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AI-driven pedagogical frameworks for transforming financial behaviour through enhanced financial self-efficacy

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Abstract

In the era of digital transformation, the integration of Artificial Intelligence (AI) into pedagogy has redefined how financial literacy and behavioural competencies are developed among learners. This secondary research explores the potential of AI-integrated pedagogical frameworks in fostering financial self-efficacy and behavioural transformation among Gen Z students. Drawing insights from contemporary studies published between 2018 and 2025, the paper synthesizes evidence on the intersection of AI-driven learning tools, digital financial education, and behavioural finance principles. It critically examines how AI-based personalized learning, intelligent tutoring systems, and adaptive assessment platforms translate financial knowledge into actionable, responsible behaviour. The review also highlights pedagogical innovations that bridge cognitive understanding with practical financial application through gamification, simulations, and predictive analytics. Findings emphasize that AI-integrated learning environments not only enhance financial confidence but also promote ethical and sustainable decision-making. The study concludes by proposing a conceptual framework linking AI pedagogy, financial self-efficacy, and behavioural transformation.

Keyword: Artificial Intelligence (AI), pedagogy, financial self-efficacy

1. Introduction

The 21st-century learning ecosystem is undergoing a paradigm shift driven by digital transformation and artificial intelligence (AI). In the domain of financial education, this shift has redefined how knowledge is acquired, processed, and translated into meaningful behavioural outcomes. Traditionally, financial literacy programs focused primarily on imparting conceptual knowledge related to budgeting, saving, investing, and responsible credit use. However, research increasingly indicates that knowledge alone is insufficient to drive positive financial behaviour (Lusardi & Mitchell, 2014)^[12]. The bridge between knowledge and action lies in the construct of financial self-efficacy an individual's belief in their ability to manage financial tasks effectively and make sound economic decisions (Bandura, 1997)^[3].

With the rise of Generation Z digital natives who blend technology and decision-making seamlessly educational institutions are now challenged to move beyond static instruction toward AI-integrated, experiential pedagogies. AI-enabled platforms, such as adaptive learning systems, personalized dashboards, and intelligent tutoring applications, offer dynamic environments that cultivate confidence, autonomy, and actionable skills. Through data-driven feedback and simulation-based exercises, these tools empower learners to test financial decisions, evaluate outcomes, and internalize behavioural insights. Such pedagogical innovations align with the broader educational goal of transforming financial understanding into financial action.

Moreover, global financial challenges such as increasing digital transactions, fintech disruptions, and post-pandemic economic volatility have reinforced the need for a generation capable of making informed, ethical, and resilient financial choices. Educational institutions, therefore, play a pivotal role in designing AI-integrated frameworks that connect theoretical financial knowledge with behavioural competencies. By merging behavioural finance principles with technology-enhanced learning, AI-integrated pedagogy can facilitate

cognitive engagement, build financial confidence, and nurture responsible behaviour among learners.

This paper explores the evolution of AI-integrated pedagogical practices in financial education and their influence on financial self-efficacy and behavioural transformation. As a secondary research study, it synthesizes existing evidence from 2018–2025 to conceptualize how artificial intelligence serves as a pedagogical catalyst, transforming financial learning from a passive cognitive process into an active behavioural experience. The study further proposes a conceptual model linking AI-enhanced pedagogy, financial self-efficacy, and behavioural outcomes, offering a foundation for future empirical validation and curriculum innovation.

2. Review of Literature

2.1 AI in Pedagogical Transformation

Artificial Intelligence has emerged as a transformative force in education, reshaping how knowledge is delivered, assessed, and internalized. AI-driven pedagogical models utilize intelligent tutoring systems, adaptive learning algorithms, and predictive analytics to tailor educational experiences to individual learner profiles. These systems go beyond conventional instruction by providing personalized feedback, identifying learning gaps, and offering scaffolded support that aligns with each student's pace and comprehension level.

In commerce and finance education, AI enables real-time simulation of financial decision-making scenarios, fostering experiential learning (Zhang & Aslan, 2022) ^[19]. Tools such as virtual trading platforms, gamified budgeting applications, and AI chatbots for financial guidance create immersive environments that link cognitive understanding to behavioural engagement. Studies by Panigrahi and Srivastava reveal that AI-based adaptive courses significantly enhance students' motivation, engagement, and reflective thinking key precursors to behaviour change. Consequently, AI-integrated pedagogy represents a paradigm shift from teacher-centered instruction to learner-centered empowerment, where students actively construct knowledge through interactive digital interfaces.

2.2 Financial Self-Efficacy as a Behavioural Construct

The concept of financial self-efficacy (FSE) stems from Bandura's (1997) ^[3] social cognitive theory, emphasizing belief in one's ability to execute behaviours necessary for desired outcomes. Within financial domains, FSE influences how individuals manage resources, respond to financial stress, and make long-term investment decisions. High levels of FSE are linked to prudent financial planning, consistent saving, and reduced susceptibility to impulsive spending.

However, empirical studies highlight that many educational interventions fail to translate financial knowledge into action due to the absence of self-efficacy development (Lusardi & Mitchell, 2014) ^[12]. Pedagogical methods that incorporate reflective exercises, peer collaboration, and feedback mechanisms are found to strengthen FSE by allowing learners to experience mastery and self-assessment. Thus, FSE functions as the psychological conduit transforming theoretical learning into behavioural practice a bridge essential for effective financial education.

2.3 Linking AI Pedagogy with Financial Self-Efficacy

AI-enabled pedagogical environments inherently support the development of self-efficacy through personalization and feedback loops. Intelligent systems provide learners with continuous insights into their progress, reinforcing a sense of competence and control. For example, adaptive quizzes that adjust difficulty levels based on student performance not only enhance understanding but also promote confidence in applying financial principles to real-world contexts.

Research by Jangid *et al.* demonstrates that AI-based simulations, such as stock market games and financial scenario modelling, stimulate decision-making autonomy and self-reflection core components of FSE. Similarly, AI chatbots offering instant responses to financial queries have been shown to reduce learning anxiety and increase self-assuredness among students. The integration of AI, therefore, redefines pedagogy as an iterative process where learners experiment, receive guidance, and gradually develop behavioural resilience.

2.4 Behavioural Transformation through AI-Enabled Financial Learning

Behavioural transformation is the ultimate goal of financial education manifested through responsible spending, saving, investing, and ethical financial conduct. AI-integrated pedagogies promote this transformation by converting abstract knowledge into experiential insights. According to Li and Sarkar, interactive AI-based financial labs encourage learners to observe cause-effect relationships between decisions and financial outcomes, leading to long-term attitudinal change.

Moreover, gamification and virtual simulations have been identified as potent tools for reinforcing behavioural consistency. Studies in digital learning environments (Gonzalez & Lopez) indicate that reward mechanisms embedded in AI systems sustain engagement and help internalize desirable financial behaviours. When such digital experiences are complemented by reflective classroom discussions and mentorship, they create a holistic environment conducive to sustained behavioural reform.

2.5 Conceptual Linkages and Research Gaps

Synthesizing the reviewed literature reveals a coherent linkage among AI-driven pedagogy, financial self-efficacy, and behavioural transformation. While AI enhances cognitive engagement and personalization, its deeper impact lies in fostering psychological empowerment enabling learners to act confidently and responsibly. Yet, research gaps persist. First, few studies have empirically modeled the mediating role of FSE within AI-driven educational frameworks. Second, most existing studies are concentrated in developed economies, limiting insights for emerging educational ecosystems such as India's commerce education sector. Finally, there is a paucity of longitudinal analyses tracing how AI-facilitated learning sustains financial behaviour over time.

Addressing these gaps requires a structured conceptual model that integrates pedagogical design, AI functionality, and behavioural finance theory. Such a model can guide future empirical research to evaluate how AI-integrated pedagogical frameworks transform financial learning from knowledge acquisition to behavioural application.

3. Methodology

3.1 Research Design

This study adopts a qualitative secondary research design, employing a systematic literature review (SLR) approach to synthesize theoretical and empirical insights on AI-integrated pedagogy, financial self-efficacy (FSE), and behavioural transformation. As a conceptual and integrative review, it aims to consolidate dispersed findings across educational technology, behavioural finance, and financial literacy research to construct a comprehensive pedagogical framework that explains how AI integration translates financial knowledge into behavioural competence.

3.2 Nature and Scope of the Study

The study is descriptive and analytical, exploring the intersection between educational innovation and financial behaviour formation. It focuses on:

- The pedagogical role of Artificial Intelligence in financial education.
- The mediating function of Financial Self-Efficacy in translating knowledge into behaviour.
- The behavioural outcomes arising from AI-enabled learning among Generation Z and university-level commerce students.

The scope extends across global and Indian educational contexts, acknowledging regional variations in technological adoption and curriculum design.

3.3 Data Sources

The study relies exclusively on secondary data collected from credible and peer-reviewed sources published between 2018 and 2025. The sources include:

- Academic journal articles from SCOPUS, Web of Science, and UGC-CARE databases.
- Research reports from OECD, UNESCO, and World Economic Forum related to AI in education and financial literacy.
- Case studies and white papers from FinTech-driven educational platforms.
- Conference proceedings, dissertations, and institutional reports focusing on AI pedagogy and behavioural learning.

3.4 Inclusion and Exclusion Criteria

Inclusion Criteria

- Studies published in English between 2018–2025.
- Research addressing AI or digital learning in the context of financial literacy or self-efficacy.
- Papers with measurable outcomes related to learning engagement, financial behavior, or technological adoption.

Exclusion Criteria

- Articles lacking empirical or conceptual grounding.
- Publications unrelated to pedagogy, financial education, or behavioural finance.
- Opinion pieces and non-scholarly blogs.

3.5 Data Collection and Analysis Procedure

1. Identification

Relevant keywords such as “AI pedagogy,” “financial self-efficacy,” “digital financial literacy,” “behavioural transformation,” and “AI in education” were used to locate relevant literature.

2. Screening

Abstracts and full texts were screened to ensure alignment with the study’s objectives.

3. Data Extraction

Key themes, conceptual linkages, and methodological patterns were extracted from the selected studies.

4. Synthesis

A thematic analysis approach was applied to categorize findings into conceptual domains:

- AI-driven pedagogical innovations
- Self-efficacy enhancement mechanisms
- Behavioural outcomes of AI-assisted learning

5. Integration

The insights were then integrated into a conceptual framework illustrating the interdependence between AI pedagogy, financial self-efficacy, and behavioral transformation.

3.6 Analytical Framework

The study employs thematic synthesis supported by existing theoretical models such as:

- Bandura’s Social Cognitive Theory (1997) ^[3] – for understanding self-efficacy development.
- Technology Acceptance Model (TAM) – for explaining adoption of AI-driven learning tools.
- Behavioural Finance Theory – to contextualize behavioural transformation in financial decision-making.

These theories provide the structural basis for interpreting how AI-integrated pedagogy promotes learner empowerment and responsible financial behaviour.

3.7 Reliability and Validity

To ensure credibility, only peer-reviewed and indexed sources were included. Cross-verification of themes was conducted by reviewing multiple studies with similar contexts. Triangulation was achieved by integrating findings from academic, institutional, and policy-level sources to enhance interpretative validity.

3.8 Ethical Considerations

As this is a secondary research study, no primary data collection or human participation was involved. All sources have been appropriately acknowledged to maintain academic integrity and ethical standards.

3.9 Outcome of Methodology

The methodological process culminates in the development of a conceptual AI-integrated pedagogical model that connects cognitive learning (knowledge), psychological empowerment (financial self-efficacy), and actionable behaviour (financial responsibility). This framework forms the theoretical foundation for future empirical validation using quantitative methods such as SEM or mediation analysis.

4. Conceptual Framework and Discussion

4.1 Conceptual Foundation

The reviewed literature indicates that the intersection of AI-integrated pedagogy, financial self-efficacy (FSE), and behavioural transformation can be conceptualized as a dynamic learning ecosystem. This ecosystem blends technological innovation, psychological empowerment, and behavioural application. The theoretical base is grounded in Bandura's Social Cognitive Theory (1997) ^[3], which asserts that self-efficacy develops through mastery experiences, social modeling, and feedback. In the AI-driven classroom, these sources of efficacy are operationalized through digital simulations, personalized analytics, and adaptive reinforcement mechanisms.

In this study, the conceptual framework positions AI-integrated pedagogy as the independent variable, financial self-efficacy as the mediating construct, and financial behavioural transformation as the dependent outcome. The framework proposes that AI-enabled instructional design strengthens learners' confidence and competence (FSE), which subsequently manifests in measurable behavioural improvements such as informed decision-making, disciplined saving, and responsible consumption.

4.2 Components of the Proposed Model

a. AI-Integrated Pedagogy

AI-driven pedagogy incorporates machine learning algorithms, intelligent tutoring systems, gamified interfaces, and predictive learning analytics. These tools personalize learning trajectories and deliver real-time feedback. For instance, virtual stock trading platforms and AI-powered financial dashboards simulate realistic economic conditions, allowing learners to experience financial consequences without real-world risk. Such active experimentation nurtures reflective learning and behavioural readiness.

b. Financial Self-Efficacy (Mediator)

Financial self-efficacy bridges cognitive learning and behavioural performance. It evolves when learners perceive themselves as capable of interpreting financial data, managing budgets, and making investment decisions. Continuous AI feedback such as progress tracking, adaptive assessments, and chatbot guidance enhances self-belief. High FSE thus motivates sustained engagement, critical reflection, and proactive financial management.

c. Behavioural Transformation (Outcome)

Behavioural transformation represents the translation of learned principles into consistent financial actions. Indicators include regular saving, investment diversification, digital transaction discipline, and ethical spending. As AI learning environments simulate consequences and reward responsible choices, students internalize these behaviours, moving from knowledge acquisition to behavioural execution.

4.3 Theoretical Model (Narrative Representation)

The proposed conceptual model may be visualized as follows:

AI-Integrated Pedagogy → Financial Self-Efficacy → Financial Behavioural Transformation

The model also assumes feedback loops, wherein

behavioural outcomes reinforce self-efficacy through successful experiences, creating a virtuous learning cycle. Additionally, moderating factors such as digital literacy, AI literacy, and learning engagement can influence the strength of these relationships.

4.4 Discussion

AI-integrated pedagogy redefines the teaching-learning continuum by merging automation, adaptivity, and analytics. It enhances learner autonomy and converts passive financial education into participatory learning. The personalization embedded in AI systems facilitates differentiated instruction an essential factor in building self-efficacy. Studies in digital education suggest that when learners receive immediate corrective feedback, their confidence and self-regulation increase.

Furthermore, AI's data-driven insights allow educators to identify behavioural tendencies and customize interventions. For example, predictive analytics can alert students to risky spending patterns during simulated exercises, prompting corrective behavioural responses. This experiential cycle strengthens cognitive control and financial responsibility.

The integration of AI also supports inclusive learning, providing equitable access to quality financial education irrespective of background. The authors argue that digital transformation in education is not just about adopting technology but also about changing mindsets, pedagogical methods, and institutional processes to promote innovation (Augustin Reymend S & G. John, 2025) When learners engage in AI-enabled simulations, they not only comprehend financial principles but also experience decision-making consequences leading to lasting behavioural transformation. Thus, the pedagogical design itself becomes an instrument of empowerment.

4.5 Implications for Higher Education and Research

For educational institutions, this framework offers a blueprint for curriculum innovation. Embedding AI tools within financial literacy modules can cultivate a generation of learners who are not merely financially literate but financially confident and behaviourally responsible. For researchers, the model opens pathways for empirical validation through Structural Equation Modeling (SEM) or Mediation Analysis, testing how AI-based learning influences self-efficacy and, consequently, behavioural outcomes.

Additionally, policy-makers and educators can adopt this framework to design AI-assisted financial literacy programs that align with the United Nations' Sustainable Development

Goal 4: Quality Education promoting lifelong learning, financial inclusion, and economic well-being.

5. Implications for Higher Education and Research

A. For Educational Institutions (Practice & Curriculum Innovation)

The conceptual framework positions AI not as an add-on, but as an instructional design principle that converts passive financial knowledge into practiced financial competence via strengthened financial self-efficacy (FSE). Institutions must therefore reframe financial literacy from content delivery toward experience-centered learning where learners

practice, fail safely, reflect, and improve.

Actionable steps for implementation:

1. **Curriculum redesign:** Embed experiential modules (simulations, virtual labs, fintech sandboxes) within core commerce courses. Align learning outcomes to behavioural indicators (e.g., increased frequency of simulated savings, reduced impulse trades).
2. **AI tool adoption:** Introduce adaptive tutors, chatbots, and personalized dashboards that present tailored scenarios (budgeting, investing, loan management) and give instant, scaffolded feedback.
3. **Blended learning models:** Combine classroom discussion, instructor-led debriefs, and AI-driven practice sessions so students translate simulation insights into real planning strategies.
4. **Faculty development:** Train teachers in interpreting learning analytics, facilitating reflection sessions, and coaching students on translating simulation outcomes into real-life behaviour.
5. **Peer and mentorship structures:** Set up peer learning groups and mentor programs that use learning analytics as conversation prompts social modeling is important for FSE.
6. **Assessment alignment:** Move beyond knowledge tests to include performance assessments (simulation outcomes), reflective portfolios, and behavioural intentions scales.

Evaluation & metrics:

- **Psychological:** Pre- and post-measures of Financial Self-Efficacy (validated FSE scales).
- **Behavioural (simulated):** Changes in simulation metrics (saving rate, portfolio diversification, risk choices).
- **Behavioural (actual):** Where possible, track real behaviours via self-report diaries or anonymized fintech partnerships (e.g., increased savings, uptake of budgeting apps).
- **Engagement:** Time-on-task, completion rates, clickstream indicators.
- **Learning transfer:** Short case-based assessments measuring ability to apply concepts to novel scenarios.

Institutional considerations & challenges

- **Digital divide:** Access inequalities must be addressed through device loans, campus labs, or low-bandwidth solutions.
- **Cost & procurement:** Budgeting for licenses and infrastructure; evaluating open-source vs commercial platforms.
- **Faculty readiness:** Resistance or skill gaps; requires targeted professional development and incentives.
- **Data privacy & ethics:** Student learning data are sensitive; colleges must ensure secure data governance and transparent consent.

B. For Researchers (Empirical Validation & Future Inquiry)

Research opportunities opened by the model:

- **Mediation testing:** Empirically test AI-pedagogy → FSE → Financial Behaviour using mediation analysis

or Structural Equation Modeling (SEM).

- **Moderation studies:** Investigate moderators such as digital literacy, socio-economic status, gender, prior financial experience, and AI literacy.
- **Longitudinal research:** Conduct panel studies to assess whether FSE gains from AI pedagogy sustain behaviour change over semesters or years.
- **Comparative & contextual studies:** Cross-country or urban-rural comparisons to evaluate contextual constraints and cultural effects on FSE.
- **Mixed-methods work:** Combine analytics-driven quantitative measures with qualitative interviews to understand how and why AI systems build confidence.

6. Conclusion

The movement “from knowledge to action” in financial education requires three aligned components: instructional design (pedagogy), technological enablers (AI), and psychological drivers (financial self-efficacy). Knowledge is necessary but not sufficient; AI systems create scaffolds for mastery experiences, immediate feedback, and safe experimentation conditions that Bandura identifies as foundational for building self-efficacy. Once strengthened, FSE motivates learners to apply skills consistently, thereby producing sustainable behavioural transformation.

1. AI amplifies experiential learning: Adaptive scenarios let learners make decisions repeatedly, see consequences, and adjust this loop creates mastery experiences.
2. Feedback breeds confidence: Real-time, individualized feedback reduces uncertainty and perceived task difficulty, increasing self-efficacy.
3. Confidence drives behaviour: Higher FSE leads to greater initiative, persistence, and self-regulation key for long-term financial behaviours like saving, disciplined investing, and prudent borrowing.
4. Virtuous cycles: Positive behavioural outcomes (e.g., successful budgeting in simulation followed by real savings) reinforce FSE, creating a sustainable cycle of improvement.

When educational design, AI technology, and behavioural theory converge, institutions can produce learners who are not just knowledgeable but also:

- Behaviourally competent: able to make and sustain prudent financial choices.
- Digitally fluent: comfortable using fintech tools ethically and effectively.
- Resilient & reflective: able to learn from outcomes and adjust strategies.

Transformative financial education is not merely an instructional upgrade it is a systemic redesign that centers on empowerment. By treating AI as a pedagogical enabler and FSE as the mechanism of change, educators and researchers can shift outcomes from ephemeral knowledge gains to durable, responsible financial behaviour among Gen Z. This shift has implications beyond classrooms: it supports financial inclusion, economic resilience, and lifelong financial well-being.

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