The "Three-dimensional Five-order" Fusion Model Based on OBE: Theoretical Construction and Path Exploration of AI Empowerment in Higher Education

Wanqing Cui
Sias University, Zhengzhou, Henan, China

Abstract: The rapid advancement of artificial intelligence technology is driving profound transformations in higher education paradigms. Grounded in the OBE (Outcomes-Based Education) philosophy, this study transcends disciplinary limitations to propose a universal "Three-Dimensional Five-Stage" integration model, systematically constructing a theoretical framework for deep AI-education integration. The model encompasses three fusion dimensions-"technological tools, professional expertise, and industry scenarios" and designs five progressive stages: "AI-powered pre-class preparation-intelligent collaborative grouping-problem-based inquiry deepening-enterprise feedback iteration-ethical reflection elevation." This framework addresses core theoretical challenges in AI education, including superficial application, disconnection from specialized teaching, and monolithic evaluation mechanisms. The paper elaborates on the model's theoretical essence, operational logic, and implementation pathways, demonstrating its value in transitioning teaching from "knowledge infusion" to "competency and literacy co-development" and achieving closed-loop industry-education collaboration. It provides new theoretical perspectives and practical guidelines for systemic reform in higher education during the intelligent era.

Keywords: OBE Philosophy; Artificial Intelligence; Higher Education; Teaching Model; Theoretical Model; Industry-Education Integration

1. Introduction

The emergence of next-generation artificial intelligence technologies, particularly generative AI, has become a pivotal force driving educational transformation. Educational strategies worldwide emphasize the deep integration of AI with teaching methodologies to build intelligent and personalized learning systems. However, current higher education practices face a critical disconnect between theory and practice: On one hand, Outcome-Based Education (OBE) principles prioritize student-centered development and learning outcomes that align with societal needs; on the other hand, AI applications in education remain superficially tool-based, often appearing as piecemeal combinations without deep integration into specialized curricula. This disconnect creates a gap between talent cultivation and industry demands for digital intelligence, resulting in insufficient development of students' higher-order thinking skills and innovative competencies. There is therefore an urgent need for a theoretical framework that systematically integrates OBE principles with AI technologies to guide interdisciplinary teaching reforms. This study aims to construct a "Three-Dimensional Five-Stage" integration model and explore its theoretical significance in reshaping the higher education ecosystem.

2. Theoretical Foundation: The Integration Logic of OBE Philosophy and AI Empowered Education

2.1 Policy Background and Educational Transformation Needs

Under the current policy background of "China Education Modernization 2035" and the "Implementation Plan for the Review and Assessment of Undergraduate Education in Regular Higher Education Institutions (2021-2025)", the informatization and intelligent transformation of education are accelerating. "China Education Modernization 2035" explicitly proposes "accelerating educational reform in the information age", emphasizing the construction of intelligent campuses, the coordinated development of integrated intelligent teaching, management, and service platforms, and the use of modern technology to accelerate the reform of talent cultivation models, achieving an organic combination of large-scale education and personalized training. The "Opinions on Accelerating the Digitalization of Education" jointly issued by the Ministry of Education and eight other departments further refined the "integration, intelligence, and internationalization" three-pronged advancement path, providing policy guidance for the deep integration of AI technology into education.

2.2 Teaching Challenges in the Digital Economy Era

The advent of the digital economy era has brought systemic challenges to traditional education. Current practices reveal that most universities' AI tool applications remain superficial, lacking deep integration with core professional courses. Teachers predominantly use AI technologies for surface-level tasks like text-to-image or text-to-video conversion, failing to achieve the deep integration of "technical logic-accounting rules-business scenarios". Such shallow applications cannot meet the new demands for applied talents in the digital economy era, urgently requiring the establishment of a systematic framework for teaching model innovation. In-depth exploration of intelligent education applications helps accurately grasp smart technologies, optimize teaching processes, enhance educational quality, and meet personalized learning needs, laying a solid foundation for cultivating new-generation talents [1]. The OBE philosophy emphasizes three core elements: "student-centered, outcome-oriented, and continuous improvement", which aligns perfectly with AI-powered education, providing crucial theoretical support and practical guidance for curriculum reform in higher education institutions.

2.3 The Integration Foundation of OBE Philosophy and AI Empowered Education

The Outcome-Based Education (OBE) framework begins with ultimate learning outcomes, designing curricula and teaching activities around these goals. By clearly defining the knowledge, skills, and competencies students should possess upon graduation, it ensures the entire teaching process revolves around these outcomes, thereby aligning engineering talent with industry and societal needs [2]. However, against the backdrop of rapid advancements in artificial intelligence (AI) technology, the logic of applied talent cultivation has undergone fundamental change. First, AI has evolved from an auxiliary tool into a "productivity engine" deeply integrated with professional domains, requiring professionals to master the ability to combine AI technology with specialized knowledge. Second, AI technology is driving financial functions to shift from "post-event accounting" to "pre-event forecasting + in-process control," demanding that talents acquire AI-powered decision-making tools and build decision models in real business scenarios. Most crucially, the "black-box nature" and potential "bias risks" of AI technology necessitate that applied talents possess both technical ethics awareness and critical decision-making capabilities. These new competency dimensions must be systematically incorporated into the definition of "learning outcomes" under the OBE framework and serve as the starting point for curriculum design.

In the AI era, the OBE philosophy has been redefined with new dimensions, where AI technology serves as a powerful catalyst for its implementation [3]. AI has evolved beyond being a mere auxiliary tool into a "productivity engine" deeply integrated with specialized fields, requiring professionals who can combine AI technology with domain expertise to solve complex problems. Meanwhile, the "black-box nature" and "bias risks" of AI technology have made technical ethics awareness and critical thinking essential core competencies. Consequently, the "learning outcomes" under the OBE framework must be redefined to include dimensions such as data-driven thinking, AI tool operation, industry-finance collaborative innovation, and ethical reflection. This necessitates a fundamental shift in curriculum design from "knowledge-centered" to "competency and literacy-centered" approaches, with the "Three-Dimensional Five-Stage" model providing a systematic theoretical blueprint for this transformation. Table 1 below primarily analyzes policy requirements and traditional education.

3. Model Construction: Theoretical Interpretation of "Three-Dimensional Integration" and "Five-Step Progression"

This study establishes a theoretical framework for an innovative "Three-Dimensional

Integration, Five-Stage Progression" teaching model, grounded in Outcome-Based Education (OBE) theory while incorporating Constructivist Learning Theory, Situational Learning Theory, and the Technology Acceptance Model. The framework emphasizes AI-powered pedagogical innovation, restructuring curricula to cultivate high-caliber applied professionals with AI literacy and creative thinking. OBE principles provide outcome-oriented design logic, Constructivist Learning Theory supports students' active knowledge construction, Situational Learning Theory ensures content relevance to real-world work scenarios, and the Technology Acceptance Model offers theoretical guidance for effective AI implementation. These four interconnected components collectively form the theoretical foundation, providing robust support for developing the "Three-Dimensional Five-Stage" teaching model.

Table 1. Comparative Analysis of Policy Requirements and Traditional Education Challenges

Policy requirement dimension	The Real Challenge of Traditional Education	urgency of reform
Construction of Intelligent Teaching Platform	AI application shallow, lack of deep technology integration	It is urgent to construct the unity of "technical logic-accounting rules-business scenarios"
personalized talent cultivation	The teaching model is monotonous and cannot meet the needs of differentiation	Innovate the "Five-Step Progressive" Intelligent Teaching Model
deep integration of industry and education	Insufficient school-enterprise cooperation and lagging teaching content	Establishing an Innovative Mechanism of Industry-Education Collaboration in Talent Cultivation
ethics education in technology	The system of cultivating consciousness of ethics is not perfect	The System of Technical Ethics Should Be Incorporated into the Professional Curriculum

3.1 Three-dimensional Integration: Theory of Curriculum System Reconstruction

Three-dimensional integration aims to break down disciplinary barriers and construct a three-dimensional curriculum reconstruction theory. It comprises three interrelated and mutually reinforcing dimensions:

1. Technical Tools Dimension: This dimension focuses on transforming AI technologies (e.g., intelligent financial systems, big data analytics platforms) from external tools into core components embedded in the learning process. The theoretical objective is to enable students to grasp the fundamental logic of "data structures + professional rules" through hands-on practice, rather than merely learning software operations.
2. Professional Knowledge Dimension: This dimension requires adherence to the core knowledge system of the discipline, but the teaching focus must shift from the transmission of factual knowledge to conceptual understanding and principled application. With the empowerment of AI, teaching should place greater emphasis on cultivating students' professional judgment, strategic thinking, and interdisciplinary knowledge integration capabilities.
3. Industry Scenario Dimension: This dimension serves as a bridge between education and industry, emphasizing the integration of real business scenarios and data from enterprises to create highly realistic learning environments. Its theoretical value lies in achieving "zero-time-delay" alignment between teaching content and industry competency standards, ensuring the practical effectiveness of learning outcomes. The three-dimensional integration collectively forms a dynamic curriculum ecosystem, where technology acts as an enabling tool, knowledge serves as the foundation of capabilities, and scenarios function as validation fields for value.

3.2 "Five-Step Progression": Theoretical Innovation of Teaching Process

The "Five-Stage Progressive" theory presents a coherent, closed-loop model for instructional evolution (Figure 1), which defines the teaching objectives, teacher-student roles, and technology applications at each stage.

1. AI-Powered Pre-learning: This phase is grounded in personalized learning and adaptive teaching. By integrating knowledge representation models with learning resource models to create knowledge graphs, it generates personalized recommendation lists using learners' basic information, learning resource

details, and other data, effectively facilitating deep learning [4]. The AI-based learning analytics system dynamically assesses students' prior knowledge, constructs individualized knowledge graphs, and delivers customized resources, thereby establishing a scientific foundation for differentiated instruction and overcoming the limitations of one-size-fits-all teaching approaches.

2. Intelligent Group Collaboration: This phase incorporates collaborative learning theory and team dynamics. AI assigns students into heterogeneous teams based on their multidimensional competency profiles, aiming to simulate real-world workplace team structures with complementary roles, thereby fostering socially constructed learning and developing communication and collaboration skills.

3. Problem Exploration Deepening: This phase constitutes the core of the model, driven by a "problem chain + project-based" approach. The teacher's role evolves from a lecturer to a facilitator, focusing on designing poorly structured questions and stimulating higher-order thinking (e.g., critical thinking, innovative solutions). AI serves as a cognitive tool during this stage, supporting students in data exploration, model construction, and simulation validation.

4. Enterprise Feedback Iteration: This phase embodies the integration of industry-education collaboration and design thinking theory. By introducing corporate mentors as external evaluators, their feedback on the project outcomes' "technical suitability" and "decision-making effectiveness" is incorporated into the learning cycle. This enables students to experience a genuine innovation process of "practice-feedback-iteration", thereby enhancing the social utility of their learning outcomes.

5. Ethical Reflection and Sublimation: This stage focuses on the fundamental purpose of education in fostering moral character and nurturing individuals. It guides students to systematically reflect on the ethical, social impacts, and human value positioning brought about by AI after applying technological skills. This transcends mere skill training, aiming to cultivate students' sense of responsibility as digital citizens and their awareness of social ethics, thereby achieving holistic development.

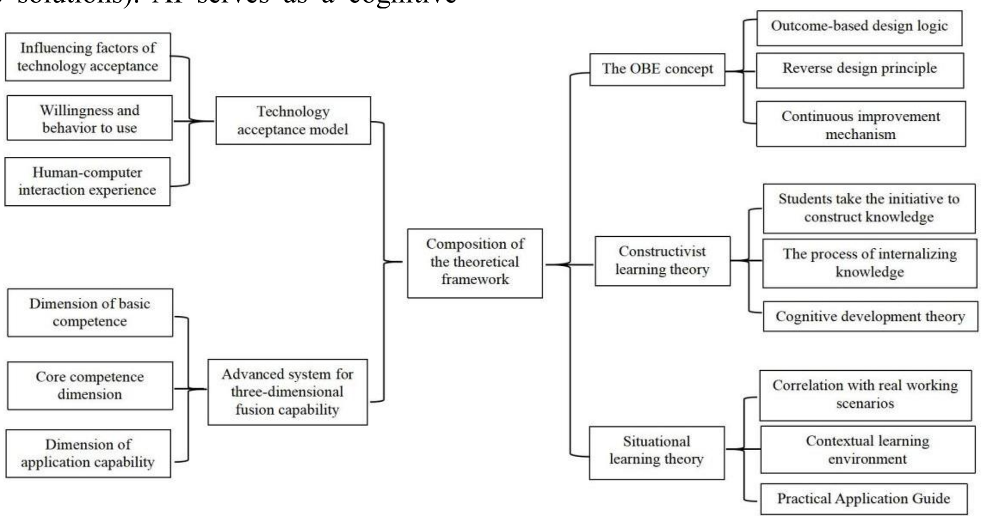

Figure 1. Theoretical Framework Composition and Logical Relationships Diagram

Taking accounting courses as an example, the core feature of the "Three-Dimensional Five-Stage" teaching model lies in the deep integration of technological logic and accounting rules, emphasizing the organic unity of AI technology application and accounting professional characteristics. This deep integration achieves organic fusion of technological empowerment and professional education through a tripartite teaching model of "technological logic-accounting rules-business scenarios". Specific implementation paths include: establishing a technical ethics review mechanism to ensure AI applications comply with accounting professional ethics requirements; developing an intelligent teaching standard system that integrates accounting standards into technical design; building an industry-education collaborative innovation platform to synchronize technological iteration with rule updates. Through systematic safeguard mechanisms, the teaching model innovation ensures both full utilization of technological advantages and adherence to the essential requirements and value pursuits of accounting professionalism.

4. Discussion on Theoretical Value and Implementation Path

The theoretical value of the "Three-Dimensional Five-Stage" model lies in its provision of a systematic analytical framework and operational guide for deconstructing and reconstructing higher education curricula and teaching in the AI era. It is not merely a teaching methodology but also a practical pathway for implementing educational philosophy. This model directly addresses several critical theoretical challenges in current educational practices: it resolves the disconnect between curriculum systems and digital-intelligent industry demands through "three-dimensional integration"; addresses the inadequacy of traditional teaching models in aligning with outcome-based education (OBE) goals via "five-stage progression"; and establishes a theoretical blueprint for addressing the lack of dynamic evaluation systems and the disconnect in industry-education collaboration by constructing a tripartite linkage mechanism among enterprises, teachers, and AI.

In terms of implementation, the model requires:

1. Teacher Role Transformation: Educators must evolve from "knowledge transmitters" to "curriculum designers" and "learning facilitators," with their core responsibilities shifting to designing integrated three-dimensional learning experiences, providing higher-order thinking scaffolding, and managing dynamic assessment processes. This transformation requires teachers to develop new competency frameworks, including AI technology application skills, instructional design innovation capabilities, data analysis proficiency and teamwork competencies. Grounded in teacher professional development theories, systematic capacity-building programs should be designed to systematically reshape teaching roles through tiered and categorized training approaches. The training system should encompass three core modules: AI technology application, instructional design innovation, and curriculum development, covering practical skills such as operating generative AI tools, applying data analysis techniques, and building virtual simulation environments.

2. Restructuring of Evaluation Systems: In the AI era, higher education evaluation design now encompasses not only individual tasks but also comprehensive assessments integrating multiple tasks, stages, and courses. This complexity significantly increases the challenges of implementing AI in educational evaluation. [5] A tripartite collaborative framework involving "teachers, industry mentors, and AI systems" must be established. For instance, Shakib et al. proposed the six-stage "AI-Enhanced Cognition for Outcome-Based Learning" (ACE) framework, which leverages generative AI to evaluate students' unstructured learning outcomes and enhance the development of higher-order cognitive abilities. [6] This paradigm shift requires moving beyond traditional score-oriented assessments to adopt multidimensional, process-based evaluations that emphasize "competency + value," incorporating dimensions such as "innovative technology application" and "data ethics awareness." Through classroom observations, assignment grading, and project guidance, the focus should be on students' knowledge mastery, attitude changes, and critical thinking development. Industry evaluations should prioritize vocational skill cultivation and job adaptability assessment, integrating industry standards and corporate needs directly into the teaching evaluation system through real-world business scenarios, practical training project design, and certification of job competencies. AI-driven evaluation optimizes personalized learning paths through data analysis and machine learning. By analyzing multidimensional data including students' learning behaviors, knowledge acquisition trajectories, and competency development curves, it constructs digital student profiles to enable real-time monitoring and early warning of learning status. The tripartite evaluation results are scientifically integrated via weighted fusion algorithms, establishing mutual recognition mechanisms and dispute resolution protocols. This ensures that the three-party evaluations not only corroborate but also complement each other, forming a complete closed-loop evaluation system.

3. Enhanced Industry-Education Collaboration: Enterprises should be deeply involved in the entire process from competency indicator design to project evaluation, forming a dynamic closed loop of "teaching needs-competency development-industry validation." This institutional framework ensures the "industry scenario dimension" of the model remains substantive and learning outcomes stay aligned. By providing authentic business scenarios and

data, enterprises collaborate on developing practical training programs to address the challenge of teaching content lagging behind technological advancements. Through establishing industry-standard practical teaching platforms, corporate experts are invited to participate in curriculum design and content updates, ensuring teaching materials keep pace with industry demands. By transforming real enterprise projects into teaching cases, an organic transformation from "technical specifications-course modules-competency standards" is achieved.

4. Building a Technical Support Ecosystem: Establish a technical platform environment capable of supporting learning analytics, personalized recommendations, and process data collection and analysis, providing the infrastructure for model operation. Through intelligent systems, real-time collection and analysis of learning data are achieved. Based on students' prior knowledge diagnosis and competency level assessment, dynamic recommendations of suitable learning resources are made to realize a "one-person-one-plan" personalized learning experience.

5. Continuous Quality Assurance Mechanism: A three-phase evaluation system is established at the beginning, middle, and end of each semester. Through standardized assessment tools and diversified data collection, the teaching effectiveness and talent cultivation quality are comprehensively monitored. Based on the evaluation results, systemic issues and individual differences in the teaching process are identified. Specific improvement measures and implementation plans are formulated for the diagnosed problems, covering multiple aspects such as curriculum content optimization, teaching method innovation, resource updates and supplements, and teacher training enhancement. The formulation of plans adopts a multi-stakeholder participation model to ensure the feasibility and effectiveness of improvement measures, forming a virtuous cycle mechanism of "evaluation-diagnosis-improvement-validation".

5. Conclusion and Prospects

The "Three-Dimensional Five-Stage" integration model proposed in this study represents a profound theoretical exploration of implementing the OBE (Outcomes-Based Education) philosophy in the intelligent era. By addressing the disconnect between course content and contemporary demands through "three-dimensional integration," and designing a "five-stage progressive" teaching process to facilitate stepwise growth in competencies and literacy, the model emphasizes the interplay of technology, humanities, and society. It provides a theoretical framework for AI-enabled higher education that balances efficiency and ethics, innovation and heritage.

Future research could focus on three key directions: First, exploring the model's adaptability and variations across disciplines (e.g., engineering, medicine, humanities). Second, investigating how different stages of the model influence students' psychological and cognitive dimensions (e.g., self-efficacy, learning motivation). Third, examining new forms of stage evolution under AIGC technology, such as "AI-driven preview" and "problem exploration deepening." In summary, as an open theoretical framework, the "Three-Dimensional Five-Stage" model is expected to be continuously tested, enriched, and developed through broader educational practices and academic dialogs.

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