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The Cultivation Pathway for Transferable Competencies in the Major of Big Data and Accounting: A Layered Contextualized Teaching Model Based on the CPA Competency Map

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Abstract: This study addresses the challenge of cultivating transferable competencies within Big Data and Accounting education. Traditional teaching methods struggle to develop these competencies cohesively amidst rapid technological and regulatory changes. To bridge this gap, the research proposes a layered contextualized teaching model grounded in the CPA Competency Map. This model systematically translates the Competency Map's seven core transferable competencies into practical pedagogy by designing progressively complex teaching scenarios aligned with cognitive development stages. These scenarios progress from foundational standardized tasks for basic skills to strategic scenarios featuring open-ended, unstructured strategic problems. This tiered approach ensures competency development evolves from concrete operations to abstract strategic thinking. In addition, this study analyzes the situation gradient control and the cognitive intermediary function of the teacher's role, which provides guarantee for the implementation of teaching strategies. The model offers a structured, industry-relevant pathway for transferable competency development, moving beyond knowledge-focused instruction to enhance graduate adaptability.

Keywords: contextualized teaching; transferable competency; Big Data and Accounting; CPA Competency Map

1. Introduction

The Big Data and Accounting program represents a distinct specialization within China's higher vocational education landscape. Operating amid rapid and continuous transformation in both information technology and the global business environment, this academic discipline faces an urgent imperative for substantial educational reform. The pervasive digitalization across industries has fundamentally shifted employer expectations, requiring accounting graduates to evolve beyond narrow, singular technical skills into multifaceted professionals equipped with integrated competencies and innovative capabilities. A growing tension exists within the traditional accounting education paradigm: curricula remain predominantly focused on technological proficiency and rely heavily on didactic, knowledge-transmission pedagogical approaches, which increasingly clash with the industry's demand for emerging skill sets.

This tension manifests across several critical dimensions. At the Knowledge System Level, the continuous evolution of accounting standards and the disruptive emergence of novel technologies-including big data analytics, blockchain, and artificial intelligence-necessitate educational content that is both dynamic and current. Traditional curriculum structures, by contrast, are often rigid and static, proving inadequate for the rapid integration and ongoing iteration of these new knowledge domains. At the Competency Cultivation Level, corporate demands for accounting professionals now extend far

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beyond technical knowledge, placing growing emphasis on soft skills such as leadership, cross-departmental collaboration, and strategic thinking. However, the absence of immersive practical components within conventional instructional methodologies hinders students' ability to develop systematic, integrated problem-solving capabilities necessary for addressing real-world complexities.

This core contradiction becomes particularly evident in the practical arena of curriculum development and delivery. Educators must navigate the dual challenge of preserving the integrity and depth of foundational courses, such as Financial Accounting, Management Accounting, and Auditing, while simultaneously incorporating emerging domains like data analytics, predictive modeling, and intelligent financial systems. The resulting tension between finite teaching resources—including time, faculty expertise, and infrastructure—and the relentless pressure to expand knowledge contributes to fragmented and often insufficient cultivation of transferable competencies among students.

The CPA Competency Map, developed by the Chartered Professional Accountants of Canada, provides an internationally validated framework to address this educational challenge. Its comprehensive structure delineates seven core transferable competencies, covering areas such as value creation, self-management, and leadership, and offers a robust conceptual foundation. Nevertheless, a methodological gap remains: translating these abstract competency requirements into concrete, actionable, and effective pedagogical practices requires careful design and innovative exploration [1].

Contextualized teaching methodologies hold significant potential as a bridge between theoretical knowledge acquisition and practical competency development. By constructing authentic teaching scenarios that mirror professional contexts, abstract competency requirements can be operationalized into observable behavioral sequences, enabling the integration of knowledge assimilation with the development of applicable skills. However, conventional implementations often remain superficial, limited to basic scenario simulations, and frequently lack systematic understanding of the developmental trajectories and cognitive principles underlying competency acquisition [2].

In response, this study proposes the development of a Layered and Progressively Contextualized Instructional Model explicitly grounded in the CPA Competency Map. The model is designed to facilitate a deep integration of the competency framework within Chinese higher vocational education for Big Data and Accounting [3]. It aligns with cognitive development principles while addressing the stratified demand for competencies ranging from foundational technical skills to advanced strategic capabilities. Ultimately, the model aims to enhance educational effectiveness and graduate outcomes, providing students with the comprehensive skills and competencies required for success in the evolving accounting and finance landscape.

2. Integration of the CPA Competency Map and Contextualized Teaching

2.1. Systemic Architecture of Transferable Competencies

The seven transferable competencies outlined in the CPA Competency Map form a sequential and logically progressive hierarchy, collectively constituting a sophisticated three-dimensional framework. This framework comprises a foundational value layer, an intermediate competency development stratum, and an outcome delivery dimension. Central to the entire structure is the meta-competency of Ethical Behavior and Professional Values, which establishes essential ethical boundaries and overarching cognitive orientation for all other competencies, ensuring professional actions operate within regulatory frameworks and generate demonstrable societal and organizational value.

Serving as the foundational underpinning of professional efficacy, Self-Management and Communication competencies support essential individual functioning within workplace environments. Self-Management emphasizes enhancing personal effectiveness through disciplined time allocation and strategic learning methodologies, while

Communication establishes the normative protocols required for successful professional interaction, forming the indispensable base upon which broader professional capabilities are systematically constructed.

The intermediate tier integrates the process-oriented competencies of Collaboration, Problem Solving, and Decision-Making. Collaboration addresses the dynamics of synergistic engagement among diverse professional actors, dismantling traditional functional barriers to facilitate the effective integration of knowledge across finance, operational management, and information technology domains. Problem Solving and Decision-Making guide learners in mastering analytical frameworks for addressing complex challenges, requiring sophisticated logical deduction and anticipatory risk assessment grounded in comprehensive data analysis. These competencies serve as the critical nexus bridging individual technical proficiency with broader organizational performance objectives.

At the apex of the hierarchy lie the advanced strategic competencies of Leadership and Value Creation. These high-order capabilities focus on generating strategic value at the organizational level. Leadership involves orchestrating resources effectively and providing strategic direction, while Value Creation reflects the practical ability to transform specialized professional knowledge into measurable commercial outcomes. This progression signifies a professional transition from executing defined technical tasks to assuming responsibilities inherent in strategic decision-making roles.

Viewed through the lens of cognitive development, this structured competency framework aligns closely with established educational principles. Foundational competencies correspond to the Application level, emphasizing fluency and reliable execution in standardized procedures. Intermediate process competencies align with Analysis and Evaluation levels, requiring the systematic synthesis and critical assessment of knowledge from multiple functional domains. Advanced competencies correspond to the Creation level, focusing on generating innovative solutions and strategic constructs within complex and ambiguous scenarios. This stratification imposes a pedagogical imperative: teaching contexts must follow a developmental spiral progressing from Concrete Operationalization to Structural Integration and ultimately Abstract Conceptualization. Instruction begins with simulations replicating discrete job tasks, advances through increasingly complex scenarios requiring cross-functional collaboration, and culminates in contexts centered on abstract business strategy formulation and executive decision-making. This calibrated progression mirrors the natural trajectory of cognitive maturation, evolving from direct experiential engagement to sophisticated abstract reasoning, and establishes a cognitive gradient aligned with sequential stages of professional competency acquisition.

2.2. Cognitive Transformation Enabled by Contextualized Pedagogy

Learning contexts function as the primary mechanism for cultivating professional competencies, and their design must adhere to cognitive science principles, particularly embodied cognition and constructivist learning theory. The effective development and transfer of competencies occur through three interconnected cognitive mechanisms, collectively forming a comprehensive transformation pathway.

The first mechanism, Embodied Cognitive Transformation, embeds symbolic representations of specialized knowledge, such as detailed accounting standards or audit protocols, within concrete actions required by authentic contextual tasks. Learners engage in structured role-playing exercises and hands-on procedural operations, forging direct neural linkages between specific actions and underlying cognitive schemas. This process transforms inert declarative knowledge into dynamic procedural knowledge, enabling the transition from passive theoretical awareness to demonstrable practical capability.

The second mechanism, Networked Knowledge Construction, emerges through contexts requiring genuine cross-domain collaboration. These settings generate cognitive

environments characterized by the interaction and fusion of heterogeneous knowledge streams. By actively assuming diverse functional roles across finance, operations, and technology, learners construct intricate mental maps of interconnected competencies. These associations go beyond additive combinations; through structural reorganization and optimization, discrete competency elements coalesce into an integrated network, enhancing problem-solving effectiveness and adaptability.

The third mechanism, Metacognitive Strategy Enhancement, is activated by confronting learners with ill-structured problem scenarios. Such complexity necessitates continuous deployment of metacognitive strategies, including contextual diagnosis, strategic evaluation, and outcome assessment. Through ongoing self-monitoring and reflective practice, learners transition from reliance on experiential reactions to rational, evidence-based decision-making. This mechanism fosters higher-order cognitive patterns, promoting a shift from mechanistic task execution to proactive creation, strategic foresight, and innovative solution generation.

3. The Layered Contextualized Instructional Model

Grounded in the hierarchical structure of professional competencies and the principles of cognitive progression, this study proposes a three-phase contextualized instructional framework. The model is conceptualized as Foundational Competency Establishment, followed by Integrative Competency Enhancement, and culminating in Strategic Capability Transition. It aligns rigorously with the stratified architecture of the CPA Competency Map. The model's core innovation lies in its precise calibration of instructional context granularity, facilitating the stage-appropriate emergence and refinement of targeted competencies. Foundational tier scenarios employ standardized design paradigms to provide focused training on discrete competency elements, embedding essential professional norms, such as data veracity and regulatory compliance, within replicable operational sequences. This approach ensures durable assimilation of professional ethics and mastery of fundamental technical skills. Enhancement tier scenarios introduce multi-dimensional conflicts and require authentic interdisciplinary collaboration, creating complex meso-level contexts characterized by diverse stakeholder perspectives and interdependent data ecosystems. Learners are guided to construct logical interconnections among previously isolated competencies, fostering a cohesive, internally networked structure essential for sophisticated problem-solving. The strategic tier leverages open-ended design principles to stimulate innovative competency synthesis and emergent strategic thinking. Learners engage with high-impact business challenges, such as complex merger and acquisition negotiations or enterprise-wide digital transformation initiatives, cultivating strategic foresight, visionary leadership, and the capacity to generate tangible organizational value. This tiered pedagogical architecture mirrors the evolutionary dynamic from Elemental Proficiency to Structural Integration to Functional Emergence, ensuring competency development maintains sharp, developmentally aligned focus while establishing vital linkages across the entire continuum. The model provides learners with optimally calibrated cognitive and practical support tailored to their evolving developmental trajectory.

3.1. Foundational Layer: Standardized Construction of Professional Cognition

Instructional activities in the foundational layer focus on instilling Ethical Behavior, Self-Management, and Foundational Communication. This is achieved through carefully designed scenarios confined to single functional domains, supporting standardized and replicable development of these fundamental competencies. Scenario design adheres to the Principle of Minimal Cognitive Load, minimizing extraneous complexity to focus attention on core skill acquisition. Critical cognitive and procedural decision nodes are isolated, including tasks such as verifying source document authenticity and accurately recording transactions within cash disbursements journals. Abstract professional norms

and ethical mandates are translated into explicit step-by-step behavioral protocols. For instance, in a simulated accounts payable scenario, embedded compliance rules require learners to perform ethical assessments during each transaction, questioning anomalies, verifying documentation, and upholding data integrity. Temporal structuring of sequences, such as daily reconciliation and monthly closing procedures, develops essential process control capabilities central to effective self-management. Foundational communication competency is embedded in scenarios replicating inter-departmental exchanges, such as explaining budget variances or requesting purchase requisition clarifications. By enforcing standardized financial terminology and structured communication formats, these exercises establish baseline paradigms for professional discourse, ensuring accuracy, clarity, and contextual appropriateness in organizational information transfer.

3.2. Enhancement Layer: Systematic Integration of Competency Networks

The enhancement layer emphasizes Collaboration, Problem-Solving, and Decision-Making capabilities. Scenarios at this stage demand authentic cross-departmental interaction, fostering richly interconnected competency networks. Moderate cognitive conflict is embedded by situating learners within complex, real-world business processes featuring competing priorities and divergent stakeholder goals, such as balancing sales growth initiatives with stringent finance cost controls. Learners assume distinct departmental roles and engage in iterative cycles of data sharing, collaborative brainstorming, and negotiation to reconcile conflicting objectives. This synthesis process integrates knowledge across financial accounting, management accounting, and information technology domains, forming dynamic Knowledge Collision Arenas. These contexts generate productive friction, compelling learners to confront contradictions, weigh trade-offs, and develop organizationally viable solutions. For example, during complex budget formulation simulations, learners must employ cost-benefit analysis and scenario modeling while leveraging communication and negotiation skills to achieve inter-departmental consensus. This dual focus ensures the integrated development of collaborative proficiency and strategic decision-making, reflecting their interdependent nature in professional practice.

3.3. Strategic Layer: Innovative Leap Towards Strategic Capability

The strategic layer focuses on cultivating Leadership and Value Creation. Learners engage with complex, dynamic business ecosystems designed to evoke advanced strategic competencies. Scenarios follow the principles of maximized cognitive openness and strategic ambiguity, presenting unstructured, information-rich challenges such as corporate acquisitions or enterprise-wide financial technology transformations. Learners autonomously form and lead interdisciplinary project teams, integrating expertise across accounting, legal, regulatory, and digital technology domains. High-stakes assignments require comprehensive commercial due diligence, sophisticated financial modeling under uncertainty, and holistic enterprise risk and opportunity assessment. For instance, in a digital finance transformation scenario, teams conduct scenario analyses to evaluate financial sustainability and strategic alignment of technology investments, negotiate divergent priorities between IT governance and business units, and formulate phased implementation plans with milestones, resource allocation, and risk mitigation strategies. These exercises cultivate executive capacities, including strategic vision articulation, organizational navigation, and mobilization of collective action. Value Creation competency emerges through the transition from data processing and reporting to generating actionable insights and measurable business outcomes, such as optimizing product line profitability, proposing operational improvements, or guiding strategic investment decisions. This process marks the professional evolution from a passive data

custodian to an active contributor in strategic decision-making and organizational value creation.

4. Implementation Safeguards for the Instructional Model

The successful operationalization of the layered contextualized teaching model necessitates robust implementation safeguards. The dynamic management of scenario complexity and the strategic transformation of the teacher's role are critical for aligning pedagogical practices with the developmental trajectory of learner competencies.

4.1. Strategic Calibration of Scenario Complexity Gradients

The dynamic modulation of contextual complexity stands as a critical operational imperative for the effective implementation of this model. This calibration must rigorously adhere to the foundational principle of Progressive Abstraction, thereby achieving an essential equilibrium between the necessary openness of problem spaces and learners' cognitive accessibility. This ensures precise alignment between scenario design and the developmental stage of learners' emerging competencies. Foundational tier scenarios maintain a deliberately High Degree of Structural Determinacy, quantified operationally at approximately 70%. This is achieved through explicit procedural guidance and unambiguous normative requirements, providing learners with clearly delineated cognitive pathways. This structured environment guarantees the systematic and disciplined formation of fundamental competencies, effectively preventing cognitive disorientation that could result from excessive ambiguity. Enhancement tier scenarios strategically reduce structural determinacy to approximately 50%. This deliberate reduction carves out essential space for conflict negotiation and strategic exploration, thereby stimulating learners' problem-solving capabilities within a bounded, supportive framework that maintains pedagogical manageability. Strategic tier scenarios operate with structural determinacy deliberately maintained below 30%. This intentional design choice creates highly open-ended problem landscapes specifically engineered to ignite strategic innovation and visionary thinking, while consciously avoiding the constraining effects of excessive scaffolding on creative cognition and emergent solution generation. This sophisticated gradient control mechanism consciously mirrors the natural progression of human cognitive evolution-advancing from initial Ordered Processing, through necessary engagement with Controlled Complexity, towards ultimate Generative Creation. Consequently, it ensures learners encounter developmentally appropriate cognitive challenges at each distinct phase, facilitating the systematic and measurable advancement of professional capabilities.

4.2. The Teacher's Transformative Role: Cognitive Mediation and Strategic Facilitation

The effective enactment of this model necessitates a fundamental transformation in the teacher's pedagogical identity: a shift from the traditional Knowledge Disseminator towards the dynamic role of a Competency Catalyst. In this redefined capacity, the teacher functions as an essential Cognitive Mediator, bridging the crucial gap between theoretical constructs and practical application, thereby directly facilitating the learner's competency development journey. This mediation manifests through three core, interrelated functions.

The first critical function is the Construction of Differentiated Cognitive Scaffolding. Applying the principles of Cognitive Apprenticeship, the teacher provides calibrated support tailored specifically to the demands of each contextual tier. For foundational layer scenarios, this entails supplying comprehensive operational manuals and explicit cognitive templates. These resources function as detailed blueprints, enabling learners to grasp and master essential procedural skills with confidence. Within enhancement layer contexts, the teacher shifts focus to providing integrative knowledge maps and robust analytical frameworks. These tools guide learners in navigating the complexities of cross-domain information, facilitating the synthesis of disparate knowledge strands into

coherent problem-solving strategies. At the strategic level, the teacher introduces sophisticated strategic thinking toolkits and innovation methodologies. These resources act as intellectual levers, empowering learners to grapple with ambiguity, envision future states, and formulate original strategic approaches. Collectively, this tiered scaffolding strategy equips learners with a progressively evolving Cognitive Toolkit, precisely calibrated to their developmental stage and the cognitive demands of the task at hand.

The second vital function is the Strategic Orchestration of Cognitive Conflict. The teacher deliberately employs Socratic questioning techniques to provoke deep cognitive engagement and critical reflection. Challenging inquiries such as "How would your proposed solution adapt if this underlying market assumption proved fundamentally flawed?" or "What alternative valuation methodologies could challenge the conclusions drawn from your initial model?" serve to destabilize simplistic reasoning. The teacher may also consciously adopt the role of a Constructive Adversary, systematically challenging learners' implicit assumptions, exploring potential blind spots, and presenting credible counter-arguments. This deliberate introduction of cognitive dissonance acts as a powerful Intellectual Catalyst, stimulating profound reflection, forcing cognitive reappraisal, accelerating cognitive iteration, and ultimately strengthening metacognitive capabilities.

The third essential function is the Data-Driven Modeling of Individual Competency Development. Grounded in the insights of Multiple Intelligences theory, the teacher engages in continuous Competency Profiling. This involves synthesizing multi-source assessment data-encompassing direct observation of performance within scenarios, analysis of reflective journals, peer feedback, and formal assessment outcomes - to construct personalized Competency Heatmaps for each learner. Based on this granular diagnostic understanding, the teacher designs and delivers highly targeted, personalized intervention strategies and tailored developmental pathways. This sophisticated approach ensures precision in competency cultivation efforts, moving beyond generic instruction to provide bespoke developmental guidance. It effectively generates a Personalized Competency Development Roadmap for every learner, guaranteeing that each individual receives the specific support needed to maximize their growth potential from their unique starting point, thereby optimizing educational outcomes across diverse learner profiles.

5. Conclusion

To effectively enhance the adaptability of Big Data and Accounting graduates in navigating an era of constant change, this research proposes a layered contextualized instructional model grounded in the CPA Competency Map. This model provides a robust methodological framework specifically designed for the systematic cultivation of transferable competencies. By integrating theoretical insights from cognitive psychology, educational systems theory, and related disciplines, the study elucidates the intrinsic mechanisms governing the stratification of transferable competencies and their critical alignment with corresponding instructional contexts. This synthesis forms a cohesive, cross-theoretical analytical framework, thereby enriching the theoretical underpinnings of Big Data and Accounting education.

At the practical level, this paper offers a tangible and effective pathway to address the persistent issue of the "disembodiment of competency cultivation" within contemporary accounting education. It advocates for a significant paradigm shift, moving professional competency development away from reliance on experiential tradition towards a foundation firmly rooted in scientific pedagogy and evidence-based instructional design. Future research endeavors could productively extend this work by incorporating analyses of diverse regional business practices. This would facilitate a deeper exploration of the model's cross-cultural applicability and adaptation, potentially broadening its scope for implementation and fostering further innovation across varied

educational landscapes. Through sustained theoretical refinement and ongoing empirical investigation, this instructional model holds considerable promise for delivering increasingly sophisticated solutions for developing accounting professionals equipped to meet the complex demands of the digital age. Ultimately, it aims to propel the educational standards and outcomes of the Big Data and Accounting discipline towards new heights of excellence and relevance.

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