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# Validating a Multidimensional Financial Literacy Model for Thai Pre-Service Teachers

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## Abstract

Financial literacy is increasingly recognized as a multidimensional competency essential for both individual well-being and societal development. Despite global progress, validated instruments tailored to teacher education remain scarce, particularly in developing contexts such as Thailand. This study develops and validates a comprehensive financial literacy measurement instrument for Thai pre-service teachers, grounded in the OECD/INFE tripartite framework of knowledge, behavior, and attitude. Using a quantitative design, data were collected from 350 pre-service teachers enrolled in Group 3 institutions designated by Thailand's Ministry of Higher Education. The instrument underwent expert validation (CVI) and confirmatory factor analysis (CFA) using AMOS. Results demonstrated excellent model fit indices (CFI = 0.96, TLI = 0.94, RMSEA = 0.08, RMR = 0.04), strong factor loadings (0.63–0.91), and robust reliability and validity measures (CR = 0.956, AVE = 0.880). Findings confirm that financial literacy among pre-service teachers is best conceptualized as a multidimensional construct, with behavior and attitude contributing as strongly as knowledge. This validated tool offers theoretical contributions by extending financial literacy measurement into teacher education, practical value by providing an assessment model for curriculum design, and policy relevance by aligning with Thailand's national teacher standards and OECD benchmarks. The study addresses critical measurement gaps and provides a foundation for comparative and longitudinal research, positioning financial literacy as a core competency in teacher preparation and educational reform.

**Keywords:** Financial Literacy, Pre-Service Teachers, Confirmatory Factor Analysis, Measurement Validation

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## 1. Introduction

The growing complexity of the global economy has transformed financial literacy from an abstract concept into a day- to-

day survival skill. In our own work with pre-service teachers, we often heard them speak candidly about their struggles with student loans, impulse spending, or the pressure to send money home to support their families. Such stories highlight that financial literacy is not only about numbers on a page but also about the attitudes and behaviors that shape meaningful decisions for long-term well-being (Knoll & Houts, 2012; Lusardi & Mitchell, 2011; Remund, 2010; Xiao & Porto, 2017). International organizations, including the OECD and the World Bank, have repeatedly recognized financial literacy as a foundation for economic resilience, inclusive growth, and social stability (OECD/INFE, 2020, 2023).

Teachers occupy a unique position in this landscape. They are not only facilitators of knowledge but also role models whose everyday financial behaviors may influence their students. As financial education becomes more visible in school curricula worldwide, society increasingly expects teachers to guide young people toward financial responsibility (Amagir et al., 2017; Johnston-Rodriguez & Henning, 2019; Schindler & Cardona, 2023; Way & Holden, 2009). This dual role makes it critical for teacher education programs to foster solid knowledge, positive attitudes, and responsible habits among pre-service teachers (Compen, De Witte, & Schelfhout, 2020; Schindler & Cardona, 2023).

Thailand's context makes this challenge urgent. National surveys consistently reveal weaknesses in saving behavior, debt control, and budgeting among youth and university students (Bank of Thailand, 2022; Channak et al., 2022; Intaprot et al., 2023). While a National Strategy for Financial Literacy exists (Atkinson & Messy, 2012), its translation into teacher education has been uneven.

To address this, the Teachers' Council of Thailand revised its accreditation standards in 2024, requiring 21st-century competencies such as financial literacy, digital literacy, and ethical reasoning in teacher preparation programs (Teachers' Council of Thailand, 2024). These reforms recognize that teachers must be prepared for a world where financial choices are increasingly complex and digitally mediated. Yet persistent deficits in financial literacy still affect individuals and communities, reinforcing cycles of debt and economic vulnerability (Lusardi & Mitchell, 2011; Xiao & Porto, 2017). The OECD stresses that financial literacy equips individuals with tools for informed decisions, effective risk management, and active participation in society (OECD/INFE, 2023).

Evidence also suggests that well-designed interventions can change financial behavior, particularly during transitional life stages such as adolescence and young adulthood (Kaiser & Menkhoff, 2017). For teacher education institutions, this means curricula must go beyond theory to embed financial responsibility as a tangible learning outcome. Achieving this requires instruments that are not only statistically valid but also meaningful within the lived realities of pre-service teachers.

Similar levels of methodological rigor have been reported in other fields. For instance, Hidayat et al. (2024) validated an instrument measuring engagement among Generation Z students during online mathematics classes, using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Rasch analysis. Citrawan et al. (2024) applied a mixed-methods design with CFA and Structural Equation Modeling (SEM) to examine special education teachers' literacy and numeracy assessment competencies, integrating local wisdom into instrument design. These studies demonstrate that context-sensitive validation is both feasible and valuable. Importantly, these methodological precedents underscore the importance of robust validation in education research an approach this study applies directly to financial literacy in teacher education.

Building on this foundation, the present study develops and validates a financial literacy measurement model specifically tailored for Thai pre-service teachers. Drawing on the OECD/INFE framework, financial literacy here is conceptualized through three dimensions: knowledge, behavior, and attitude. The CFA was employed to test the structure and ensure that the instrument accurately represents the realities observed among pre-service teachers (Hair et al., 2019; Nopembri & Sugiyama, 2021). This study provides not just a psychometrically reliable tool but also one that reflects Thailand's cultural and educational context. By doing so, it contributes to curriculum reforms, informs teacher education policy, and strengthens national strategies for financial literacy in education.

## 2. Research Method

### 2.1. Research Design

This study adopted a quantitative design to construct and validate a financial literacy model for Thai pre-service teachers. We selected this approach because it allowed us to examine latent constructs and to test how observed indicators reflect deeper, unobservable competencies. The SEM was particularly appropriate, as it enabled us to connect statistical evidence with what we observed in classrooms and during pilot testing (Hair et al., 2019).

The research unfolded in three stages. First, we analyzed existing documents to extract core components of financial literacy and generate candidate indicators. Second, a panel of experts reviewed the items using the Content Validity Index (CVI), ensuring that each item was both theoretically sound and practically relevant. During this stage, experts provided feedback such as "students may misinterpret compound interest items," which led us to adjust wording. Finally, we subjected the refined model to the CFA in AMOS, using fit indices including Goodness-of-Fit Index (GFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA) (Brown, 2015; Byrne, 2016). CFA was chosen not only for its statistical rigor but also for its ability to verify whether the model truly matched the lived experiences of participants. Convergent validity was examined with Composite Reliability (CR) and Average Variance Extracted (AVE) following Fornell and Larcker's (1981) recommendations.

## 2.2. Theoretical Framework Development

The framework drew on both global and Thai literature, centering on the OECD/INFE tripartite model knowledge, behavior, and attitude. These three domains represent the building blocks of sound financial decision-making (OECD/INFE, 2016, 2020, 2023; Atkinson & Messy, 2012). International evidence links them with personal well-being and economic stability.

We synthesized post-2020 research conducted in the aftermath of the COVID-19 pandemic to confirm the model's suitability for the Thai context (Bank of Thailand & National Statistical Office of Thailand, 2022; Channak et al., 2022; Inlakorn, 2020; Intaprot et al., 2023; Khanitcharongkul, 2023; Nuansomsri & Boonkrong, 2023; Penrattanahiran, 2024; Sirisak et al., 2024; Treepoonpon et al., 2023; Wongsrikaew et al., 2022). These recent studies consistently highlighted gaps not only in basic concepts such as inflation or diversification but also in financial behaviors like budgeting and saving, and in attitudinal aspects such as long-term planning. Drawing on these insights, we operationalized the OECD/INFE tripartite model into seven to eight candidate indicators per dimension. This approach not only ensured theoretical alignment but also reflected the cultural realities of Thai pre-service teachers, many of whom balance academic responsibilities with part-time employment and family obligations intensified by post-pandemic economic pressures.

## 2.3. Instrument Development

Guided by the framework, we designed an initial pool of 25 items: 8 for knowledge, 7 for behavior, and 8 for attitude. These items were adapted from OECD/INFE guidelines but modified with classroom language familiar to Thai pre-service teachers. Responses were rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

An expert panel of five two financial education specialists, two psychometricians, and one teacher educator evaluated the instrument. Content Validity Index (CVI) scores were computed for the Item-level Content Validity Index (I-CVI) and the Scale-level Content Validity Index (S-CVI) (Polit & Beck, 2006). Interestingly, one expert suggested that behavior items be reduced because students might overstate positive habits when self-reporting. Based on this and other feedback, the instrument was refined to 18 items: 8 for knowledge, 4 for behavior, and 6 for attitude. This refinement process strengthened theoretical alignment while avoiding redundancy (DeVellis, 2016; Haynes et al., 1995).

## 2.4. Participants

Participants were Thai pre-service teachers enrolled in Group 3 institutions designated by the Ministry of Higher Education, Science, Research and Innovation (MHESI, 2022) as Local or Community Development Universities. These institutions are tasked with promoting regional equity, which made them ideal sites for this study.

Purposive sampling yielded 350 participants from northeastern Thailand. Inclusion criteria required that students (a) be currently enrolled in a teacher education program, (b) study in a Group 3 institution, and (c) consent voluntarily. The sample size exceeded the 200 minimum recommended for CFA (Hair et al., 2019) and fell within the optimal range of 300–500. Many participants were first-generation university students, which shaped not only their responses but also their reflections on financial challenges. Several mentioned during informal conversations that they often felt unprepared to manage loans or monthly expenses.

## 2.5. Data Collection Procedures

Data were collected in the second semester of 2024 via an online questionnaire distributed through Google Forms. We chose this format because students were preparing for practicum placements and reported limited time for in-person surveys. Before completing the questionnaire, participants were briefed on research objectives, confidentiality, and their right to withdraw at any stage. Several students later expressed relief that the online format reduced pressure and allowed them to respond thoughtfully in their own time.

## 2.6. Data Analysis Strategy

Data analysis was performed with AMOS and SPSS. We first screened for missing values, checked normality, and assessed multicollinearity. Missing data amounted to less than 2% of responses and were handled using listwise deletion, ensuring minimal bias in the CFA results. CFA was then used to evaluate the hypothesized three-factor model. Model fit was examined using multiple indices GFI, NFI, TLI, CFI, RMSEA, and RMR reflecting best practice in SEM (Byrne, 2016; Hu & Bentler, 1999; Kline, 2015). Convergent validity was confirmed through factor loadings, CR, and AVE, while discriminant validity followed Fornell and Larcker's (1981) guidelines. This multi-step process ensured that the instrument was not only statistically valid but also resonant with the context in which it was applied.

## 3. Results and Discussion

Preliminary analysis confirmed the dataset's suitability for the CFA. As shown in Table 1, the Kaiser-Meyer-Olkin (KMO) value was 0.937, exceeding the 0.90 threshold and thus considered "marvelous" (Kaiser, 1974). Individual Measures of Sampling Adequacy (MSA) ranged from 0.847 to 0.969, surpassing the recommended minimum of 0.50 (Hair et al., 2019). Bartlett's Test of Sphericity indicated a highly significant result,  $\chi^2(153) = 6282.835$ ,  $p < .001$ , confirming that the correlation matrix was not an identity matrix and that sufficient inter-item correlations existed. Taken together, these results verified that the dataset was statistically appropriate for CFA, supporting the methodological rigor of the study (Field, 2017; Tabachnick & Fidell, 2013).

These preliminary findings set the stage for testing the hypothesized three-factor structure of financial literacy. The CFA confirmed that the model, consisting of knowledge, behavior, and attitude, was both statistically robust and theoretically coherent. As depicted in Figure 1, the three dimensions converge into a higher-order construct of financial literacy. The visual

model clearly shows the balance between cognitive, behavioral, and attitudinal components, helping stakeholders understand that financial literacy is not confined to theoretical knowledge alone.

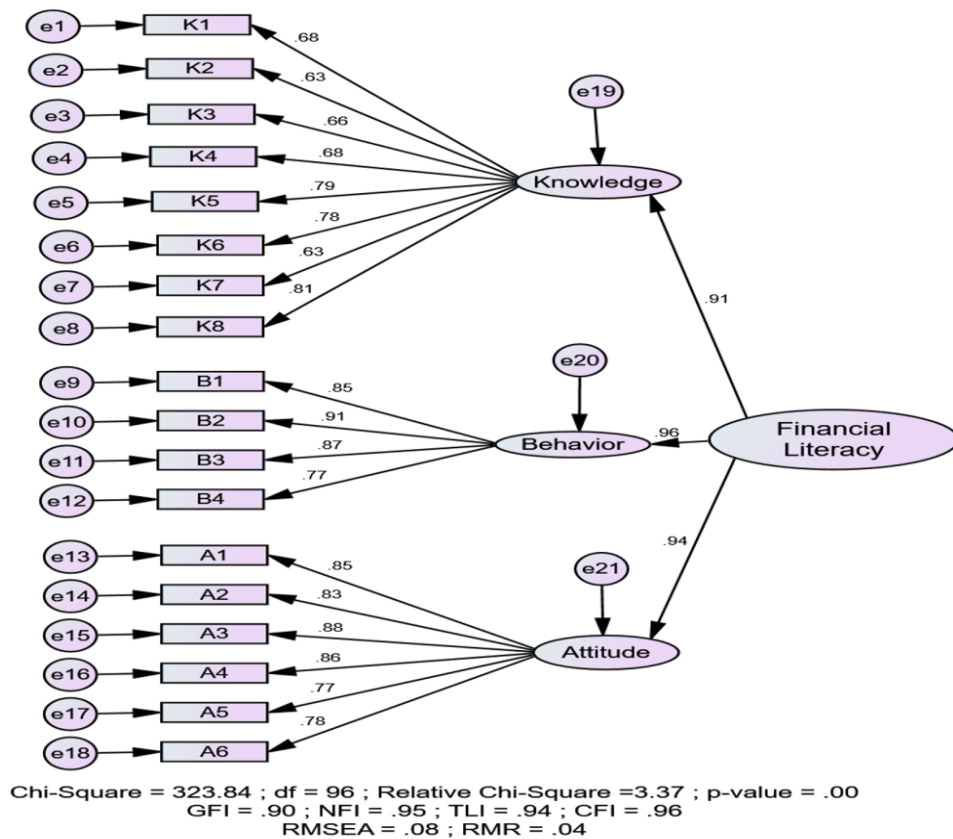
**Table 1. KMO and Bartlett’s Test of Sphericity for CFA Data Suitability**

Test		Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.937
Bartlett’s Test of Sphericity	Approx. Chi-Square	6282.835
	Degrees of Freedom	153
	Significance	.000

The chi-square statistic for the model was 323.84 with 96 degrees of freedom, yielding a relative chi-square of 3.37. Ratios between 1 and 5 are generally considered acceptable (Hair et al., 2019; Schumacker & Lomax, 2012), suggesting that the discrepancy between the hypothesized model and the observed data is within a tolerable range. Although the chi-square test was statistically significant ( $p < .001$ ), Byrne (2016) emphasizes that this result is common in studies with large samples, since even trivial differences can produce significant chi-square values. Hence, chi-square should not be interpreted in isolation.

To address this limitation, researchers typically rely on multiple indices that capture different dimensions of model adequacy. The GFI value of 0.90 indicates that the proposed model sufficiently reproduces the observed covariance matrix. Incremental indices, including the NFI = 0.95 (Bentler & Bonett, 1980), the CFI = 0.96, and the TLI = 0.94, all exceed the conventional cutoff of 0.90 and approach the more rigorous threshold of 0.95 recommended by Hu and Bentler (1999). Error-based indices provide further support: the RMSEA = 0.08 falls within the “reasonable fit” range (Browne & Cudeck, 1992; Kline, 2015), while the Root Mean Square Residual (RMR = 0.04) indicates minimal residual variance. Altogether, the indices provide strong evidence that the financial literacy measurement model achieves a satisfactory to excellent fit, thereby reinforcing its theoretical validity and empirical robustness.

Figure 1 provides a clear visual summary of these results. The regression weights from the three first-order constructs to the second-order financial literacy factor were 0.91 for knowledge, 0.96 for behavior, and 0.94 for attitude. What stands out here is the slightly stronger contribution of behavior and attitude compared to knowledge. This challenges the traditional emphasis on financial knowledge as the sole foundation of literacy, a perspective common in earlier Thai studies. Instead, our findings align with international work (Kaiser & Menkhoff, 2017) while also adding local nuance: in Thailand, cultural expectations of family support and high household debt make behavioral discipline and attitudinal resilience just as critical as factual knowledge.



**Figure 1. Financial Literacy Model for Pre-Service Teachers**

Factor loadings, presented in Table 2, ranged from 0.63 to 0.91, surpassing the 0.50 benchmark (Hair et al., 2019). Knowledge items loaded between 0.63 and 0.81, with strong contributions from Economic Basics (K8 = 0.81) and Retirement Planning (K5 = 0.79). These findings underscore the importance of foundational economic literacy and long-term planning an area often overlooked in Thai classrooms but critical for financial stability. Behavior items produced even stronger loadings (0.77–0.91), with Income and Expense Management (B2 = 0.91) emerging as the most influential. This reflects what many students shared during data collection: they struggled to balance part-time income with daily expenses, making budgeting a central skill. Attitude items ranged from 0.77 to 0.88, led by Spending Restraint (A3 = 0.88) and Long-Term Financial Perspective (A4 = 0.86). These highlight the role of self-control and future orientation, both of which are particularly relevant in a cultural context where students often face pressure to support their families financially.

**Table 2. Constructs, Items, Factor Loadings**

Construct	Items	Factor Loadings
Knowledge	K1. Income and Expense Management	0.68
	K2. Savings	0.63
	K3. Investments	0.66
	K4. Debt Management	0.68
	K5. Retirement Planning	0.79
	K6. Risk Management and Insurance	0.78
	K7. Digital Finance Knowledge	0.63
	K8. Economic Basics	0.81
Behavior	B1. Financial Planning Behavior	0.85
	B2. Income and Expense Management Behavior	0.91
	B3. Savings Behavior	0.87
	B4. Investment Behavior	0.77
Attitude	A1. Financial Responsibility	0.85
	A2. Savings Orientation	0.83
	A3. Spending Restraint	0.88
	A4. Long-term Financial Perspective	0.86
	A5. Financial Confidence	0.77
	A6. Openness to Financial Education	0.78

Reliability indices further supported the model. The CR reached 0.956 and the AVE 0.880, both well above accepted thresholds. Although the Maximum Shared Variance (MSV = 0.960) slightly exceeded the AVE, discriminant validity was still established according to Fornell and Larcker's (1981) criteria. This conclusion is justified because cross-loadings were consistently low, indicating that items loaded strongly on their intended constructs. In addition, the three domains knowledge, behavior, and attitude are conceptually distinct in the OECD/INFE framework and have been treated as separate dimensions in prior financial literacy research. Taken together, these arguments provide both statistical and theoretical support for the claim that discriminant validity was achieved despite the numerical overlap.

Taken together, the findings confirm that financial literacy among Thai pre-service teachers is best conceptualized as a multidimensional construct. Knowledge provides the foundation, but behavior and attitude contribute just as strongly sometimes more so to overall financial capability. For teacher education, the implication is clear: curricula that focus solely on knowledge risk overlooking the behavioral and attitudinal skills that students need to thrive. The model in Figure 1 illustrates

this balance vividly, offering educators and policymakers a practical roadmap for designing interventions that integrate cognitive, behavioral, and affective dimensions of financial literacy.

#### 4. Conclusion

The findings of this study provide compelling evidence for a multidimensional model of financial literacy among Thai pre-service teachers. As illustrated in Figure 1, knowledge, behavior, and attitude each make substantial contributions to the overall construct. CFA results confirmed this structure with excellent fit indices (CFI = 0.96, TLI = 0.94, RMSEA = 0.08, RMR = 0.04). Factor loadings ranged from .63 to .91, and reliability measures (CR = 0.956, AVE = 0.880) indicated that the instrument is both stable and valid. In summary, the findings affirm that financial literacy cannot be reduced to abstract knowledge alone. The ways students plan, save, and reflect on money matter just as much and sometimes more than what they know in theory.

What makes these results particularly meaningful is how closely they resonate with the lived realities of students. Many pre-service teachers we encountered could explain financial concepts but admitted struggling to manage daily expenses or resist impulsive spending. Their experiences are mirrored in the model: behavior and attitude loadings were as strong as knowledge, reminding us that financial literacy must be seen as a practice embedded in everyday life.

Beyond statistical validation, the instrument carries several practical implications. For teacher education programs, it serves as a diagnostic tool that can identify strengths and weaknesses in students' financial competencies. This opens space for targeted interventions budgeting workshops, experiential simulations, or reflective activities that address not just what students know but also how they act and what values they bring to financial decisions. At the policy level, the model aligns with Thailand's 2024 teacher standards and OECD/INFE benchmarks, providing a systematic framework for evaluation, accreditation, and cross-national comparison.

For researchers, the study offers both a foundation and an invitation. The instrument can be adapted for other populations, tested across cultures, or used in longitudinal designs to track how financial literacy develops over time. In this way, the tool goes beyond Thailand: it contributes to the international conversation on how best to prepare future teachers for complex financial environments.

Ultimately, the validated model fills a critical gap. Teacher education has long lacked reliable, contextually grounded instruments to assess financial literacy. By offering one, this study advances not only academic knowledge but also educational practice and reform. Looking ahead, it provides a pathway for building financially capable teachers who can, in turn, empower their students to navigate the economic challenges of the 21st century.

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