepSeek to assist low-code data analysis, role-playing, and process automation, it provides a "pragmatic, low-cost, and high-efficiency" digital intelligence reform path for teaching environments with limited resources. The study not only reconstructs the teaching content of "data, interaction, and process" three-dimensional integration but also proactively proposes targeted strategies to address teacher bottlenecks, student frustration, and academic evaluation distortion. This "tool

as application, business as foundation” teaching reform plan effectively lowers the threshold for business students to master hardcore data technology, truly transforming cutting-edge AI technology into accessible classroom productivity, and providing a highly operable paradigm reference for the training transformation of application-oriented business talents in similar universities.

## Funding

Talent Project of Chengdu Technological University (Project No.: 2025RC012); 2025 Annual Project of the Sichuan Province Drone Industry Development Research Center (Project No.: SCUAV25-C010)

## Disclosure statement

The authors declare no conflict of interest.

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