

AI-Enabled Light Metaverse-Based Marketing Teaching Model

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Abstract: The integration of artificial intelligence (AI) and virtual technologies has opened up new avenues for innovating practice-oriented business education. However, existing research has paid insufficient attention to the mechanisms through which AI can be embedded into commercial contexts and contribute to the development of students' marketing decision-making capabilities. Drawing on experiential learning theory, this study develops an AI-enabled light metaverse-based Marketing teaching model that integrates virtual business scenarios, AI consumer agents, marketing decision-making tasks and the 5E instructional process. The model centers on the development of students' practical marketing competencies and employs both virtual and real-world teaching environments as learning contexts. Through a triadic collaboration among teachers, students and AI agents, the five instructional phases—Engage, Explore, Explain, Elaborate, and Evaluate—are embedded throughout the processes of market analysis, consumer insight generation, marketing decision-making and strategy optimization. The findings indicate that the proposed model facilitates a shift in marketing education from static case analysis toward dynamic business scenario simulation, thereby promoting the development of students' capabilities in consumer insight, marketing decision-making, dynamic strategy adjustment and knowledge transfer. The study further suggests that the educational value of the light metaverse lies not in the complexity of its virtual technological presentation, but in the effective integration of technology with authentic business contexts and instructional tasks. This study provides a reference for the reform of practice-oriented business education through the integration of artificial intelligence.

Keywords: Artificial Intelligence; Light Metaverse; Marketing Education; 5E

Instructional Model

1. Introduction

Artificial intelligence (AI) is accelerating the transformation of knowledge production, business operations and talent development, thereby placing new demands on the instructional models of marketing courses in higher education [1]. The Report to the 20th National Congress of the Communist Party of China explicitly called for the advancement of educational digitalization. General Secretary Xi Jinping has emphasized that educational digitalization represents an important breakthrough for opening up new avenues of educational development and cultivating new advantages in education. Chinese government pays attention to students' higher-order thinking and practical abilities, it advance a series of educational digitalization and AI-enabled smart education policies. Accordingly, applying AI and virtual technologies to reconstruct practical and context-based business course teaching is essential for higher education digital transformation [2].

Marketing courses are highly practical by nature, but their core knowledge extends beyond rote memorization of concepts. So it requiring learners to identify consumer needs, analyze market competition and formulate marketing decisions amid complex business environments. Traditional marketing teaching still heavily depends on textbook lectures, static case studies and classroom discussions. In such a situation, students usually analyze past business events from an outsider's perspective and struggle to immerse themselves in authentic market contexts. This limitation is especially prominent in teaching consumer insights and marketing decision-making. For example, the consumer profiles and market data provided by instructors are often static, which denying students opportunities to interact directly with consumers or conduct iterative trial-and-error under uncertain market conditions. The contextual interaction, immersive experience, and

integration of virtual and physical environments offered by the metaverse provide new technological possibilities for addressing these challenges [3]. Previous studies have suggested that the educational metaverse can facilitate the reconstruction of practice-oriented teaching models through embodied participation, contextual interaction, and the integration of virtual and physical environments [4]. Nevertheless, the realization of its educational value depends primarily on whether technology can be effectively embedded into specific instructional tasks and learning mechanisms, rather than on the technological sophistication of virtual spaces alone [5].

Meanwhile, the rapid development of generative AI has further transformed the conditions under which metaverse-based education can be implemented. Traditional virtual learning environments primarily address the question of where students learn, whereas AI agents can further address with whom students interact and how they receive feedback. In marketing education in particular, AI consumer agents can simulate consumers with different needs, preferences, price sensitivities and purchase responses. This enables students to conduct interactive experiments resembling market research within virtual business environments and to develop a dynamic learning cycle through decision-making, feedback, adjustment and subsequent decision-making. Consequently, the integration of artificial intelligence and light metaverse technology has the potential to transform marketing education: shifting pedagogy from static case analysis to dynamic business simulation and from passive knowledge reception to hands-on decision-making practice. However, existing research still suffers from two main limitations. First, the integration of technology and pedagogy is insufficient. Current research on metaverse education has largely focused on virtual spaces, immersive experiences and technological applications, while discussions on how to embed virtual scenarios into specific curricular tasks and establish stable pedagogical mechanisms remain inadequate. Second, the role of AI in practice-oriented education remains relatively limited. Existing applications of AI in education have focused predominantly on knowledge question answering, content generation and intelligent assessment, whereas relatively little research has explored the use of AI as a simulated business

actor—such as a consumer or competitor—actively participating in the instructional process. Therefore, there is a need to explore the specific implementation mechanisms of AI-enabled light metaverse-based marketing education from an integrated perspective encompassing technology, context, tasks and assessment. Building on experiential learning theory, this study develops an AI-enabled light metaverse-based marketing teaching model that integrates virtual business scenarios, AI consumer agents, marketing decision-making tasks and the 5E instructional process. This study offers insights into how the integration of AI and light metaverse concepts can reshape the marketing teaching process and foster the development of students' practical marketing skills and knowledge transfer capabilities.

2. Construction of an AI+Light Metaverse Marketing Teaching Model

Traditional marketing education centers on lectures, case studies and classroom discussions, which is effective for knowledge transfer, but it suffers from a critical shortcoming— the lack of continuous, dynamic and cost-effective marketing practice environments.

This is particularly evident in courses including International Marketing, Consumer Behavior and Digital Marketing. These courses are featured by highly complex real-world business scenarios. Students are generally confined to retrospective analyses relying on static materials, they cannot fully experience the end-to-end marketing decision-making process, which encompasses information collection, consumer engagement, strategy formulation, market feedback and dynamic adjustment. The immersive and interactive features of the metaverse make it possible to break through these limitations. Its educational value resides not merely in 3D visualization, but in converting virtual spaces into learning laboratories for marketing practice. Prior research indicates that scenario-based learning, role-playing interactions and experiential tasks within metaverse environments can substantially boost student engagement and facilitate contextualized learning via virtual avatars and non-player characters (NPCs) [6–8].

Building on these insights, this study moves beyond the high-cost, hardware-intensive approach associated with the so-called heavy metaverse and develops a Marketing teaching

model based on a low-hardware-dependence online virtual environment. The model places AI agents and data interaction at its core, uses authentic business problems and contextualized tasks as its instructional content and facilitates experiential, interactive, and practice-oriented learning through the integration of virtual and physical environments.

Rather than simply transferring traditional classroom activities into a virtual space, the proposed model reconstructs the relationships among teachers, students, learning content, learning environments and assessment through the integration of AI and virtual business scenarios. Students engage in a continuous learning process of experiencing, exploring,

explaining, elaborating and evaluating within simulated business contexts, thereby promoting the coordinated development of marketing knowledge, practical competencies and digital literacy.

2.1 Design Philosophy: From Knowledge Transmission to Marketing Practice

The proposed model follows four core principles: technology as an enabler rather than a substitute; scenarios as drivers rather than technological embellishments; intelligent interaction rather than one-way question answering; and competency development rather than knowledge memorization [9–11]. These principles are reflected in the table 1.

Table 1. Design Principles of the Marketing Metaverse Instructional Model

Principle	Design Rationale	Core Idea	Key Points
Learning-Objective Orientation	Traditional digital teaching tends to overemphasize technical operation while ignoring the cultivation of students' core marketing competencies, resulting in disjointed technology application and talent training goals.	Technology should serve the core objectives of marketing talent development rather than become an end in itself.	The model focuses on cultivating key competencies in market analysis, consumer insight, marketing decision-making and innovative marketing planning, rather than on the instrumental operation of virtual platforms.
Authentic Problem-Driven Learning	Conventional marketing teaching relies on static textbooks and historical cases. Students can only conduct retrospective analysis, lacking access to dynamic and authentic market scenarios and complete marketing decision-making practice.	Uses real-world business challenges as the starting point for instruction.	Simulates market uncertainty, competition and dynamism, enabling students to make end-to-end marketing decisions in a hands-on, real-world context.
Intelligent Interaction-Driven Learning	Traditional classroom and virtual teaching adopts a passive knowledge-receiving mode, with no iterative interaction or trial-and-error practice, failing to cultivate students' dynamic strategic adjustment ability.	Centers learning interaction on AI consumer agents.	Breaks the passive reception model of traditional virtual instruction, establishing a closed-loop learning process of formulating hypotheses, obtaining feedback and refining strategies.
Lightweight Implementation	Most higher education institutions face constraints of insufficient equipment, funds and professional teachers, making high-cost and high-threshold virtual teaching models difficult to popularize and replicate.	Designed to accommodate the constraints on equipment, funding and faculty resources faced by higher education institutions.	Utilizes a web-based virtual environment and standard end-user devices to enable modular setup, thereby lowering implementation barriers and enhancing scalability and replicability.

2.2 Basic Architecture of the Model: A Teaching Framework Comprising “One Core, Two Contexts, Three Actors and Four Stages”

Based on the above theoretical foundations, this paper constructs an AI+Light Metaverse marketing teaching model featuring “one core, two settings, three agents and four stages”. Specifically, the “one core” centers on the cultivation of students' comprehensive

marketing competencies; the “two settings” include immersive virtual business scenarios and physical teaching environments; the “three agents” consist of teachers, students and intelligent AI agents; and the “four stages” cover scenario construction, intelligent interaction, marketing decision-making and feedback evaluation. The overall architectural framework of the proposed AI+Light Metaverse marketing teaching model is illustrated in Table 2.

Table 2. Basic Architecture of the AI+Light Metaverse-Based Marketing Teaching Model

Structural Layer	Core Content	Main Functions
One Core	Development of practical marketing competencies	Market analysis, consumer insight, marketing decision-making, and innovative marketing planning
Two Contexts	Virtual business context + real-world teaching context	Integrating virtual and physical environments and bridging theoretical learning with practical application
Three Actors	Teacher + students + AI agents	Fostering teacher–student collaboration and human–AI collaborative learning
Four Stages	Scenario creation → Intelligent interaction → Marketing decision-making → Feedback and evaluation	Facilitating a dynamic and iterative cycle of learning activities

Regarding its system architecture, the model establishes AI as the intelligent hub linking virtual business scenarios, intelligent consumer agents, marketing tasks and assessment systems. Following a student-centered design, it stimulates active learning through role participation and task-driven activities. Teachers shift from conventional knowledge deliverers to designers of learning contexts, process facilitators and outcome assessors.

This framework brings about three core paradigm shifts. First, the learning space expands from physical classrooms to a blended virtual–real environment. Second, the pedagogical interaction transforms from binary teacher–student exchanges into tripartite interplay in teachers, students and AI agents. Third, learning activities evolve from a linear sequence of knowledge input and outcome assessment into a cyclical process comprising contextual experience, decision-making practice, feedback-based optimization and competency evaluation.

2.3 Core Element Design: Reconstructing Marketing Learning Contexts with AI-Driven Consumer Intelligence

2.3.1 Virtual Business Scenarios: Transforming abstract markets into tangible, immersive learning environments.

Marketing knowledge is highly context-dependent: virtual business scenarios address the fundamental question of where learning takes place by transforming fragmented, theoretical

concepts into coherent, experiential business contexts. Using the expansion of new energy vehicles into the Southeast Asian market as the instructional setting, the design establishes four functional learning spaces. (1) Market Analysis Center: integrates decision-making data such as the macro-environment, industrial policies, market size and competitive landscape; (2) AI Consumer Experience Center: supports consumer research, demand insights and behavioral analysis; (3) Virtual Brand Experience Store: enables immersive simulation and testing of products, pricing and brand image; and (4) International Marketing Decision Center: facilitates team discussions, strategy formulation and proposal presentations.

This design consolidates fragmented resources including textbooks and case studies into a coherent business logic chain. It can enable students to develop an in-depth understanding of marketing concepts by experiencing the full workflow of market entry, consumer insight, strategy formulation and market feedback.

2.3.2 AI Consumer Agents: Transforming static profiles into dynamically interactive learning subjects

By addressing the core issue of who to interact with, AI consumer agents break the limitations of static consumer data and passive analysis in traditional teaching, upgrading consumers from textual materials into core interactive objects. AI consumer agents possess three core functions, which is illustrated in Table 3.

Table 3. AI Consumer Agents' Three Core Capabilities

Core Capability	Description
Multidimensional profile generation	Constructing models of distinct consumer segments based on variables such as age, income, preferences and price sensitivity
Dynamic behavior simulation	Generating realistic purchasing intentions and decision-making responses in real time, based on factors such as product attributes, price and brand
Natural language interaction	Enabling students to ask questions and test strategies while receiving immediate, personalized consumer feedback

This design transforms consumer analysis from static conceptual learning into a practical process of active inquiry and dynamic experimentation, enhancing students' market insight and capacity to identify consumer needs. As a pedagogical simulation instrument, AI consumer agents generate only controlled simulated data. They cannot substitute for real-world market research and follow the core principle that technology serves instructional design.

2.4 Design of Teaching Activities: Applying the 5E Instructional Model to Promote the Transformation of Marketing Knowledge into Practical Competence

To prevent virtual scenarios from becoming mere "display spaces", this study embeds the 5E instructional model into the entire AI+light metaverse teaching process, forming a progressive teaching workflow consisting of Engage, Explore, Explain, Elaborate and Evaluate (see Figure 1).

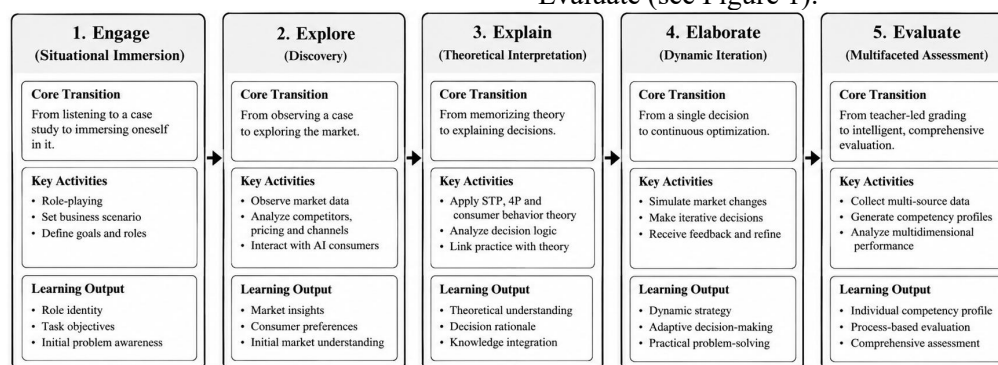


Figure 1. 5E Marketing Instructional Model

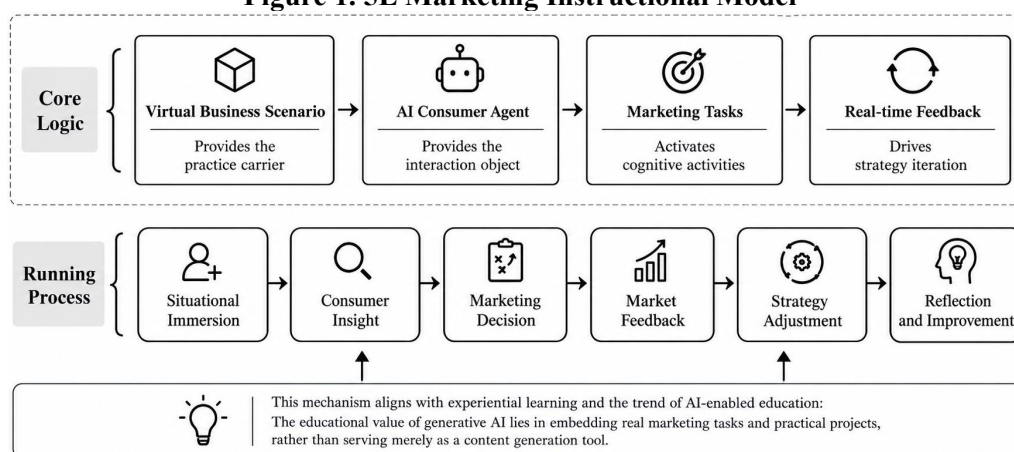


Figure 2. The Closed-Loop Competency Development Mechanism

3. Operational Mechanisms and Implementation Pathways of the AI+Light Metaverse-Based Marketing Teaching Model

3.1 Operational Mechanism: A Closed-Loop Competency Development Mechanism

This model is not a simple assemblage of instructional components. In fact, it builds a continuous and cyclical mechanism for competency development that integrates immersive contextualization, intelligent interaction, decision-making practice and iterative feedback. The Closed-Loop Competency Development Mechanism is shown in Figure 2.

3.2 Reconstruction of Teacher-Student Roles: A Triadic Collaborative Teaching and Learning Community

This model reconstructs the relationship among teaching subjects and establishes a new teaching relationship featuring teacher guidance, student-centered learning and AI collaboration. Teachers shift from knowledge transmitters to learning designers, responsible for scenario construction, task design, theoretical support, process monitoring and calibration of AI-generated feedback. Students transform from knowledge recipients into marketing decision-makers, who conduct active research, develop plans and bear decision consequences via virtual identities to focus on solving real business problems. AI evolves from a tool into an intelligent learning

partner, undertaking functions including consumer simulation, data generation, dynamic scenario adaptation, instant feedback and learning analyst. Its outputs require critical verification to prevent mechanical over-reliance. The three parties have clear division of labor: teachers perform design and guidance, students conduct exploration and decision-making, AI carries out simulation and feedback.

3.3 Principles of Implementation: Balancing Technical Feasibility and Instructional Effectiveness

To enable effective deployment, five core implementation principles are proposed.

(1) Lightweight infrastructure principle. Computers, tablets and mobile devices serve as primary access terminals, VR serve as an

optional enhancement. This lowers costs amenable to large-scale implementation, including adult education.

(2) Task-centered principle. Virtual scenarios must fully serve marketing tasks and avoid the pitfall of prioritizing technology over pedagogy.

(3) AI assistance principle. AI's supporting role should be clearly defined, with a human review mechanism for AI outputs to mitigate content errors.

(4) Data-driven evaluation principle. Behavioral data on student interactions, decisions and iterations enables holistic process-oriented teaching diagnosis and assessment.

(5) Virtual-physical integration principle. Virtual environments enable low-cost trial-and-error and situational training, complemented by corporate field research and real-market practice.

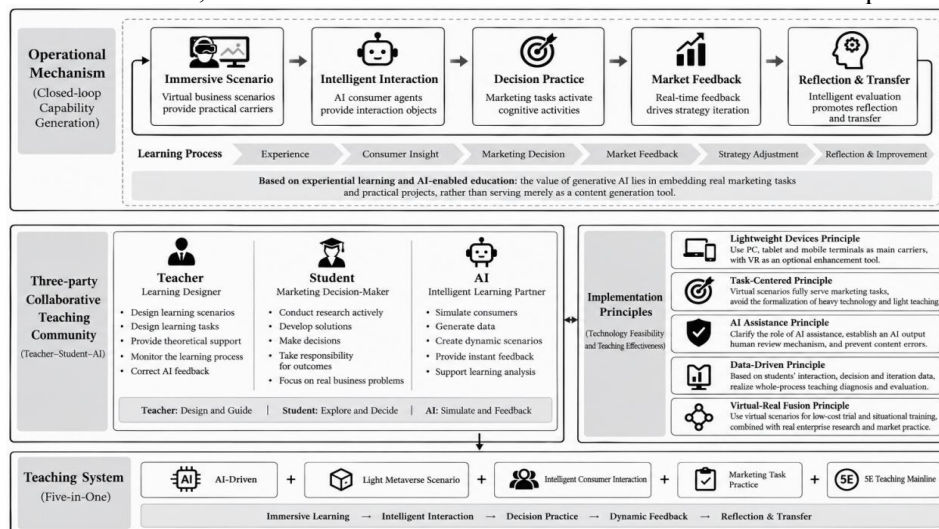


Figure 3. Operational Mechanism and Implementation Pathways of the AI+Light Metaverse-Based Marketing Teaching Model

This model delivers a paradigm shift in marketing education, replacing the conventional lecture, case study and examination model with a framework of situational immersion, intelligent interaction, decision-making practice, dynamic feedback and reflective knowledge transfer. Its core innovation is the adoption of AI-powered consumer agents to construct a hyper-realistic business simulation. Students conduct end-to-end practices including consumer observation, product testing, pricing and competitive response, which can converting theory into actionable, iterative marketing competencies. Anchored in the 5E instructional framework, this forms an integrated pedagogical system combining AI intelligence, light metaverse scenarios, intelligent consumer interaction and hands-on marketing tasks. Figure 3 shows the

operational mechanism and implementation pathways of the AI+light metaverse marketing teaching model.

4. Conclusions and Discussion

This paper investigates AI empowerment for marketing education within a light metaverse environment and develops an instructional model that integrates virtual business scenarios, AI consumer agents, marketing decision-making tasks and the 5E instructional cycle. The key findings are as follows.

(1) Integrating AI and the light metaverse drives marketing education away from knowledge transmission toward contextualized practice. Virtual business scenarios transform students from passive case analysts in conventional instruction into marketing decision-makers

within simulated firms. By completing tasks including market entry, consumer targeting, marketing-mix design, students apply theoretical knowledge in situated business contexts. Accordingly, the educational value of the light metaverse resides not merely in immersive environments, but in reconstructing the contexts for applying marketing knowledge.

(2) AI consumer agents shift consumer-related learning from static analysis to dynamic interaction. These AI agents deliver differentiated responses in accordance with students' inquiries, product designs and price adjustments. They guide students through a recurring loop of need identification, strategy formulation, feedback validation, plan revision, advancing students' consumer insight and marketing decision-making competencies.

(3) The 5E instructional model effectively connects knowledge acquisition and competency development. Following a progressive sequence of contextual engagement, market exploration, theoretical explanation, strategy optimization, the model unifies experience, theory, practice and reflection. Dynamic market events particularly strengthen students' capacity for decision-making and adaptation under business uncertainty.

This study extends the analytical scope of metaverse education research by synthesizing virtual scenarios, intelligent interaction and marketing decision-making into a unified framework. It proposes a Scenario-Interaction-Decision-Feedback pedagogical mechanism, shifting the focus of metaverse education research from spatial reconstruction to the reconstruction of learning mechanisms. Furthermore, it enriches research on AI-enabled practical business education, allowing students to conduct marketing experiments amidst dynamic feedback and extending the application logic of AI in business teaching from mere knowledge support to scenario generation and decision support.

This study has three limitations. First, the simulated nature of virtual enterprises and AI consumers means their feedback cannot yet fully replace real-world market research; Second, the effectiveness of the case-based teaching approach requires further validation through larger samples, multi-institutional studies and longitudinal analysis; Third, issues regarding the authenticity and explainability of AI consumer agents, as well as the privacy protection of

student learning data, warrant further investigation. Future research could introduce diverse agent types—such as competitors, channel partners and marketing consultants—to construct a multi-agent virtual business ecosystem. Additionally, the light metaverse teaching approach could be extended to practical courses such as cross-border e-commerce, brand management and entrepreneurship management to further evaluate its applicability across different courses and contexts.

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