WEP Warwick Evans Publishing

International Journal of Computer Science and Information Technology
ISSN: 3005-9682 (Print), ISSN: 3005-7140 (Online) | Volume 8, Number 4, Year 2026
DOI: https://doi.org/10.62051/ijcsit.v8n4.05
Journal homepage: https://wepub.org/index.php/IJCSIT/index

Construction and Pathway Exploration of a “Lightweight” Generative AI Model for Fundamental Accounting Education: A Study Based on the TPACK Framework

Shuai Fang

School of International Business, Zhejiang Yuexiu University, Shaoxing, 312000, China

ABSTRACT

The digital intelligence transformation has profoundly reshaped the capability landscape of the accounting profession, necessitating an urgent paradigm shift in accounting education. However, current accounting instruction faces significant dilemmas, including an overreliance on “heavy-asset” specialized software, high barriers to technological adoption, and ineffective integration of core competencies. These challenges hinder the systematic development of students' ability to leverage intelligent technologies for solving complex accounting problems. To address these bottlenecks, this study draws upon an evolved TPACK framework to propose an innovative “lightweight integration” teaching paradigm. This approach advocates for the use of general-purpose generative AI as a low-threshold technological foundation, replacing expensive specialized educational systems. Through “minimally invasive” instructional design, it facilitates a dynamic and deep integration of Technological, Pedagogical, and Content Knowledge. The study constructs a comprehensive “Environment–Content–Process–Evaluation” integrated teaching model. Using the “Intelligent Audit of Original Vouchers and Risk Insight” module from Fundamental Accounting as a case study, it demonstrates the complete pedagogical chain from prompt design to “human-machine co-verification.” This model effectively lowers the economic and technical barriers to digital intelligence education, offering a theoretically self-consistent and cost-effective solution to the disconnect between technology and professional practice in accounting education reform.

KEYWORDS

Generative AI; Fundamental Accounting; TPACK; Lightweight Teaching; Human-Machine Collaboration; Accounting Professional Judgment

1. INTRODUCTION

The 14th Five-Year Plan for Accounting Reform and Development explicitly states that promoting the digital transformation of accounting is an inevitable choice for adapting to contemporary development [1]. Echoing this trend, corporate demand for accounting talent is accelerating its transition from traditional “record-keeping” roles to “digital intelligence decision support” functions. However, a significant “time lag” persists between university talent cultivation systems and frontier industry practices.

On one hand, existing teaching practices often fall into the trap of “technological instrumentalism” or blindly pursue expensive, complex intelligent financial shared services laboratories. This results in students learning merely to “click buttons” without comprehending the accounting logic behind data flows, leading to a decoupling of technological application from professional core knowledge. On the other hand, Fundamental Accounting, as an introductory course, aims to cultivate students' “debit-credit thinking” and “voucher awareness.” However, traditional instruction struggles to simulate the unstructured data processing scenarios found in real business environments. Consequently, students' perception of teachers' Technological Pedagogical Content Knowledge (TPACK) remains generally low, making it difficult to foster deep literacy in critically using AI tools and making independent professional judgments within intelligent environments [2]. This tension between “educational lag” and “industry advancement” directly leads to a disconnect between learning and application.

Evidently, simply adding software operation courses is insufficient to address these challenges. The core of educational transformation must shift from “technical operation” to “literacy construction”—specifically, cultivating an integrated AI literacy that fuses professional knowledge, technological command, and professional ethics through collaborative practice with intelligent systems. To this end, this paper proposes a new “lightweight integration” pathway based on the TPACK theoretical perspective. This pathway advocates returning to the essence of teaching by discarding reliance on high-cost specialized hardware. Instead, it focuses on the deep coupling of general-purpose generative AI tools (such as ChatGPT and ERNIE Bot) with refined instructional design to reconstruct the “low-threshold technology + higher-order thinking training” paradigm within the Fundamental Accounting course.

2. THEORETICAL EVOLUTION AND MODEL CONNOTATION: FROM “INTEGRATION BLOCKAGE” TO “LIGHTWEIGHT INTEGRATION”

2.1. Theoretical Perspective: Intergenerational Evolution and Applicability Challenges of the TPACK Framework in the AI Era

The TPACK (Technological Pedagogical Content Knowledge) framework, proposed by Mishra and Koehler (2006), has long been regarded as the core metric for evaluating teachers' technology integration capabilities, emphasizing the dynamic balance among Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK) [3]. However, in the practical field of traditional accounting information education, the application of the TPACK framework often encounters “integration blockage.” Teachers frequently rely excessively on tightly encapsulated ERP systems or financial simulation software, causing technology to become an external “shell” rather than an internalized cognitive tool. This phenomenon of “valuing the tool over its use” leaves technology and professional content in a detached state, failing to reach the deep logic of accounting judgment.

With breakthrough progress in Generative AI, the TPACK framework requires an intergenerational upgrade. Scholars such as Celik (2022) point out that AI is no longer merely a “tool” for assisting teaching but an “intelligent agent” capable of generating content and participating in interactions. The traditional TK dimension can no longer encompass the complexity of human-machine collaboration, leading to the new concept of Intelligent-TPACK [4]. Under this new perspective, technology integration in accounting teaching shifts from simple software operation training to the construction of a “Teacher–AI–Student” ternary collaborative smart teaching system. This provides firm theoretical legitimacy for introducing generative AI into Fundamental Accounting.

2.2. Connotation Definition: The “Lightweight Integration” Teaching Paradigm

Addressing the issues of high costs, high thresholds, and resource underutilization in traditional digital intelligence laboratory construction [3], this study proposes a “lightweight integration” teaching paradigm. While aligned with the philosophy of existing laboratory construction, this paradigm prioritizes inclusiveness and flexibility in its implementation path. Its core connotation involves reconstructing teaching across three dimensions—technological environment, knowledge integration, and capability orientation—using a general-purpose generative AI large model as the technological base combined with desensitized real enterprise data.

Specifically, in the technological environment dimension, the paradigm emphasizes a low-threshold access mechanism, utilizing cloud-based AI services to replace certain heavy, localized software, thereby significantly reducing implementation costs. As suggested by Li He (2025), using VR virtual training or simplified intelligent financial systems allows students to engage in high-fidelity immersive experiences at a low cost [5], a strategy that alleviates resource constraints and expands accessibility. In the knowledge integration dimension, the paradigm highlights dynamic interaction mechanisms, emphasizing the real-time interplay between technological elements and accounting rules within specific business scenarios (e.g., voucher auditing, report preparation). By introducing real cases and data, it guides students to analyze enterprise cost structures and capital flows, deepening their understanding of economic operation laws and cultivating comprehensive literacy for solving complex financial problems [6]. Furthermore, the paradigm orients the teaching focus toward higher-order thinking capabilities, shifting from simple operational training to deep training in “risk insight” and “decision support.” It utilizes AI to simulate complex economic environments and uncertain scenarios, training students' professional judgment and ethical control capabilities within a “human-machine collaboration” environment. This three-dimensional reconstruction not only embodies the dynamic balance principle of the TPACK framework but also offers a low-cost, high-efficiency practical pathway for accounting education transformation.

2.3. Path Characteristics: “Human-Machine Symbiosis” Practice Based on General Large Models

“Lightweight” does not imply a downgrade in teaching function but rather a “disintermediation” of technology application to restore the essence of accounting education. The specific implementation path of this paradigm is characterized by a shift from “black box operation” to “transparent interaction,” from “system dependence” to “human-machine collaboration,” and from “standard answers” to “risk insight.”

First, the shift from “black box operation” to “transparent interaction” addresses the issue where traditional financial software encapsulates accounting logic in the background, allowing students to see results but not processes. In contrast, the lightweight mode requires students to interact with AI using natural language and explicitly describe accounting business logic (Prompting). This process compels students to externalize tacit knowledge, deepening their understanding of accounting principles and bridging the gap between technical tools and professional cognition.

Second, the evolution from “system dependence” to “human-machine collaboration” breaks away from reliance on complex automated grading scripts or external plug-ins. Instead, it advocates establishing a structured Prompt Library where AI acts as a “virtual cashier,” “business counterparty,” or “simulated auditor,” while students act as “audit supervisors” to verify the compliance of AI-generated vouchers and ledgers. This dynamic division of labor enhances interaction depth and strengthens student agency in a symbiotic environment.

Finally, the sublimation from “standard answers” to “risk insight” skillfully leverages the potential “hallucinations” of generative AI. Teachers can design “correction-oriented” teaching scenarios, guiding students to identify and rectify erroneous entries or non-compliant documents generated by AI based on Accounting Standards for Business Enterprises. This cultivates professional values through “human-machine co-verification.” As noted by Liu Qin (2025), AI large language models may suffer from attacks like “data poisoning,” leading to manipulated outputs; thus, cultivating students' critical scrutiny of AI outputs aligns perfectly with the core value goal of “risk control” in financial digital intelligence transformation [7]. These three path characteristics not only reflect the dynamic deduction of the TPACK framework in the AI era but also provide operable, low-friction transformation strategies for accounting education.

3. CONSTRUCTION OF THE TEACHING MODEL

To prevent the integration of generative AI into Fundamental Accounting from remaining at the level of mere tool superimposition, and to address the tension between low-cost thresholds and high-quality education in the context of digital transformation, this paper constructs a four-dimensional integrated teaching model covering Environment, Content, Process, and Evaluation within the evolved TPACK theoretical perspective. This model uses general-purpose generative AI as a technological base and employs “minimally invasive” instructional design to facilitate the dynamic coupling of Technological, Pedagogical, and Content Knowledge, thereby shifting the teaching focus from “software proficiency” to “explicit accounting logic and professional judgment generation.”

3.1. Environment Dimension

The model emphasizes the construction of a replicable and sustainable teaching field. Its fundamental orientation is to utilize cloud-based or platform-oriented general generative AI services for convenient access, reducing reliance on specialized software, complex deployment, and high hardware investment. This lowers the entry threshold for curriculum digitalization at both institutional and resource levels. Regarding resource configuration, the combination of desensitized business data packets, sample voucher libraries, and common error libraries forms a supply of learning materials close to real business contexts. This strengthens coverage of unstructured information processing scenarios, compensating for the defects of traditional question banks in presenting real business complexity. Simultaneously, the environment dimension must embed clear academic integrity and data compliance boundaries, establishing requirements for AI usage transparency and evidence retention to ensure technology operates within ethical and normative frameworks.

3.2. Content Dimension

The model organizes the Fundamental Accounting knowledge chain based on the core principles of expressibility and verifiability of accounting thinking, restructuring it into capability-oriented modules. Compared to linear arrangements based on chapter lectures, lightweight integration emphasizes organizing learning tasks around key objects such as vouchers, ledgers, and reports. It transforms knowledge points into operable judgment problems and evidence problems, enabling students to realize the explicit construction of accounting rules, business substance, and processing logic through natural language expression and structured output. The key to content organization lies not in increasing the proportion of technical knowledge but in prompting students to continuously clarify debit-credit logic, account boundaries, and business consistency standards within the conversational context of generative AI. It encourages forming reasonable assumptions, supplementary evidence strategies, and risk identification frameworks under uncertain information conditions, thereby driving professional knowledge from rote memorization to understanding and transferability.

3.3. Process Dimension

The model advocates a problem-driven “Dialogue–Verification–Correction” cycle as the classroom operating mechanism, forming a learning flow aimed at closing the evidence chain. Teaching activities begin with business narratives, using situational materials to trigger students' initial judgments on information integrity and consistency. Subsequently, prompt design training develops students' problem formulation and task constraint capabilities, enabling them to translate professional intent into executable interaction instructions via role setting, rule constraints, and output format control. The process then enters the “human-machine co-verification" stage, where students must verify AI outputs item-by-item based on course-provided rule texts and material elements, clarifying what is proven and what is insufficient. Based on this, they complete necessary follow-up questioning, evidence supplementation, and correction. The educational value of this process lies in transforming AI output from an "answer" to an "object for review," driving students to develop critical usage capabilities through verifiability requirements, and deepening their understanding of accounting processing boundaries, risk sources, and the principle of professional prudence through error correction and reflection. To enhance transfer effects, the process dimension should utilize variable tasks for cross-situational training, enabling students to maintain a stable judgment framework amidst changes in industries, business conditions, and document forms, rather than relying on fixed templates or standard answers.

3.4. Evaluation Dimension

The model emphasizes consistency between evaluation metrics and capability objectives, promoting a shift in assessment from result-orientation to process- and judgment-orientation. Evaluation subjects should include not only the correctness of final entries or conclusions but also key dimensions such as Prompt Quality, Evidence Chain Quality, and Professional Judgment Quality. Prompt quality reflects students' mastery of problem definition, constraint setting, and follow-up strategies; evidence chain quality reflects their execution level regarding element verification, clause correspondence, logical consistency, and citation norms; professional judgment quality reflects their prudence, risk sensitivity, and ethical awareness under conditions of incomplete information and uncertainty. To prevent AI substitution, the evaluation design must implement AI usage transparency and process retention requirements, incorporating key interaction summaries, verification records, and correction bases into assignments or classroom outputs. This reinforces student accountability for conclusions and establishes "explainable, traceable, and reviewable" as the core standards for learning quality.

4. CONCLUSION

Based on the reconstruction trends of the accounting professional capability map in digital transformation, and addressing common problems in accounting teaching such as heavy asset reliance, high threshold constraints, and weak integration effectiveness, this paper proposes and refines a lightweight integration pathway for generative AI-empowered Fundamental Accounting teaching under the evolved TPACK theoretical perspective. By constructing a four-dimensional integrated teaching model of Environment, Content, Process, and Evaluation, general-purpose generative AI is positioned as a low-threshold technological base. Instructional design assumes the critical function of facilitating the deep integration of Technological, Pedagogical, and Content Knowledge, thereby achieving the goal of supporting higher-order thinking training and professional judgment cultivation at a lower cost. The core contribution of this model lies in elevating technology introduction from tool application to a learning process of evidenced judgment via a human-machine co-verification mechanism. This provides an implementation framework with theoretical self-consistency and universal replicability to alleviate the fragmentation between technology and professional knowledge in the transformation of accounting education.

REFERENCES

[1] Ministry of Finance. The "14th Five-Year Plan" for Accounting Reform and Development [Z]. 2021.

[2] Kuang, Y. Exploration of "Business-Finance-Data Integration" Teaching Reform in Accounting Majors Based on the TPACK Theoretical Framework [J]. Communication of Finance and Accounting, 2025(3): 162-166.

[3] Mishra, P., & Koehler, M. J. Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge [J]. Teachers College Record, 2006, 108(6): 1017-1054.

[4] Celik, I. Towards Intelligent-TPACK: An Empirical Study on Teachers' Professional Knowledge to Ethically Integrate Artificial Intelligence (AI) into Education [J]. Computers in Human Behavior, 2023, 138: 107496.

[5] Li, H., Zhang, P., Zhu, X., et al. Research on the Training Mode of Digital and Intelligent Accounting Talents Based on Practical Teaching [J]. Friends of Accounting, 2025(S2): 191-198.

[6] Mu, D. Teaching Reform of Accounting Courses in Universities under the Background of Digital Economy [J]. Journal of Shanxi University of Finance and Economics, 2025, 47(S2): 277-279.

[7] Liu, Q. The Key to the Implementation of Financial Digital and Intelligent Transformation: Application Scenarios [J]. Finance and Accounting Monthly, 2025, 46(20): 24-30.