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**Research Article**

# Toward Curriculum–Industry Alignment in FinTech Education: A Conceptual Framework Linking Digital Competence and Critical Thinking at Changchun Sci-Tech University, China

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**ABSTRACT**

This conceptual paper introduces a scenario-based, competency-driven framework to improve the curriculum–industry alignment of FinTech education at Changchun Sci-Tech University, China. Drawing on Core Competency Theory, Competency-Based Education, and the CIPP evaluation model, the study examines how critical thinking and digital competence—as key student competencies—serve as strategic inputs for curriculum design. It emphasizes that integrating these skills into academic programs is essential for aligning higher education with the evolving demands of the FinTech industry. The paper outlines methodological considerations for future empirical validation and contributes to the ongoing discourse on curriculum reform by offering theoretical, practical, and policy-level insights into preparing graduates for the digital economy in China.

**Keywords:** Digital competence, Critical thinking, Curriculum–industry alignment, FinTech education, Competency-Based Education.

## Introduction

### *Background and Context*

Financial Technology(FinTech) has revolutionized the global financial system as new generation technological innovations like blockchain, big data, artificial intelligence (AI), cloud computing and digital payment systems have been integrated into various forms of financial services. As a result, this evolution has led to a major redefining of what is expected of finance professionals. In light of this evolution, higher education providers, especially those offering finance, economics and management programs, are increasingly pressured to adjust their curricula to correspond to the changing demand (Liu & Li, 2024; Stoica et al., 2023).

FinTech companies have thrived in China, with strong digital infrastructure, a regulatory environment that encourages innovation, and high rates of digital adoption among consumers all contributing. Consequently, the country has emerged as a world leader in FinTech development (Chen et al., 2022). But this swift evolution of industry creates a conundrum for higher education. Conventional curricula tend to stay static while being full of theoretical models and traditional teaching practices that are somewhat behind real life innovation. As a result, the divide between industry needs and what academia is able to produce has further widened (Xu et al., 2024).

Central to this concern is the ability to emerge FinTech programs to instill key student competencies that reflect industry needs. Among these, digital competence — the capacity to leverage digital tools meaningfully — and critical thinking skills — the ability to analyze, evaluate and practicalize solutions to complex problems— have emerged as core skills for success in the financially retooled world. In addition to supporting students' academic growth, these competencies play a crucial role in employability, adaptability in the workplace, and lifelong learning (Braslavska & Ozerova, 2022; Wu et al., 2024; Lee et al., 2025).

In this context, Changchun Sci-Tech University, a key institution in Northeast China, makes a timely and relevant case in point for rethinking curriculum design. As the university deepens its engagement with applied disciplines in finance and technology, it must also confront the challenge of ensuring that its curricula match the rapidly changing landscape of talent needs in the FinTech sector. Doing so necessitates a clearer understanding of how mandatories of the student competencies relate to curriculum relevance and responsiveness (Yang, 2022; Zhang et al., 2024).

In addition, as national reforms have called for a stronger emphasis on digital literacy and artificial intelligence (AI) within classroom instruction, the government's focus on technology-integrated education is anticipated to expedite institutional shifts (China Ministry of Education, 2025; Xu & Montgomery, 2024).

### *Problem Statement*

Despite growing recognition of the need for curriculum reform in Chinese universities, there remains a significant disconnect between university curricula and FinTech industry expectations. Traditional education models continue to emphasize theory over application, focusing on legacy content while underrepresenting the technological and cognitive competencies required in modern finance roles. As a result, students are often ill-equipped to meet the skill demands of FinTech firms, which prize not only domain knowledge but also digital literacy, adaptability, and analytical acumen (Luo, 2023).

Digital competence is becoming more important but not widely embedded in all undergraduate courses. These include skills from involve coding and programming for FinTech, so digital tools, platforms, or project-based learning environments that mimic the real world of FinTech applications are rarely integrated into many of the courses (Li, 2024; Zhang et al., 2024). For instance, although critical thinking is considered a 21st century skill (McCabe et al., 2019), the majority of instructional approaches towards teaching a subject remains exam-oriented, hindering deeper inquiry, problem-solving and interdisciplinary reasoning (Huang & Wu, 2020; Wu & Pan, 2019).

Adding to the challenge is the absence of a clear framework for assessing how student competencies mapped against electronic learning are aligned with industry needs. Most curriculum reforms are about updating content or meeting accreditation requirements, and little focus is given to how well graduates' skills align with industry needs. It is imperative that we move beyond generalized, systemic improvements to the curriculum and towards models that drive alignment of the curriculum according to competencies instantiated in students.

This challenge is particularly pronounced at universities like Changchun Sci-Tech University, where job market-related programs in the FinTech sector are still nascent yet must refocus and be directed in fashions that both predict current employment opportunities as well as prepare students for digital transformation trajectories in the future. Unless such actionable frameworks establish strong links from competency development to curriculum alignment, reform efforts may tend to become superficial and ineffective (Dong & Yin, 2019; Zhang & Tlili, 2024).

### *Significance of Study*

As such, this conceptual paper provides theoretical and practical contributions to the continued conversation around curriculum reform in FinTech education, especially within the higher education context in China. On a

theoretical level, the research connects the fields of students' competency development and curriculum alignment by developing a framework that integrates Core Competency Theory, Competency-Based Education (CBE), and CIPP evaluation model. These integrated perspectives underscore the importance of student outcomes—as not just end goals, but strategic inputs that should inform curriculum design.

Framing digital competence and critical thinking as mutually constitutive terms, this paper adds to ongoing discussion around the shaping of perceived and real value in higher education curricula through distinctive 21st century skills. It adds to a growing body of research that supports curriculum model that are nimble, industry-responsive, and student-centered.

From a practical perspective, the study provides conceptual instruments for curriculum designers, university administrators, and education policies to assess as well as improve the suitability of academic programs to the requirements of the FinTech labor market. As Changchun Sci-Tech University works to expand its role in the landscape of China's era of digital education, the findings from this paper could provide insight into how to incorporate high-impact competencies into curricula and how to build sustainable linkages between universities and industry.

In essence, this article justifies this broader aim of improving Chinese university graduate skills, agility, and critical capacity for work in the FinTech workforce and through them to contribute productively to China's innovation-sensitive economy.

### *Research Objectives*

This conceptual paper focuses on understanding how specific student competencies influence the alignment between university curricula and the evolving needs of the FinTech industry. The study is guided by the following two objectives:

- To examine the role of digital competence in influencing curriculum–industry alignment at Changchun Sci-Tech University.
- To identify the role of critical thinking in influencing curriculum–industry alignment at Changchun Sci-Tech University.

### *Research Questions*

Based on these objectives, the paper addresses the following research questions:

- How does digital competence influence curriculum–industry alignment in the context of FinTech education at Changchun Sci-Tech University?
- What is the role of critical thinking in shaping curriculum–industry alignment at Changchun Sci-Tech University?

## Literature Review

### *Digital Competence in Higher Education*

Digital competence encompasses the knowledge, skills, attitudes, and behaviours needed to use digital technologies for work, learning, and participation in society. In the context of higher education, it includes the competencies to locate, organize, assess, and create information in digital spaces, as well as the ability to communicate and collaborate in the digital world. The Digital Competence framework of the European Commission defines five basic areas of digital competence: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. These skills are recognized more and more as key in helping students move forward in the digital field of workplaces today.

In the context of higher education, integrating digital competence into curricula has become a priority. A study by Fidalgo-Blanco et al. (2021) analyzed the extent to which digital competence was embedded in the curricula of 40 bachelor's degree programs at a Catalan university. The findings revealed that technical degrees had higher levels of digital competence integration, highlighting the need for a more uniform approach across disciplines. Moreover, the digital competence of educators plays a crucial role in fostering students' digital skills. A large-scale analysis of educator self-assessments based on the Digital Competence in Education framework, including teachers from various global and national contexts, has revealed considerable variability in digital proficiency levels, emphasizing the necessity of continuous professional development to enhance teaching effectiveness and learning outcomes (Cabero-Almenara et al., 2021). In China, this urgency is echoed in recent efforts to adapt and validate the Digital Competence in Education framework for higher vocational and technical institutions, where educators' digital competencies were found to be essential for modernizing teaching practices (Yuayuan et al., 2024). The Chinese Ministry of Education has also formalized a national digital literacy framework for educators, mirroring Digital Competence in Education levels, to guide and assess teachers' digital readiness (Dou & Zhao, 2023). Integrating digital skills into university curricula is now considered vital not just for equipping students with essential competencies, but also for ensuring that educational outcomes remain aligned with the dynamic demands of the FinTech sector and China's broader digital economy.

### *Critical Thinking in Higher Education*

Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information to reach an informed conclusion. It is a foundational skill in higher education, enabling students to engage deeply with content, question assumptions, and develop well-reasoned arguments.

Critical thinking skills have long been valued as an essential attribute of higher education graduates. Critical thinking skills are crucial for students to address and solve complex problems and make decisions (Elder & Paul, 2007). This study should all want the students to be independent thinkers and lifelong learners and promoting critical thinking is one of the fundamental purposes of education. Embedding critical thinking into the curriculum does not happen by chance but through purposeful instructional design. According to a study conducted by the Center for Excellence in Teaching and Learning at the University of Connecticut, this creates a need for educators to be equipped with the tools to create and maintain a learning environment that pushes students to not only evaluate information with scrutiny but also to analyze it. This includes integrating active learning methods that enhance higher-order thinking skills, such as problem-based learning and reflective writing (Wu & Pan, 2019).

Ensuring students' critical abilities have been emerged in the educational-vital of China. However, rote memorization-oriented traditional teaching methods are obstacles for this goal (Zhang, 2017). In response, Chinese HEIs will pursue pedagogical reforms that promote analytical thinking and problem-solving in line with FinTech skills that industry needs (Jiang, 2020).

### *Curriculum–Industry Alignment*

Curriculum–industry alignment signifies the extent to which educational programs fulfill the present and emerging demands of the labor market. This alignment guarantees that graduates have the necessary competencies sought by employers in improving employability and economic productivity (Rizal et al. 2023).

FinTech education is undergoing enormous changes to meet the fast-paced nature of the sector, so aligning curricula with what companies are looking for is a necessity. Literature has underscored the need for the curricula to be flexible and incorporate emerging technologies and practices to ensure relevance (Animashaun et al., 2024; Chen et al., 2019).

There are efforts being made in China to facilitate this link between academic programs and industry needs. Among these are the co-development of courses between universities and FinTech companies, placements in internships or internships that examine the relationship between teaching content and practice (Chen et al., 2019).

The CIPP (Context, Input, Process, Product) evaluation model is a valid and reliable framework for examining and enhancing curriculum–industry alignment. A curriculum audit also assists educators to examine gaps in a curriculum and make data-driven improvements of the curriculum pertaining to context (industry needs), input (curriculum content), process (teaching methods), and product (graduate outcomes) to ensure that curricula remain responsive to the shifting FinTech industry landscape (Liu, 2020; Rizal et al., 2023).

## Theoretical Framework

This conceptual paper is grounded in three interrelated theories that support the relationship between digital competence, critical thinking, and curriculum–industry alignment: Core Competency Theory, the CIPP Evaluation Model, and Competency-Based Education (CBE). Together, these frameworks provide the theoretical foundation for exploring how essential student competencies can inform and improve curriculum relevance within the context of FinTech education at Changchun Sci-Tech University.

### *Core Competency Theory (Prahalad & Hamel, 1990)*

Prahalad and Hamel (1990) developed the idea of 'core competencies' in the business field, arguing that a competitive advantage is gained through capabilities that are difficult for competitors to replicate. In educational contexts, this theory has been modified to give greater emphasis to the identification and cultivation of core learner competencies that meet the needs of the workforce.

In the context of this study, core competency theory suggests that enhancing student digital competence and critical thinking are fundamental skills that higher education institutions need to nurture to adapt and prepare for future FinTech employer demand. These are not simply academic skills, but rather professional competencies that will directly enhance the value of students' employability and ability to flourish in the complex, technology-driven environments they will face. Therefore, the reason for this is the importance of both variables as company understands the significance of coordinating its course with industry expectation which is rightly justified by core competency theory.

### *Competency-Based Education (CBE)*

Competency Based education (CBE) is a learner centered instructional model that arranges curriculum around explicitly defined competencies coming from real-world needs. Instead of time-based progress (e.g., credit hours), CBE emphasizes mastery of the knowledge, skills, and abilities necessary for professional practice (Le, Wolfe, & Steinberg, 2014).

In this paper, CBE serves as the justification for the inclusion of digital competence and critical thinking as principles in curriculum design. These competencies are far from random academic outcomes; rather they are discipline-specific competencies that have been carefully aligned to industry norms in the FinTech space. CBE offers the opportunity to improve the fluency of curriculum to better align its effectiveness (and, thus, applicability to industry) in the event that students can demonstrate proficiency in such competencies. This is because CBE provides a connection in the causal pathway from student competencies (IVs) to curriculum–industry alignment (DV).

### *CIPP Evaluation Model*

The CIPP model—Context, Input, Process, and Product—is one of the most widely used frameworks in educational evaluation. Developed by Daniel Stufflebeam, it emphasizes systematic, data-informed evaluation of

educational programs for continuous improvement (Madaus, 1983).

In this study, the CIPP model is applied to assess Curriculum–Industry Alignment, the dependent variable. The model offers a structured lens for evaluating:

- **Context**: Are the curriculum goals aligned with FinTech industry needs?
- **Input**: Do the resources and teaching methods address digital and critical thinking competencies?
- **Process**: Are teaching strategies fostering student mastery of targeted skills?
- **Product**: Are students graduating with the competencies expected by FinTech employers?

By applying the CIPP model, this study establishes a comprehensive mechanism to evaluate how the presence (or absence) of digital competence and critical thinking among students contributes to the curriculum's relevance and responsiveness to industry demands.

***Integrative Perspective***

Together, these three theories provide a coherent and robust foundation for the proposed conceptual framework. Core Competency Theory identifies what students need, CBE explains how curriculum should be structured around those needs, and the CIPP model provides a way to evaluate how well the curriculum aligns with those competencies.

This theoretical integration supports the central proposition of this paper: that strengthening digital competence and critical thinking among students is a key pathway to achieving curriculum–industry alignment in FinTech education.

**Conceptual Framework**

The conceptual framework of this study is designed to illustrate the proposed relationships between the key constructs: Digital Competence and Critical Thinking (Independent Variables), and Curriculum–Industry Alignment (Dependent Variable). This framework draws from the theoretical foundations established by Core Competency Theory, Competency-Based Education (CBE), and the CIPP Evaluation Model, each of which underpins how student competencies can influence the design, relevance, and effectiveness of university curricula in a rapidly evolving digital and financial landscape.

The framework proposes that the development of two key student competencies—digital competence and critical thinking—plays a foundational role in improving how well a university's curriculum aligns with FinTech industry needs. These competencies are viewed as both essential learning outcomes and strategic educational priorities.

- Digital competence enables students to engage with emerging financial technologies, interpret and manipulate digital data, and use platforms such as blockchain or AI-based tools—all of which are core expectations in the FinTech sector.
- Critical thinking equips students with cognitive flexibility to analyze complex problems, challenge assumptions, and innovate—skills highly valued in dynamic, tech-driven industries.

The framework suggests that by embedding these competencies into the curriculum, institutions like Changchun Sci-Tech University can enhance the alignment between their academic offerings and the requirements of the FinTech labor market. This alignment is assessed across the four dimensions of the CIPP model:

- **Context** (alignment with market needs),
- **Input** (curricular resources and strategies),

- **Process** (teaching practices and learning activities), and
- **Product** (student outcomes).

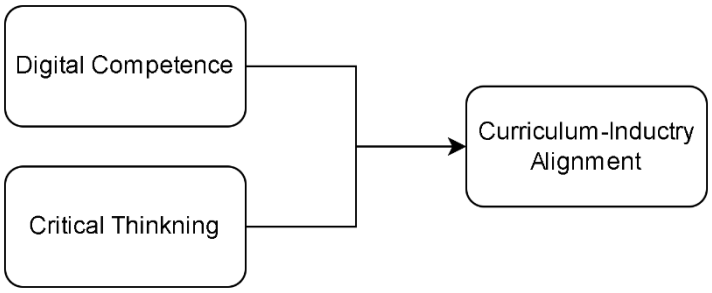


Figure 1. Conceptual Framework

**Sources:** Author's own work

## Methodology

It should be noted although the study is conceptual, but it presents a theoretical model for empirical testing and validation. To understand the experiences of university students with respect to FinTech-related curriculum–industry alignment, a future study could employ a quantifiable, cross-sectional research design to explore the impact of digital competence and critical thinking among university students specifically at Changchun Sci-Tech University.

### *Research Design*

A deductive research approach would be appropriate, allowing hypotheses derived from the conceptual framework to be empirically tested. The study could utilize survey-based design, collecting data through a structured questionnaire targeting undergraduate students enrolled in finance, business, and technology programs.

### *Population and Sampling*

The target population consists of third and fourth years at the Changchun Sci-Tech University, who are assumed to have learnt core parts of their program and gained some insights about industry related competencies. At the level of sampling, you can employ a stratified random sampling so that the collected participants can be generalized across different programs or faculties that are related to FinTech.

### *Measurement of Constructs*

Digital Competence could be measured according to established scale such as the scales established based on the DigComp 2.2 framework (Vuorikari et al., 2022), capturing competencies from areas such as data literacy, digital communication, and content creation.

Critical Thinking was measured by employing validated instruments, such as the California Critical Thinking Skills Test (CCTST) or the Critical Thinking Disposition Scale (CTDS).

Curriculum–Industry Alignment, could be computed by average ratings of Likert-scale items adapted from well-established curriculum evaluation frameworks, e.g. the CIPP model (Stufflebeam, 1983), assessing student perceptions of curriculum relevance for their career path, required learning outcomes, and applied skill development.

### *Data Analysis*

Analyses such as descriptive and inferential statistics (i.e., regression analysis or Structural Equation Modeling) might help to examine the strength and direction of the relationships between the independent variables (i.e., digital

competence and critical thinking) and the dependent variable (i.e., curriculum–industry alignment). CFA was also used to validate the measurement model.

## Implications and Contributions

This conceptual paper provides a timely and significant contribution to a discussion regarding the reimagination of curriculum development within higher education, especially within the domain of FinTech education in China. This study provides a multi-dimensional view with relevance for theory, practice, and policy by proposing a framework which reasonably contextualizes digital competence and critical thinking as a critical enabler to curriculum–industry alignment. These implications are especially relevant to universities like Changchun Sci-Tech University that are grappling with mounting demands for digitalization and industrial relevance in their degree programs.

### *Theoretical Contributions*

The paper makes a theoretical contribution by developing an integrated competency-alignment model that relates micro individual-level competencies to macro systemic curriculum design. Against the backdrop of Core Competency Theory, the paper potentializes student competencies beyond desirable outputs of educational processes, exploring their role as input for the design of curricula that properly reflects the demands of the knowledge economy.

In addition, utilizing CBE principles in an editorial framework allows for a greater responsiveness of curriculum and an opportunity, as demonstrated in this piece, to challenge the static, institution-centric paradigm of curriculum as designed only by institutions. Rather, it stresses that a dynamic, iterative process in which curriculum content, pedagogy and learning outcomes are co-developed in response to changing demands on the workforce is needed.

Using the CIPP model as an evaluation framework provides further theoretical strength by illustrating how curriculum–industry alignment can be measured along the dimensions of context, input, process and product. From a theoretical perspective, this augments the existing inklings of knowledge by providing a pragmatic conceptual architecture that has the potential to inform empirical inquiry and programming in practice-oriented fields like Financial Technology (FinTech).

### *Practical Implications*

From the perspective of practice, the study provides practical implications for educators and curriculum designers and university leaders, especially those who are engaged in implementing technology into business and finance education. With digital competence and critical thinking as median capabilities, the model proposed provides a clear rational to rethink course content, teaching strategy, and assessment methods.

Such framework is conducive to drive the delivery of experiential learning approaches like project-based learning, experimental learning, real-world simulation, and inter-disciplinary experiential modules ultimately integrated with technology which would lead to digital agility and analytical thinking at Changchun Sci-Tech University and other such entities who are aspiring to venture on the FinTech skill mapping. Module-based learning also facilitates industry collaboration (in the form of internships, expert lectures and co-designed curriculum modules) which addresses the gap between academic training and applied practice.

It also facilitates the construction of faculty development programs to provide instructors not only with content knowledge but also the pedagogical methods to develop these key skills among students.

## Future Research Directions

As this paper outlines a conceptual model without testing its validity in real-world situations, this paper encourages future studies to validate and build upon the model proposed here. Qualitative studies with

undergraduate students in FinTech-oriented programs at Changchun Sci-Tech University and other institutions throughout China could provide empirical evidence about the relationships among digital competence, critical thinking, and curriculum–industry alignment. Researchers can further explore the strength and direction of these associations and assess explanatory power using standardized instruments and statistical modeling methods, like Structural Equation Modeling (SEM).

In addition to empirical validation, future research may identify and explore moderating or mediating factors affecting the relationship between student competencies and the alignment of the curriculum. These factors (e.g., institutional support, faculty digital literacy, or learning motivation, etc.) may further influence the extent to which curricula can be adapted to reflect labor market needs. Comparative analysis in multiple universities, regions, or academic disciplines would further shed light on the generalizability and adaptability of the model.

Lastly, scholars might explore using the framework to study other emerging fields undergoing rapid digital transformation—like health technology, digital marketing, or education for artificial intelligence. Such an effort would not only challenge the generalizability of the model across contexts but would fulfil a global movement toward contextualizing curriculum reform in higher education systems.

## Conclusion

The purpose of this conceptual paper was to propose a framework relating digital competence and critical thinking to curriculum–industry alignment in the context of FinTech education at Changchun Sci-Tech University. Using Core Competency Theory, Competency-Based Education and the CIPP Evaluation Model (Context, Input, Process, Product) the study found that in order to adequately align curricula with industry needs that focus must be on key student competencies rather than a content update.

As such, the framework positions learners' digital and cognitive skills as drivers of the relevance of curriculum, providing both theoretical basis and practical pathway to curriculum reform. It urges educators and policymakers to integrate competency development into the core of the curriculum, so students are better prepared to thrive in fast-moving digital economies.

Though conceptual, the model sets the stage for future empirical research and contributes to ongoing efforts to make higher education more responsive, skill-driven, and industry-aligned.

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