

Research on Humanoid Robots to Boost Enterprise Strategy and Risk Management Course Teaching Reform

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Abstract: In today's world, digitalization and intelligentization are profoundly reshaping the business environment. Traditional enterprise management teaching faces bottlenecks such as a lack of practical scenarios and insufficient decision-making experience. This paper focuses on the pedagogical application value of humanoid robot technology, systematically analyzing its innovative potential within the Enterprise Strategy and Risk Management course. The research finds that current teaching commonly suffers from problems like "emphasizing theory over practice," "focusing on cognition with limited experience," and "delayed, weak feedback," rooted primarily in the lagging nature of course scenarios, the monotony of teaching methods, and resource constraints. Humanoid robots offer a new pathway for deepening students' core competencies in strategy formulation and risk management under uncertainty by providing highly immersive strategic decision-making environments, dynamic risk deduction mechanisms, and low-cost, repeatable practice platforms. This study demonstrates that humanoid robot-driven contextualized, interactive, and collaborative teaching models can effectively enhance students' higher-order thinking and practical abilities, representing a significant direction for future business education reform. The research proposes specific strategies, including constructing a hybrid virtual-physical experimental scenario system, establishing a tiered teaching robot platform, developing an integrated teaching operating system, building a "AI + Teacher" dual-teacher teaching model, and reconstructing a competency-oriented assessment system, providing references for university course reform.

Keywords: Humanoid Robot; Enterprise Strategy and Risk Management; Contextual Teaching; Cognitive Experience; Immersive Learning; Teaching Reform

1. Introduction

The complexity and uncertainty of the global economy have surged (e.g., geopolitical conflicts, technological "black swans," industrial chain restructuring), placing unprecedented demands on enterprises for strategic foresight and risk resilience. Traditional Enterprise Strategy and Risk Management courses rely primarily on case studies and lectures, making it difficult for students to experience the complete "decision–feedback–adjustment" cycle in a safe environment. Alongside the converging evolution of robotics, artificial intelligence, and Internet of Things technologies, and the emergence of theories like embodied cognition emphasizing the key role of physical situational interaction in cognitive development, humanoid robots, with their human-like form and natural interaction capabilities^[1], provide a technological vehicle for constructing dynamic, simulated business environments. Existing research has found that humanoid robots can significantly enhance learner engagement and task-solving abilities in STEM education and special education^[2]. However, their application in complex cognitive domains within business education is still nascent, representing a significant research gap. This study aims to fill this gap, exploring how humanoid robots can empower Enterprise Strategy and Risk Management course teaching, driving the teaching system towards "unity of knowledge and action."

2. Current Situation and Dilemmas in Enterprise Strategy and Risk Management Course Teaching

Enterprise Strategy and Risk Management is a

course that systematically teaches methods for formulating, implementing, and evaluating enterprise strategies, focusing on cultivating students' abilities to identify, assess, and respond to various business risks. Its current teaching situation and dilemmas are as follows.

2.1 Limitations of Teaching Methods

In current teaching, instructors rely heavily on case material libraries (e.g., Harvard Case Library) and lecture formats. This learning approach is primarily receptive and cognitive; students essentially remain in a "spectator" state, experiencing weak immersion in complex strategic scenarios. Group discussions can foster intellectual exchange but are limited by student experience and classroom time, often remaining at the stage of theoretical deduction without verification. Some universities have introduced computer simulation software to enhance practicality, however, using screen interfaces as the operating medium inherently creates a sense of detachment between the user and the decision-making object^[3], making it difficult to mobilize embodied cognition and deep emotional engagement.

2.2 Obvious Shortcomings in Teaching Effectiveness

Firstly, there is a significant disconnect from context. Classic cases often come from mature companies and past historical events, such as the bankruptcy of Kodak or the transformation of Nokia, which lack timeliness and scenarios reflecting agile decision-making in the new economy.

Secondly, the decision-making experience is superficial. Simulated decisions in teaching are mostly hypothetical deductions, lacking dynamic interference (e.g., stock price fluctuations, policy changes, public opinion crises) and real-time feedback within authentic environments^[4]. Students struggle to learn how to formulate flexible strategies amidst genuine risk perception. Finally, core competency cultivation is insufficient. Students' understanding of abstract theoretical frameworks (e.g., SWOT analysis, risk assessment matrix) and complex strategic planning steps remains shallow. Due to a lack of high-density, contextualized practical exercises, their strategic thinking, risk identification sensitivity, and on-the-spot decision-making abilities are notably weak.

3. Unique Value and Potential of Humanoid Robots in Empowering Teaching

As a cross-product of AI, embodied intelligence, and robotics technology, humanoid robots can simulate human posture, language, and behavior for real-time physical interaction^[5], creating three crucial dimensions for teaching.

3.1 Constructors of Immersive Scenarios

Humanoid robots can be embedded as key roles in simulated scenarios^[6]. For example: Executive Roles, Controlling multiple robots to construct executive team meeting scenarios, participating in business debates, and providing decision-making pressure; Customer/Investor Roles, Using pre-set language models (e.g., integrated with GPT), they can express demands, complaints, or apply pressure to students. Competitor Roles, Simulating competitors' sudden actions (e.g., price cuts, new technology investments), creating authentic market competition environments.

The dynamic behavior of humanoid robots provides not only audiovisual information flow but also fosters a sense of physical presence^[7], inducing genuine urgency and pressure for on-the-spot decisions in students, thereby mobilizing deeper cognitive and emotional participation.

3.2 Engines for Generating Dynamic Complex Environments

Humanoid robots can serve as engines for generating dynamic complex environments. For example: Multi-layered Risk Injection: Through pre-set data interfaces or a teacher's central control platform, they can dynamically introduce situational variables (e.g., product recalls, currency flash crashes, cyberattacks), simulating uncertainty shocks in real business environments. Data-driven Interactive Feedback, Robots can adjust their language, emotions, and behavioral strategies instantly based on backend input data (e.g., changes in public opinion keyword frequency), guiding students to respond flexibly to emerging risks.

Students must observe, think, and respond in real-time to multi-source risks generated by coordinated actions of multiple robots, training their risk identification capabilities and response speed within a complex ecosystem.

3.3 Core Hubs for Closed-Loop Teaching

Humanoid robots can act not only as challengers

in decision-making but also as carriers for strategy execution. Strategy Implementation Mediators, After students decide on a product iteration strategy, they can use a controller to have the robot simulate the "new product display in a physical store" process. Implementation Result Collectors, While "displaying," the robot can automatically collect customer reactions (using built-in emotion recognition AI), generating instant data reports. Multidimensional Feedback Providers, Using natural language generation technology, they can summarize implementation data and generate decision suggestions (e.g., "40% of customers reacted negatively to pricing, suggest activating Plan B"). This "Decision – Robot Execution – Data Feedback – Strategy Optimization" closed-loop model significantly strengthens students' understanding of the entire decision-making process.

4. Current Challenges in Integrating Humanoid Robots into Teaching

Despite significant technical potential, their widespread adoption faces practical obstacles, as detailed below.

4.1 High Cost of Technology Deployment

The price of a single high-performance humanoid robot can be as high as ¥80,000 to ¥100,000 RMB, not including the cost of supporting sensors, AI computing clusters, and ongoing maintenance. This poses a significant financial barrier for ordinary university business programs.

4.2 Insufficient Course Adaptability

Existing research on business education robots mostly concentrates on basic service scenarios (e.g., restaurant ordering robots, hotel reception robots). The development of "deep simulation robot" scenarios capable of simulating advanced business behaviors (e.g., business negotiations, crisis public relations) lags behind. There is a lack of algorithmic logic and behavioral models adapted to higher-level courses.

4.3 Bottlenecks in Faculty Capabilities

Teachers require the following composite abilities: familiarity with humanoid robot operation mechanisms, the ability to design experimental scripts linked to robots, and mastery of teaching data collection and analysis tools. Many teachers have weak interdisciplinary

knowledge reserves, making it difficult to effectively leverage technology to empower teaching.

4.4 Lagging Assessment System

Traditional course assessments emphasize conceptual questions and essays, lacking effective methods to evaluate students' operational skills, situational decision-making abilities, and competence in responding to sudden risks. This inadequacy prevents the quantitative assessment of outcomes from new technology-based teaching. Furthermore, traditional assessment systems mostly employ static evaluation methods (e.g., final exams), lacking dynamic adjustment mechanisms, resulting in an inability to comprehensively and continuously measure students' integrated application abilities.

5. Analysis of Deep-Seated Causes

Analysis reveals that the root causes of the above problems stem primarily from the following three aspects.

Firstly, Cognitive Barriers. Teaching administrators have insufficient understanding of the pedagogical value of new technologies, prioritizing budgets towards research equipment. Most universities lack dedicated "Teaching Digital Reform Funds."

Secondly, Path Dependence Inertia. Current business training laboratories heavily rely on ERP sandbox simulation systems. While mature and stable after two decades of iteration, this technological system exhibits diminishing marginal returns in learning outcomes.

Thirdly, Lack of Interdisciplinary Collaboration. Business teachers are unfamiliar with the robot technology development process, while robot engineers struggle to comprehend complex business logic. This lack of mutual understanding creates an interface gap hindering the development of deep teaching scenarios.

6. Implementation Strategies for Humanoid Robot-Enabled Course Reform

The above analysis highlights both the unique value and potential of humanoid robots in empowering teaching, and the undeniable reality of integration challenges^[8]. To address these dilemmas, we propose the following integrated implementation pathways.

6.1 Construct a Hybrid Virtual-Physical

Experimental Scenario System

Level 1: Lightweight Scenarios (Foundation). Utilize desktop-type robots for risk dialogue training, focusing on basic concept cognition.

Level 2: Intermediate Scenarios (Advanced). Construct supply chain disruption negotiation scenarios based on humanoid robots.

Level 3: High-Level Scenarios (Comprehensive). Utilize AR glasses to overlay digital scenarios (e.g., virtual factories), enabling interaction with robots to handle multinational compliance conflict events, forming a "physical robot + virtual reality" multidimensional training field.

6.2 Establish a Tiered Teaching Robot Platform

Currently, many universities adopt a wait-and-see attitude towards the promotion and application of humanoid robots in teaching due to high deployment costs. Establishing a shared platform providing robot equipment leasing services to universities can significantly reduce the burden of one-time investment, facilitating the adoption of humanoid robots in teaching.

6.3 Develop an Integrated Teaching Operating System

Develop a specialized teaching operating system integrating the following functions: Dynamic Scenario Template Library (e.g., templates for new market entry decisions). One-Click Behavior Script Generation System (adaptable to different course objectives). Automated Behavior Analysis Dashboard (tracks student strategy effectiveness). This platform allows teachers to configure experimental scenes via drag-and-drop interfaces, drastically lowering the technical barrier to entry.

6.4 Construct an "AI + Teacher" Dual-Teacher Teaching Model

Within the Enterprise Strategy and Risk Management course, teachers and robots divide responsibilities. Teacher Responsible for controlling the overall teaching pace, setting core situational nodes, and facilitating classroom discussions. Robot Responsible for automatically generating scenarios, injecting multi-source information, executing behaviors and providing feedback, and scoring decisions. This forms an efficient learning loop: "Teacher designs the problem space – Robot manifests the problem – Student makes decisions and optimizes – AI system provides feedback –

Teacher guides reflection."^[9]

6.5 Reconstruct a Competency-Oriented Assessment System

Leverage the real-time data collection capabilities of the robot system to build a three-dimensional assessment system:

Operational Layer Data. Pertaining to the clarity of student instructions and operational precision.

Strategic Layer Data. Pertaining to decision-making time and resource allocation rationality.

Outcome Layer Data. Focusing on cumulative risk indices, enterprise value growth rates, etc.

This enables a leap in assessment from testing answer-giving ability to evaluating decision-making competence^[10].

7. Conclusion

Humanoid robots are not merely teaching tools but physical embodiments of complex business environments. Their application in Enterprise Strategy and Risk Management courses is creating a new educational paradigm: grounded in context, operationalized through practice, focused on cognition, and anchored by closed-loop processes. Despite facing obstacles related to cost, adaptability, and cognition, their pedagogical value can be unlocked by deepening the application of virtual-physical fusion technologies, building low-cost cloud platforms, and developing intelligent teaching operating systems.

Future exploration should focus on: Conducting large-scale experiments to verify the enhancement effects on cognitive depth (e.g., strategy transferability). Developing dynamic ethical decision-making scenarios (e.g., responding to AI bias). It is believed that in the near future, humanoid robots will assist business education in achieving a fundamental shift: from "memorizing knowledge" to "incubating wisdom," and from "understanding the market" to "mastering risk," thereby contributing crucial pedagogical momentum to cultivating strategically intelligent talent.

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