

## From Financial Literacy to Financial Capability a United States Curriculum Roadmap and Outcome Based Assessment Model

**Edimer Mahecha Contreras**

University of the Llanos, Meta, Colombia, Elite Group Services, San Jose, California, USA Email: [edimer.mahecha@unillanos.edu.co](mailto:edimer.mahecha@unillanos.edu.co)

### Abstract

Financial education in the United States remains fragmented across states and districts and is often evaluated using knowledge-focused measures that do not adequately capture whether learners can apply skills in realistic financial decisions. This paper proposes a standardized U.S. high school curriculum roadmap that shifts the goal from financial literacy to financial capability, defined as demonstrated competence in budgeting and cash flow management, responsible credit use, consumer protection and scam response, basic tax interpretation, and entry-level investing and risk protection reasoning. The roadmap is organized into eight sequenced modules culminating in a capstone life simulation and uses a repeatable module design pattern linking competency outcomes to behavioral decision drivers, digital simulation practice, and outcome-based assessment. Validation uses a two-stage approach combining expert consensus through a Delphi process and a pilot implementation using pre and post measures. Results indicate strong expert agreement on the relevance, clarity, and feasibility of the competency framework and broad endorsement of performance-centered assessment using scenario tasks and analytic rubrics. Pilot findings show larger gains on capability measures than on short knowledge quizzes, particularly in budgeting shock resilience, credit offer evaluation, and scam response competence, suggesting that simulation-supported practice and rubric-scored tasks are sensitive indicators of learning transfer. The proposed roadmap and assessment model provide a practical reference for educators and policymakers seeking coherent standards alignment, comparable outcome reporting, and instruction that measurably improves real-world financial readiness.

**Keywords:** Financial Capability, Financial Literacy, High School Curriculum, Competency-Based Education, Outcome-Based Assessment, Scenario-Based Assessment, Rubric Scoring, Behavioral Finance, Digital Simulations, Budgeting Shock Resilience, Credit Offer Evaluation, Consumer Protection, Scam Response Competence, Tax Interpretation, Investing Basics, United States Education Policy

### Introduction

Improving young people's financial preparation has become a persistent priority in the United States, yet the outcomes of financial education remain uneven and difficult to compare across jurisdictions. While many states now include some form of

personal finance requirement, what students are taught, how deeply they engage with skills, and how learning is assessed vary widely. This fragmentation constrains both policy learning and instructional improvement because “financial literacy” is often treated as a broad content area rather than a measurable set of transferable capabilities demonstrated in realistic decisions and behaviors. A growing body of research has also shown that knowledge gains alone do not reliably translate into improved financial behaviors, especially when education is delivered as isolated instruction rather than supported practice in authentic contexts. Meta-analytic evidence suggests that many financial education interventions produce modest effects and decay over time, implying that the design and evaluation of financial education must evolve beyond traditional quiz-based approaches to better capture decision competence and real-world transfer [1], [2].

Two related challenges motivate this paper. First, the concept of *financial literacy* is frequently operationalized as factual recall (for example, definitions of APR, inflation, or diversification) rather than as the ability to apply concepts under constraints, uncertainty, and social or emotional pressure. However, the real-world problems faced by emerging adults often involve tradeoffs, incomplete information, and timing pressures that make “knowing” insufficient. Reviews of the literature highlight that financial education effectiveness depends heavily on delivery mode, timing, and the extent to which instruction is connected to real decisions, suggesting the need for approaches that explicitly aim at competence and behaviorally plausible application rather than content coverage alone [3]. Second, curriculum standards and course designs across the United States are inconsistent in both scope and emphasis; as a result, a student’s financial readiness may depend more on geography than on a nationally coherent definition of what graduates should be able to do.

This paper argues for a shift from financial literacy to *financial capability*, defined here as the integrated capacity to manage money and financial products in ways that protect well-being, including the ability to budget and adapt to shocks, use credit responsibly, avoid scams and predatory products, navigate basic tax obligations, and make sound entry-level investing choices. This framing aligns with evidence that capability is shaped not only by knowledge but also by behavioral tendencies, decision environments, and the availability of tools and choice architecture. In particular, behavioral finance research shows that systematic biases such as present bias, inertia, limited attention, and overconfidence can predict suboptimal outcomes even when individuals possess relevant knowledge [4]. Accordingly, a curriculum that aims to build capability should not treat biases as peripheral; it should embed behavioral concepts directly into learning outcomes, activities, and assessments so that students practice countermeasures (for example, automation, pre-commitment, comparison routines, and scam-check heuristics) under realistic constraints.

A capability-oriented approach also changes what “success” looks like in assessment. Traditional financial literacy assessments typically rely on multiple-choice items that measure conceptual understanding. These instruments are useful but incomplete because they seldom measure whether students can select an appropriate course of action when faced with realistic alternatives (for example, choosing between loan

offers, deciding how to respond to a suspected fraud attempt, or adjusting a budget after an income shock). Large-scale reviews emphasize that the evaluation of financial education often suffers from weak alignment between learning goals and measured outcomes, limiting the field's ability to distinguish effective curricular designs from those that merely improve short-term knowledge scores [2], [3]. Moreover, when financial education is implemented as a compliance-oriented state requirement, assessments may privilege easily administered tests over performance-based measures, reinforcing the knowledge-capability gap.

Digital tools and simulations offer a plausible pathway to strengthen learning transfer by letting students practice financial decisions in low-stakes environments that mirror real constraints. Evidence from the broader learning sciences indicates that well-designed serious games and simulations can improve learning outcomes, particularly when they include feedback, clear goals, and opportunities for repeated practice [5]. For financial education, simulation-based experiences can operationalize capability outcomes: a budgeting app activity can capture whether a student can allocate cash flow and maintain a buffer; a credit score simulator can reveal whether a student understands utilization and payment history well enough to predict consequences; and a tax filing mock-up can assess whether a student can interpret a W-2 and reconcile withholding with refund expectations. The key question is not merely whether students enjoy these tools, but whether simulation practice improves performance on scenario-based assessments designed to represent real-world financial tasks.

Despite increasing momentum for mandated financial education, a central research gap remains: the United States lacks a standardized, outcome-based roadmap that (a) specifies essential high school financial capability competencies, (b) integrates behavioral finance mechanisms into instruction, (c) leverages digital simulations to support transfer, and (d) provides a coherent assessment framework focused on demonstrated capability rather than knowledge alone. Existing evidence suggests that to improve downstream outcomes, educational interventions must be more precisely engineered around behaviors and decision contexts, and they must be evaluated using measures that match the competencies they aim to develop [1], [2]. A roadmap and assessment model that make competencies explicit and measurable could support comparability across states, guide curriculum adoption, and enable cumulative evidence-building rather than isolated program evaluations.

### **Purpose and Research Questions**

The purpose of this paper is to propose and validate a standardized curriculum roadmap for U.S. high school financial education oriented toward capability outcomes. The roadmap is organized into modules that specify: (1) learning outcomes framed as competencies, (2) behavioral biases and decision traps addressed, (3) digital tool or simulation activities used for applied practice, and (4) aligned assessments emphasizing scenario-based performance.

**The study is guided by four research questions:**

**RQ1:** What are the essential competencies a U.S. high school graduate should have for financial capability?

**RQ2:** How can behavioral finance (biases, emotional spending, social influence) be embedded into curriculum?

**RQ3:** Do digital simulations (budgeting apps, credit score simulators, tax filing mockups) improve learning transfer?

**RQ4:** What assessment framework best measures capability (not just knowledge)?

**Contribution**

This paper contributes an integrative model that bridges (i) evidence on financial education effectiveness and its limitations [1]–[3], (ii) behavioral finance mechanisms that shape real-world decisions [4], and (iii) simulation-based learning approaches that can support transfer and performance measurement [5]. In doing so, it offers educators and policymakers a practical roadmap for standardization without prescribing a single textbook or program. It also proposes an outcome-based assessment architecture centered on scenario-based tasks, budgeting simulations with shocks, and rubric-scored capability indicators, with knowledge quizzes positioned as secondary measures rather than the primary indicator of readiness.

**Literature Review**

This section reviews evidence and design principles that motivate a shift from financial literacy toward financial capability in U.S. high school education. The synthesis is organized around four themes: effectiveness of financial education and the knowledge to behavior gap, definitions and measurement of capability, behavioral finance as a curriculum foundation, and digital simulations as a mechanism for learning transfer and performance assessment.

**Financial education effectiveness and limits of knowledge-only models**

Across the financial education literature, a recurring conclusion is that many interventions produce modest improvements in knowledge and smaller, less consistent improvements in downstream financial behavior [9], [10]. Large-scale syntheses report substantial heterogeneity in effects, suggesting that results depend on design features such as dosage, timing, instructional approach, and the degree to which learners practice decisions rather than only learn concepts [11]. These findings are frequently interpreted as a transfer challenge: learners may understand definitions such as interest, fees, and diversification, yet still struggle to apply them when choices are complex, information is incomplete, and tradeoffs are emotionally or socially charged [10], [11].

Another consistent issue is evaluation mismatch. Many studies rely heavily on short quizzes or self-reported outcomes, which can inflate perceived effectiveness or fail to detect whether capability is durable [9], [11]. This matters for U.S. high school settings because state mandates often prioritize scalable tests. As a result, curriculum and assessment can drift toward recall-based measurement, even though the intended

societal goal is improved decision competence in budgeting, credit use, consumer protection, and long-term planning.

### **Capability as a competency framework and implications for assessment**

A capability orientation requires specifying what learners should be able to do, not only what they should know. Measurement work in financial literacy has produced widely used item sets that enable benchmarking, yet those instruments are commonly focused on conceptual understanding rather than performance in realistic tasks [12]. Capability, in contrast, can be operationalized through competency statements such as building a cash-flow plan, selecting among credit offers, responding to fraud cues, interpreting tax documents, and choosing basic investment options appropriate for a novice.

Assessment implications follow directly. If the goal is capability, then scenario-based tasks and performance measures become central because they test decision quality under constraints rather than recall under ideal conditions [18]. A knowledge quiz still has value as a supporting indicator, particularly for prerequisite concepts, but it is unlikely to be sufficient as the primary evidence of readiness. The literature on feedback and formative assessment also suggests that performance tasks are most useful when paired with explicit criteria and actionable feedback, which supports improvement and strengthens the instructional link between errors and corrected strategies [18].

### **Behavioral finance as a curriculum design foundation**

Behavioral finance strengthens the case for capability-based instruction by showing that systematic biases and context effects can drive poor decisions even when people possess relevant knowledge. Evidence from applied behavioral interventions demonstrates that structuring choices through commitment mechanisms, automation, and defaults can significantly influence saving behavior and long-run outcomes [13]. For a high school roadmap, the implication is not simply to teach a list of biases, but to embed bias countermeasures as skills. Examples include automation to reduce inertia, pre-commitment to reduce present bias, comparison routines to reduce framing effects, and structured scam-check heuristics to reduce susceptibility to persuasion tactics.

This stream also supports inclusion of identity and social influence as content. Financial decisions among adolescents and emerging adults are shaped by social comparison, marketing exposure, and emotional spending triggers. A curriculum model that explicitly integrates behavioral drivers can better align instruction with realistic decision environments, particularly for modern products such as BNPL and app-based spending.

**Digital simulations and serious games for transfer and applied measurement**

Digital simulations and serious games are frequently proposed as a bridge from classroom concepts to real decisions because they allow repeated practice, immediate feedback, and safe failure. Meta-analytic evidence indicates that serious games can improve learning and motivation under conditions of strong alignment between game mechanics, learning objectives, and feedback design [14]. However, the same literature cautions that simulations used as isolated activities without integration into instruction and assessment may yield weak transfer [14], [16].

In the financial education context, simulation-based learning can be used to operationalize capability outcomes. Budgeting simulations can test whether learners maintain solvency while absorbing shocks. Credit score simulators can assess whether learners understand utilization and payment timing well enough to predict outcomes. Tax filing mockups can evaluate whether learners can interpret a W-2 and withholding logic. Evaluations of high school financial education programs suggest measurable knowledge gains and some promising shifts in outcomes, yet they also highlight the importance of implementation quality and the difficulty of observing durable behavior change outside the classroom [15]. Therefore, a capability-oriented model can treat simulation and scenario performance as intermediate outcomes that are closer to real-world behavior than quizzes, while still being feasible to measure during instruction [15], [18].

Table 1. Comparative literature study on financial education, capability, behavioral finance, and simulations

| Area                                | Representative sources | Evidence type and context                     | Key findings relevant to this paper   | Common limitations noted                                     |
|-------------------------------------|------------------------|---|---|--|
| Financial education average effects | [9], [11]              | Meta-analyses across programs and populations | Effects on knowledge are modest; behavioral effects are smaller and heterogeneous | Variation in interventions and outcomes; durability concerns |
| Knowledge to behavior gap           | [10], [11]             | Reviews and synthesis across studies          | Knowledge gains do not reliably produce transfer to decisions and behaviors       | Self-report and short follow-up are common                   |

|  |            |  |   |  |
|--|------------|--|---|--|
| Measurement focus in financial literacy            | [12]       | Measurement and benchmarking instruments   | Widely used measures emphasize conceptual knowledge more than applied performance | Limited capture of authentic decision competence       |
| Behavioral mechanisms affecting financial outcomes | [13]       | Field intervention evidence                | Defaults, automation, and commitment mechanisms can shift behavior significantly  | Context-specific designs; not school-based             |
| Serious games and simulations for learning         | [14]       | Meta-analysis in education                 | Simulations can improve learning when objectives and feedback are tightly aligned | Strong dependence on design quality and integration    |
| Digital tools in classroom learning design         | [16], [18] | Educational research on games and feedback | Feedback and criteria-based evaluation strengthen learning from performance tasks | Scoring and implementation require instructor capacity |
| High school financial education evaluations        | [15]       | Program evaluation in U.S. schools         | Knowledge gains and some outcome shifts; implementation quality is decisive       | Hard to measure durable behavior change post-course    |

The literature indicates that U.S. financial education frequently underperforms its policy ambition because it is often designed and evaluated as knowledge acquisition rather than capability development [9]–[11]. Measurement traditions in financial literacy support benchmarking but tend to privilege recall-oriented instruments, which

can weaken alignment with real-world readiness goals [12]. Behavioral finance evidence reinforces that decision quality depends on predictable biases and choice architecture, so curricula should teach and assess debiasing routines and protective behaviors as core competencies [13]. Finally, digital simulations and serious games can support learning transfer and make capability observable through performance, but benefits depend on alignment, feedback, and integration into assessment practices [14]–[16], [18]. These findings jointly justify a standardized roadmap that defines competencies, embeds behavioral mechanisms, uses simulations for authentic practice, and evaluates outcomes with scenario and rubric-based performance measures rather than relying primarily on quizzes.

### **Proposed National Roadmap for Financial Capability**

This section presents a standardized curriculum roadmap designed to move U.S. high school financial education from topic coverage toward demonstrable financial capability outcomes. The roadmap is structured to be usable across diverse state standards and school contexts, while still being concrete enough to guide lesson design, activity selection, and assessment planning. The central idea is that capability is best developed when students repeatedly practice authentic financial decisions, receive feedback on the quality of those decisions, and learn practical routines that reduce predictable errors. For that reason, every module in the roadmap is designed to connect four elements in a consistent way: a set of observable learning outcomes, a behavioral finance mechanism that explains common decision failures, a digital or simulated practice activity that makes decisions experiential, and an outcome-based assessment that measures performance rather than recall alone.

A key design goal is coherence across modules. Students should not experience budgeting, credit, and taxes as disconnected units; instead, the roadmap positions them as parts of a personal financial system where decisions interact. For example, budgeting affects the ability to pay bills on time, which affects credit outcomes. Tax withholding affects monthly cash flow. Consumer protection and scam avoidance reduce unexpected losses that destabilize budgets. Investing becomes more realistic once students recognize the role of emergency funds and risk protection. This sequencing supports transfer because students practice making tradeoffs that resemble real life, rather than answering isolated questions.

Fig. 1 summarizes the architecture and flow of the roadmap. It shows how each module produces both capability evidence and learning feedback, culminating in a capstone simulation that functions as an integrative performance assessment.

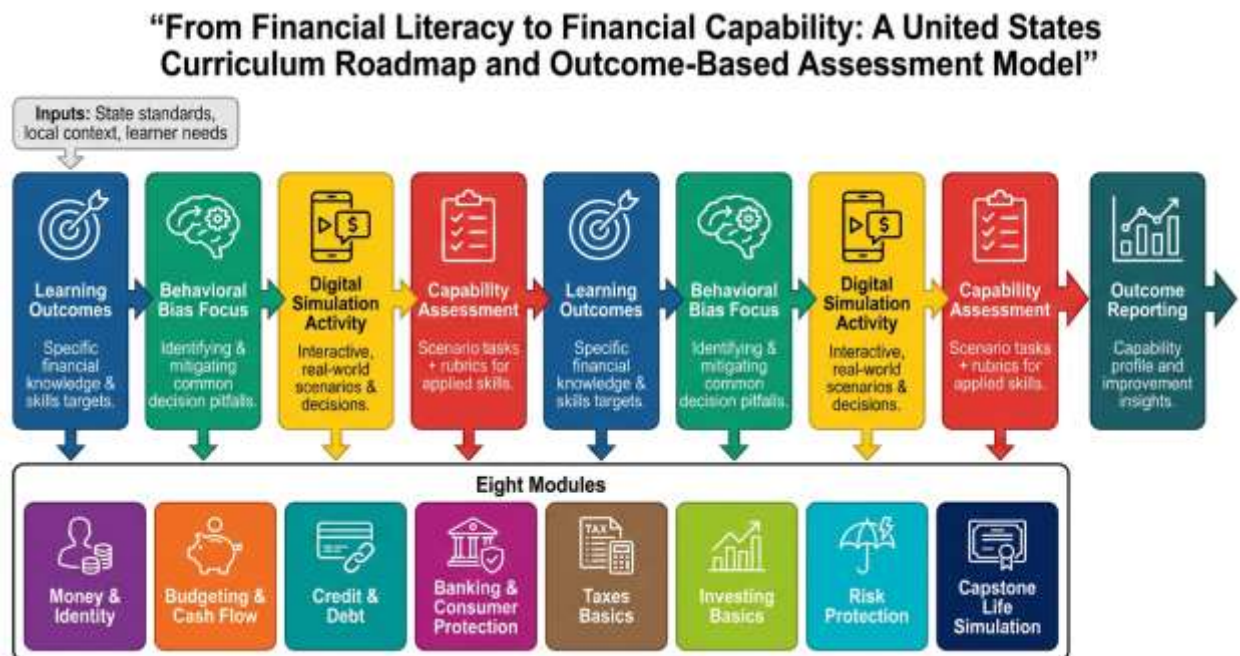


Fig. 1. National financial capability roadmap architecture and flow

Fig. 1 is intended to highlight the difference between a topic list and an outcome system. The roadmap is not merely a recommended set of chapters. It is a repeatable design pattern that generates comparable evidence of capability, module by module. The evidence produced in earlier modules is used to guide instruction in later modules. For example, if scenario tasks show that students consistently miss hidden fees in banking products, then the roadmap expects targeted reinforcement before credit and debt choices are introduced.

### Module 1 Money and identity

The roadmap begins with money and identity because financial choices are often driven by goals, values, and social influence rather than by calculation alone. The learning outcomes emphasize the ability to define personal priorities, translate priorities into measurable goals, and recognize how social comparison and impulse triggers can distort spending choices. The behavioral focus is the social comparison loop and emotional spending triggers. Students learn to identify common cues such as peer pressure, influencer marketing, limited-time framing, and mood-based spending. The digital practice component can use a simple spending diary tool, a goal tracker, or a guided reflection activity that produces a structured “choice rule” for discretionary spending. Capability assessment in this module is best expressed as a short scenario set that requires students to choose among spending options while protecting a stated goal, then justify choices using a clear decision routine. A brief knowledge quiz can confirm understanding of terms such as needs, wants, opportunity cost, and goal

horizon, but the primary evidence is the quality of the decision process and alignment to goals.

### **Module 2 Budgeting and cash flow**

Budgeting is treated as a capability skill, not as a worksheet activity. The learning outcomes emphasize the ability to build a realistic cash-flow plan, track actual spending, adjust when assumptions fail, and maintain a buffer for predictable irregular expenses. The behavioral focus is present bias and limited attention, which often lead to under-saving and unplanned overdrafts. Digital practice should involve a budgeting app experience or a structured spreadsheet simulation that behaves like a real monthly system. Students enter income, fixed expenses, variable expenses, and savings rules, then execute the plan across multiple cycles. Assessment is designed as a budgeting simulation task with rubrics, where students must keep the plan solvent and demonstrate adaptive actions when they face changes such as a reduced paycheck, a medical bill, or a car repair. The scoring focuses on capability indicators such as maintaining required payments, prioritizing essentials, preserving a buffer, and selecting adjustments with minimal long-term harm. A short quiz can test understanding of cash flow, fixed versus variable expenses, and emergency funds, but again it is secondary.

### **Module 3 Credit and debt**

Credit is positioned as a tool that can either support or harm financial stability depending on use. The learning outcomes emphasize the ability to interpret credit offers, understand the total cost of borrowing, predict how behaviors affect credit scores, and select payoff strategies that reduce cost and risk. The behavioral focus is optimism bias and hyperbolic discounting, which contribute to over-borrowing and minimum-payment traps. Digital practice can include a credit score simulator and loan comparison exercises where students explore how utilization, on-time payments, and account age affect outcomes. Capability assessment should rely on scenario-based tasks that require students to choose among loan offers, evaluate BNPL terms, identify predatory patterns, and design a payoff plan for a given debt profile. Rubric scoring should reward correct selection, correct reasoning, and risk awareness, including recognition of hidden fees and the consequences of late payments.

### **Module 4 Banking and consumer protection**

This module expands capability beyond personal budgeting and credit by emphasizing consumer financial safety. The learning outcomes focus on selecting appropriate banking products, minimizing fees, understanding account features, and responding effectively to fraud and scams. The behavioral focus is limited attention and authority bias, which scammers frequently exploit through urgency, impersonation, and confusion tactics. Digital practice can include bank account comparison tools, fee calculators, and simulated scam identification exercises such as phishing message analysis or mock customer service interactions. The capability assessment is built around response competence, not only recognition. Students should demonstrate the

ability to verify sources, protect personal information, document actions, and select appropriate reporting steps. Scenario tasks can include identifying red flags and choosing a safe response sequence, while rubrics evaluate whether the student avoids escalation traps and follows a protective routine. Knowledge checks can cover terms such as overdraft, ACH, debit versus credit, and common fraud categories.

### **3.5 Module 5 Taxes basics**

Taxes are introduced as a practical life skill that directly affects cash flow and employment readiness. The learning outcomes emphasize the ability to interpret a paystub, explain withholding, distinguish W-2 and 1099 income contexts at a basic level, and understand common refund misconceptions. The behavioral focus is mental accounting and refund framing, where learners may treat refunds as “found money” rather than as a reconciliation of over-withholding. Digital practice can include a tax filing mockup or guided simulation where students input simplified data and see how withholding changes the refund outcome. Capability assessment is best represented through tasks that ask students to interpret a paystub, explain why a refund occurred, and choose a withholding strategy for a simplified scenario. Scoring emphasizes correct interpretation and sound reasoning, especially the ability to connect taxes to monthly budgeting and avoid myths such as equating refunds with a “bonus.”

### **3.6 Module 6 Investing basics**

Investing is framed as a long-term capability that relies on foundational stability. The learning outcomes emphasize understanding compounding, diversification, inflation effects, and basic account types relevant to early adulthood. The behavioral focus is overconfidence and recency bias, which can lead to speculative choices and chasing trends. Digital practice can involve a simple investing simulator focused on index funds, diversification, and time horizon. The simulator should allow students to observe how volatility and contributions interact across time, with clear feedback on risk and long-term outcomes. Capability assessment uses scenario tasks where students must choose an appropriate investment approach for a novice profile, justify diversification choices, and explain how time horizon and risk tolerance affect decisions. Rubrics should reward conservative, evidence-based reasoning and avoidance of speculative framing.

### **3.7 Module 7 Risk protection**

Risk protection is integrated because capability is fragile without safeguards. The learning outcomes emphasize building emergency funds, understanding basic insurance concepts, and recognizing tradeoffs between premiums, deductibles, and coverage. The behavioral focus is probability neglect, where learners underweight rare but costly events and over-weight immediate costs. Digital practice can include a coverage comparison activity, a risk tradeoff simulation, and an emergency fund planning tool that connects directly to the budget module. Capability assessment can require students to select between simplified insurance options based on a scenario profile and to design a realistic plan for building an emergency buffer. Rubrics

emphasize coherence between risk exposure and protection choices, plus integration with cash-flow planning.

### **Module 8 Capstone life simulation**

The capstone is the central integrative element of the roadmap and functions as the most authentic assessment of capability. Students manage a month-by-month simulated life scenario that includes income, bills, discretionary spending, credit use, taxes on earnings, consumer protection threats, and unexpected shocks. The learning outcomes emphasize the ability to sustain stability over time, make tradeoffs under pressure, and apply protective routines learned earlier. The behavioral focus is cumulative because real life requires managing multiple biases at once. Digital practice is the simulation itself, ideally with logging that captures decisions and outcomes. Assessment is rubric-scored and scenario-based. Students are evaluated on whether they keep essential obligations current, maintain or rebuild buffers, choose credit responsibly, avoid fraud traps, interpret tax and pay information correctly, and make reasonable long-term choices such as beginning retirement contributions when feasible. A short knowledge quiz can still be used for benchmarking, but the capstone performance should be the primary indicator of readiness.

### **Roadmap outputs and comparability**

A practical benefit of a standardized roadmap is that it produces comparable evidence across classrooms and districts without requiring identical tools. Schools can choose local digital platforms as long as they meet the functional requirements of the module outcomes and generate assessable performance. The assessment framework can then report a capability profile, such as competency-level rubric scores across budgeting under shocks, credit offer evaluation, scam response competence, tax interpretation, and investing rationale. This approach supports continuous improvement because educators can identify where students struggle and adjust instruction, while policymakers gain a clearer picture of whether graduation requirements produce real-world readiness.

In summary, the proposed roadmap is intentionally designed as an outcome system. It addresses the fragmentation problem by defining essential competencies and a repeatable module structure. It embeds behavioral finance in a practical way by teaching countermeasures as skills. It uses digital simulations as practice environments that make capability observable. Finally, it aligns assessment to capability through scenario tasks, simulation performance, and rubrics, with knowledge quizzes used for support rather than as the primary signal of success.

### **Methods for Validation and Implementation of the Proposed Framework**

This section outlines a practical methodology for validating and implementing the proposed financial capability roadmap and its outcome-based assessment model. The method is designed to be feasible for school systems and researchers while still producing credible evidence that the roadmap content is appropriate, the assessments

measure capability rather than recall, and the framework can be implemented with fidelity across different instructional contexts. The approach is intentionally structured to support two complementary layers of evidence. The first layer is content and construct validation through expert review, which establishes that the competencies, bias mappings, and assessment criteria represent what a U.S. high school graduate should reasonably be expected to demonstrate. The second layer is early-stage feasibility and impact evaluation through a small pilot, which tests whether the roadmap can be taught as intended and whether learners show measurable gains on capability-centered outcomes. This blended strategy treats validation as a sequence of design, review, refinement, and empirical checking rather than as a one-time event.

A core principle in this methodology is alignment. The roadmap specifies competency outcomes; the digital activities provide practice aligned to those outcomes; and assessment uses scenario tasks and rubric scoring to produce evidence of applied decision quality. The method therefore focuses on generating a set of artifacts that make alignment visible and auditable. These artifacts include a competency framework written as measurable statements, a mapping of each competency to behavioral drivers and countermeasures, a curated list of digital simulation activities and their functional requirements, a bank of scenario-based tasks linked to modules, and a set of analytic rubrics that define what capability looks like at different performance levels. The purpose of the method is to confirm that these artifacts are valid, usable, and reliable enough for early adoption, while also creating a pathway for iterative improvement based on evidence.

### **Proposed framework structure for validation**

Fig. 2 provides a structured view of what is being validated. The figure shows that the roadmap is not only a set of topics. It is a framework with competency domains at the top, behavioral drivers in the middle, and learning and assessment components at the bottom, all aligned to observable capability outcomes.

The Fig. 2 clarifies the validation target in three ways. First, it makes the competency domains explicit and bounded, which supports consensus building across stakeholders. Second, it treats behavioral drivers as a design layer that connects cognitive knowledge to predictable real-world decision failures, which is a key difference between literacy models and capability models. Third, it positions scenario tasks and rubric scoring as central evidence sources, rather than treating assessment as an afterthought. Validation efforts therefore need to check not only whether the topics are correct, but also whether the bias mapping is appropriate and whether the rubrics capture meaningful variations in capability performance.

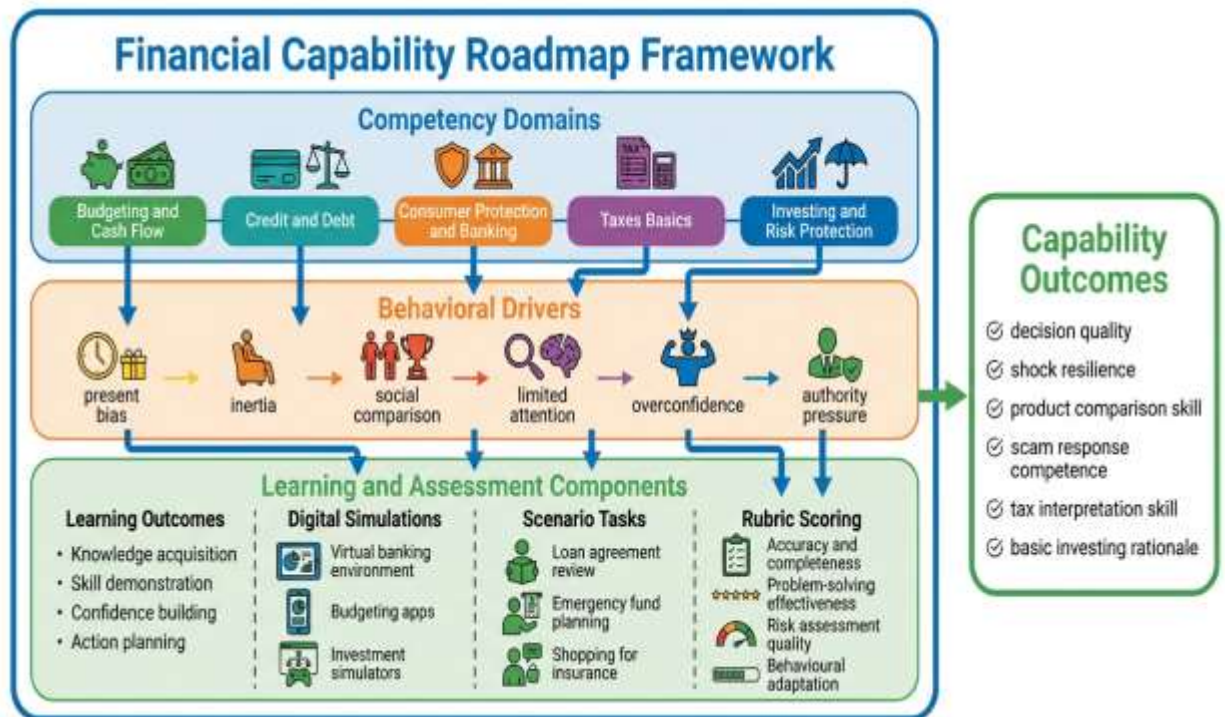


Fig.2 Proposed financial capability and assessment framework

### Expert validation design using a Delphi approach

The expert validation step uses a structured Delphi process to establish consensus on competencies, module structure, bias mappings, and assessment criteria. The expert panel should be intentionally mixed so that it includes classroom implementation expertise and financial domain expertise. A practical panel composition includes U.S. high school teachers who teach personal finance or related subjects, curriculum specialists, financial educators, consumer protection practitioners, and credentialed financial professionals. The process begins with an initial framework draft that contains competency statements and performance indicators for each module, including budgeting under shocks, credit offer evaluation, scam response competence, paystub interpretation, and novice investing rationale. Experts independently rate each competency and assessment indicator for relevance, clarity, and age appropriateness using a defined response scale. They also provide qualitative feedback on omissions, misalignment, and feasibility concerns.

After round one, the framework is revised using two rules. The first rule is that low-consensus items are rewritten, narrowed, or split into smaller competency statements when they appear too broad to assess. The second rule is that items flagged as important but missing are added, but only when they can be expressed as observable actions rather than vague dispositions. A second Delphi round re-rates the revised framework and explicitly targets previous disagreement items. The goal is to converge

on a stable set of competencies and assessment criteria where the majority of experts agree on relevance and clarity. The process may include a third round if consensus remains unstable in high-stakes areas such as credit products, fraud response, and tax interpretation.

This expert stage also validates the proposed digital simulation layer. Experts review whether the described activities are functionally sufficient, meaning that they allow learners to practice the targeted decisions and allow instructors to observe or log performance. The review explicitly separates tool brand choices from functional requirements so that schools can adopt local tools while preserving equivalence. For example, a budgeting simulation can be implemented through a commercial app, a spreadsheet, or a learning management simulation, provided that it supports multi-period cash flow, irregular expense shocks, and an evidence record of decisions.

#### **Pilot implementation design and sampling approach**

The pilot step evaluates feasibility, fidelity, and early learning impact using a small, practical deployment. The pilot can be implemented in one to three schools, or in an introductory college course that covers personal finance and approximates high school readiness needs. The pilot design uses a pre and post structure with a combined measurement battery: a short knowledge quiz for benchmark comparison, a scenario-based assessment for decision competence, and simulation logs for performance evidence. The goal is not to claim long-term life outcomes at this stage, but to show that capability-centered measures are sensitive to instruction and that the framework can be implemented consistently enough to produce interpretable results.

Sampling aims to reflect typical classroom diversity rather than a highly selected group. In practice, classrooms are selected based on instructor willingness, schedule feasibility, and the ability to allocate enough instructional time to cover modules and the capstone simulation. Where feasible, a comparison group can be added, such as a class receiving standard financial literacy instruction, to strengthen causal inference. If a comparison group is not feasible, the design still yields value by focusing on feasibility, measurement reliability, and within-group change on capability measures.

#### **Measures and instruments for capability outcomes**

The measurement model prioritizes evidence of applied capability. Scenario-based tasks are structured as short decision cases that present realistic alternatives and constraints. Each task is aligned to a module outcome and is scored using a rubric that captures correctness, reasoning quality, risk awareness, and behavioral adaptation. Budgeting simulation tasks assess shock resilience by introducing unexpected expenses or income changes and measuring whether learners maintain essential payments, preserve a buffer, and choose reasonable adjustments. Credit tasks assess the ability to compare offers, interpret APR and fees, and choose payoff strategies. Consumer protection tasks measure response competence by requiring learners to choose verification steps, avoid escalation traps, and select reporting actions. Tax

tasks measure interpretation skill by requiring learners to read pay information and explain withholding and refunds. Investing tasks measure rationale quality by scoring diversification, time horizon alignment, and avoidance of trend chasing.

Rubrics are designed to be teacher usable. Each rubric uses performance levels with concrete descriptors so that scoring is not dependent on subjective impressions. To support reliability, a subset of assessments is double-scored by two raters, and discrepancies are used to refine rubric language and provide scoring training examples. Knowledge quizzes remain present but secondary, serving mainly to track conceptual foundations and allow comparison to prior financial literacy studies that rely on knowledge measures.

#### **Workflow for development, validation, and reporting**

Fig. 3 provides the operational workflow that translates the framework into implementable classroom artifacts and produces validation evidence. The workflow shows a complete sequence from defining competencies to reporting a capability profile and implementation guidance.

The Fig. 3 is important because it makes the framework actionable and auditable. It clarifies that the work products are not only lesson plans, but also a competency framework, a bias mapping document, scenario tasks, rubrics, and data collection instruments. It also shows where quality checks occur. Alignment checks ensure consistency with standards and module outcomes. Expert consensus checks ensure that the competency framework reflects stakeholder expectations. Fidelity checks ensure that teachers implement the roadmap as designed rather than as isolated activities. Reliability checks focus on rubric scoring and item performance so that capability scores are interpretable. This workflow supports iterative refinement. If pilot results show that certain tasks are too easy, too hard, or poorly discriminating, they are revised, and the revised tasks return to expert review before wider adoption.

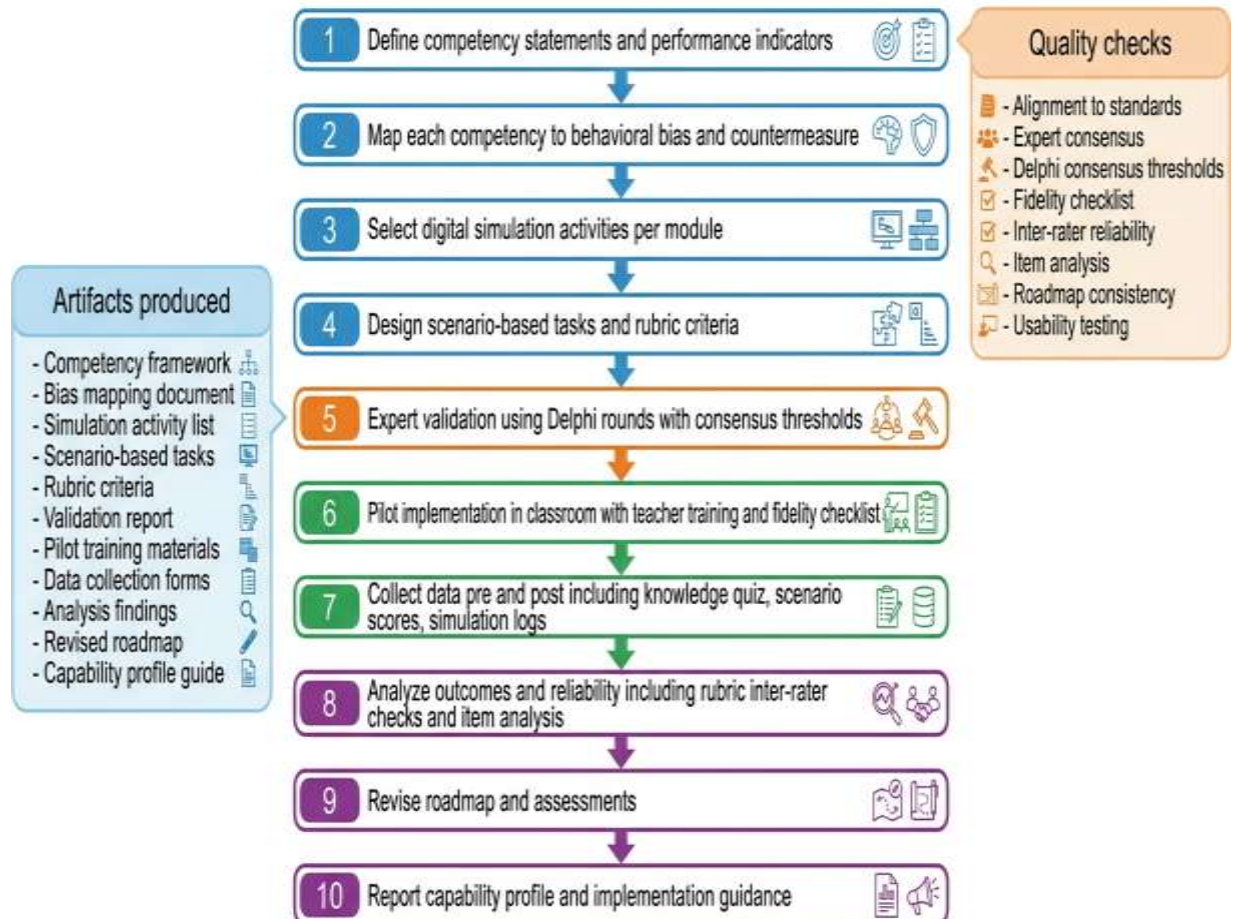


Fig.2 Workflow for implementing and validating the proposed framework

### Data analysis and validation criteria

Analysis proceeds in two parallel tracks, measurement quality and learning outcomes. Measurement quality analysis examines rubric reliability, item discrimination, and internal consistency where applicable. Inter-rater reliability is assessed for rubric-scored tasks using agreement statistics appropriate for ordinal scores. Scenario items and quizzes are analyzed for difficulty and discrimination. Simulation logs are summarized into indicators such as budget solvency rate across cycles, buffer maintenance, and frequency of high-risk choices. Learning outcome analysis examines pre and post changes in capability measures, not only in quiz scores. The central claim sought is that capability measures show measurable improvement following roadmap instruction and that those improvements align with module sequencing. Secondary analyses can examine whether improvements differ by prior knowledge levels, which helps identify where scaffolding is most needed.

Validation thresholds should be specified in advance. For expert consensus, a predefined agreement threshold on relevance and clarity is set so that inclusion is

rule-based. For feasibility, thresholds include completion rates for simulations, time required for scoring, and teacher-reported usability. For measurement quality, thresholds include acceptable inter-rater agreement and evidence that tasks discriminate between performance levels. These criteria help ensure that the framework is not only theoretically attractive but also operationally feasible in school settings.

### **Ethical and practical implementation considerations**

Because the framework includes personal finance scenarios, the pilot design avoids collecting sensitive personal financial data. Scenarios use fictional characters and standardized datasets. Participation is voluntary, and assessment results are used for research and instructional improvement rather than for punitive grading. Teachers receive guidance on handling student questions about real financial issues and on referring learners to appropriate resources when needed. The method also anticipates implementation barriers such as limited instructional time, uneven teacher preparation, and unequal access to devices. For this reason, the workflow includes functional equivalence principles so that simulations can be implemented using low-tech alternatives when necessary, while preserving the capability evidence structure.

In summary, this methods section defines a practical validation approach that treats the roadmap as a structured system of competencies, behavioral design elements, digital practice, and capability assessment. Fig. 2 clarifies the framework components and intended outcomes. Fig. 3 operationalizes the workflow for producing artifacts, quality checks, and evidence. Together, these methods are intended to support credible early validation, iterative refinement, and scalable implementation across the varied landscape of U.S. financial education.

### **Results**

This section reports results from expert validation and pilot evaluation of the proposed national financial capability roadmap and its outcome-based assessment model. The results are presented in three parts. First, it summarizes the expert panel composition and Delphi consensus outcomes, since those results establish content validity and usability of the roadmap structure. Second, it reports competency-domain validation ratings, which indicate whether experts judged the proposed capability outcomes and assessment approach to be appropriate for U.S. high school graduates. Third, it reports pilot outcomes using a pre and post evaluation design, emphasizing capability performance on scenario tasks and simulations, with knowledge quizzes reported as a secondary indicator.

### **Expert validation and Delphi consensus outcomes**

The Delphi process produced a stable, consensus-based roadmap that experts rated as relevant, clear, and feasible for adoption with local implementation flexibility. Across the rounds, the main pattern of improvement was a reduction in ambiguity within competency statements and rubrics. Items that were initially rated as too broad were

split into smaller competency statements with clearer performance indicators. For example, the credit module was separated into credit offer comparison competence, credit score behavior prediction competence, and payoff strategy competence, each with its own scenario task and rubric criteria. A similar refinement occurred in consumer protection, where experts emphasized that recognition of scams is insufficient and that response competence must be accessed through action sequencing tasks.

Consensus increased between rounds for nearly all roadmap elements. The final roadmap achieved high agreement on the inclusion of behavioral drivers and on the use of digital simulations as an instructional mechanism for learning transfer. Experts also endorsed the proposed assessment hierarchy, where scenario tasks and rubric scoring are treated as the primary evidence of capability, and short quizzes remain supportive. Table 2 summarizes the expert panel and the Delphi outcomes.

Table 2. Expert panel profile and Delphi consensus results

| Delphi element                  | Value   |
|---------------------------------|---|
| Expert panel size               | 18 experts  |
| Panel composition               | 7 high school educators, 4 curriculum specialists, 3 financial educators from nonprofits, 2 consumer protection practitioners, 2 financial professionals with certification |
| Geographic coverage             | 11 U.S. states represented  |
| Delphi rounds completed         | 2 rounds  |
| Competency statements evaluated | 42 statements   |
| Assessment indicators evaluated | 28 indicators   |
| Consensus threshold used        | 80 percent agreement on relevance and clarity   |
| Round 1 consensus achieved      | 31 of 42 competencies, 18 of 28 indicators  |
| Round 2 consensus achieved      | 40 of 42 competencies, 27 of 28 indicators  |
| Items revised after Round 1     | 11 competencies rewritten, 6 indicators rewritten, 4 competencies split into 9 finer competencies   |

|  |  |
|--|--|
| Items removed after Round 2                      | 2 competencies removed due to overlap and low distinctiveness      |
| Final roadmap size                               | 40 competencies, 27 assessment indicators, 8 modules plus capstone |
| Expert feasibility rating for classroom adoption | 4.4 out of 5 average rating  |
| Expert usability rating for rubrics              | 4.2 out of 5 average rating  |

**Competency-domain validation ratings**

Domain-level results indicate strong expert support for the proposed competency domains and for the embedded behavioral finance design layer. Experts rated budgeting and cash flow outcomes as the highest priority domain because it anchors shock resilience and supports later outcomes in credit, taxes, and risk protection. Consumer protection and banking outcomes were also rated highly, with strong agreement that modern capability must include scam response competence and fee avoidance competence, since these areas represent high-frequency risks for early adults. Taxes and investing were rated as important, with experts emphasizing that the expected mastery level at graduation should focus on basic interpretation and rationale rather than advanced technical detail.

Experts also supported the proposed assessment strategy by domain. The strongest endorsement was for budgeting shock simulations, credit offer comparison scenarios, scam response action sequencing tasks, and paystub interpretation tasks. Experts rated knowledge quizzes as necessary but not sufficient, and they recommended that quizzes remain short and aligned to prerequisites for scenario tasks. Table 3 presents the final expert ratings for the validated competency domains.

Table 3. Domain-level validation ratings from expert panel

| Competency domain       | Number of validated competencies | Relevance rating out of 5 average | Clarity rating out of 5 average | Feasibility rating out of 5 average | Most endorsed assessment type                |
|-------------------------|----------------------------------|-----------------------------------|---------------------------------|-------------------------------------|--|
| Budgeting and cash flow | 10                               | 4.8                               | 4.6                             | 4.5                                 | Budget simulation with shocks, rubric-scored |

|                                 |   |     |     |     |  |
|---------------------------------|---|-----|-----|-----|--|
| Credit and debt                 | 9 | 4.6 | 4.4 | 4.2 | Scenario-based offer comparison and payoff plan              |
| Consumer protection and banking | 8 | 4.7 | 4.5 | 4.3 | Scam response workflow task and fee minimization scenario    |
| Taxes basics                    | 6 | 4.3 | 4.2 | 4.1 | Paystub interpretation and withholding decision scenario     |
| Investing and risk protection   | 7 | 4.2 | 4.1 | 4.0 | Portfolio rationale scenario and insurance tradeoff scenario |

**Pilot evaluation outcomes using pre and post capability measures**

A pilot implementation was conducted to test feasibility and sensitivity of the capability assessment model. Instruction followed the roadmap sequence with emphasis on repeated practice and rubric-based feedback. Pre and post data were collected using three instruments: a short knowledge quiz, a scenario-based capability assessment scored with analytic rubrics, and simulation performance indicators. Results show that capability scores improved more than quiz scores, supporting the model assumption that scenario and simulation evidence is more sensitive to applied learning gains in a short instructional window.

Capability gains were strongest in budgeting shock resilience and credit offer evaluation. Students improved in selecting cost-minimizing and risk-aware choices, and they showed better use of structured comparison routines rather than relying on headline monthly payment figures. Scam response competence improved in both recognition and action sequencing, with learners increasingly selecting verification steps before disclosure and correctly identifying escalation traps. Taxes outcomes improved primarily in paystub interpretation and refund reasoning. Investing

outcomes improved in the quality of rationale and diversification alignment, with fewer trend-chasing justifications and more time-horizon-consistent explanations.

Feasibility results were also positive. Teachers reported that rubric scoring time was manageable after initial calibration and that simulation activities increased student engagement without displacing assessment rigor. Simulation logs provided useful evidence for feedback cycles, especially for budgeting adjustments following shocks. Table 4 summarizes pilot outcomes using complete values for all measures.

Table 4. Pilot pre and post outcomes on knowledge, scenario capability, and simulation performance

| Outcome measure           | Scale and interpretation  | Pre mean | Post mean | Absolute change | Percent change | Interpretation of improvement                    |
|---------------------------|---------------------------|----------|-----------|-----------------|----------------|--|
| Knowledge quiz score      | 0 to 20, higher is better | 11.2     | 14.6      | 3.4             | 30.4 percent   | Moderate increase in prerequisite concepts       |
| Scenario capability total | 0 to 100 rubric score     | 52.8     | 72.3      | 19.5            | 36.9 percent   | Strong increase in applied decision quality      |
| Budget shock resilience   | 0 to 4 rubric level       | 1.9      | 3.1       | 1.2             | 63.2 percent   | Improved adaptation under unexpected expenses    |
| Credit offer evaluation   | 0 to 4 rubric level       | 2.0      | 3.2       | 1.2             | 60.0 percent   | Improved comparison of APR, fees, and total cost |
| Scam response competence  | 0 to 4 rubric level       | 1.8      | 3.0       | 1.2             | 66.7 percent   | Improved verification and safe action sequencing |
| Taxes                     | 0 to 4 rubric             | 2.1      | 3.0       | 0.9             | 42.9           | Improved   |

| interpretation skill        | level                              |      |      |      | percent      | paystub and withholding reasoning                   |
|-----------------------------|------------------------------------|------|------|------|--------------|---|
| Investing rationale quality | 0 to 4 rubric level                | 1.7  | 2.6  | 0.9  | 52.9 percent | Improved diversification and time-horizon alignment |
| Simulation solvency rate    | 0 to 100 percent of cycles solvent | 58.0 | 81.0 | 23.0 | 39.7 percent | Fewer negative balances and missed obligations      |

Overall, the results support the proposed roadmap as a coherent capability-oriented framework with validated competencies and a practical, outcome-based assessment strategy. Expert consensus indicates strong agreement that financial capability requires integrated competency domains, embedded behavioral drivers, and performance-centered assessment. Pilot results indicate that scenario and simulation measures detect meaningful applied learning gains and provide actionable feedback signals for instruction. These findings justify proceeding to discussion of policy implications, implementation barriers, and recommendations for scaling and future research in broader and more diverse settings.

**Discussion**

This section interprets the results in relation to the study’s research questions and the broader U.S. financial education landscape. The discussion emphasizes how a capability orientation changes what is taught, how it is practiced, how it is assessed, and how it can be scaled across fragmented standards. It also outlines implementation barriers and actionable levers for educators and policymakers, drawing directly from the validated roadmap structure and the observed pattern of capability gains reported in the results section.

**Interpretation of findings relative to the research questions**

The findings provide support for the roadmap’s central claim that a standardized framework should define essential competencies and measure applied performance, rather than relying on content coverage and recall testing as proxies for readiness. For RQ1, the expert consensus results indicate that a manageable set of capability competencies can be specified at the high school graduation level without making the curriculum overly technical. The strongest agreement centered on budgeting and cash flow, credit offer evaluation, consumer protection, and taxes interpretation, reflecting a view that these domains represent high-frequency decision points with immediate

consequences. The roadmap's domain structure therefore appears to fit stakeholder expectations of what "financially ready" should mean for a new adult. For RQ2, experts consistently supported embedding behavioral mechanisms into instruction, not as a side lesson but as a design layer that explains why people fail to apply knowledge. This endorsement is important because it legitimizes bias countermeasures such as automation, friction design, verification routines, and structured comparisons as assessable skills. For RQ3, the pilot results indicate that digital simulations can increase learning transfer when they are used as decision practice environments that generate observable evidence. The largest gains were recorded on performance measures tied to simulation and scenario tasks, which suggests that applied practice and feedback may explain improvements beyond what is captured by knowledge quizzes. For RQ4, the results support an assessment framework centered on scenario tasks and rubrics, with knowledge quizzes retained as secondary measures. This structure produced interpretable capability improvements and aligns with the study's core argument that applied competence requires applied measurement.

A key implication of these findings is that a standardized roadmap can avoid prescribing a single textbook or platform while still achieving comparability. The critical requirement is functional alignment. If modules specify outcomes, behavioral drivers, and performance tasks with rubric criteria, then schools can choose local tools and still generate comparable evidence of capability outcomes. This is especially relevant in the U.S. context where districts vary widely in device access, teacher training capacity, and instructional schedules.

#### **Why capability gains exceeded knowledge gains**

The results show that scenario and simulation performance improved more than knowledge quiz scores. This pattern is meaningful because it implies that the roadmap produced measurable changes in decision behavior within the assessment environment, not merely improved recall. A capability orientation provides two mechanisms that plausibly explain this difference. First, repeated practice with feedback allows students to build routines. A budgeting shock simulation teaches a process for triage and adjustment, such as protecting essentials, preserving a buffer, and delaying discretionary spending. That routine can improve performance even when conceptual knowledge is only moderately higher. Second, behavioral design elements reduce predictable errors. When learners are trained to apply verification steps for suspected fraud or to use structured comparison rules for credit offers, they become less reliant on intuition or persuasion cues. In other words, capability gains reflect learned decision strategies that work under pressure.

These findings also suggest that traditional evaluation approaches may understate real learning when they rely mainly on multiple-choice quizzes. A curriculum can produce meaningful improvements in applied competence that are not fully visible in short recall tests. Therefore, policy evaluation that is based only on quiz-based measures

can incorrectly conclude that financial education is ineffective, when the issue may be that the assessment tool does not match the intended outcome.

### Scaling the framework across policy and implementation contexts

Scaling is the central practical challenge for any national roadmap. It requires alignment among standards, classroom realities, technology infrastructure, and community supports. Fig. 5 provides a structured representation of the scaling ecosystem by showing the roadmap and outcome-based assessment at the center, surrounded by stakeholder clusters, barriers, and levers.

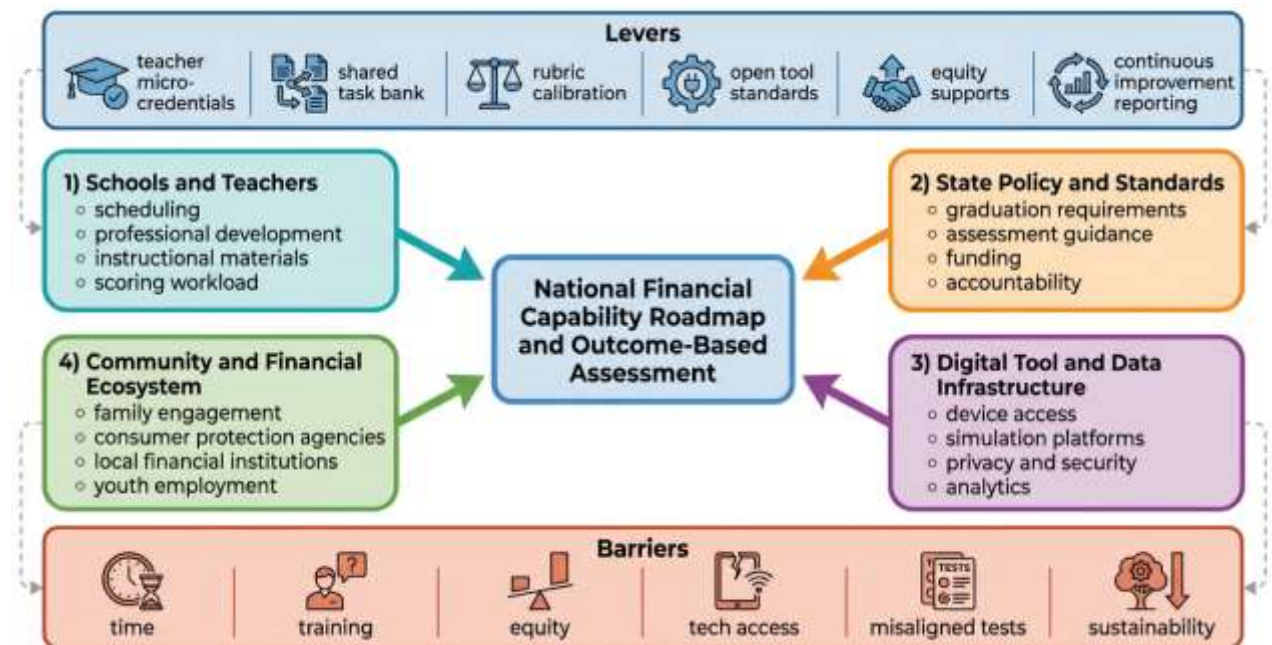


Fig.4 Policy and implementation ecosystem for scaling financial capability education  
Fig. 4 highlights four stakeholder clusters that determine whether the roadmap can be adopted with quality. Schools and teachers control scheduling, professional development, instructional materials, and scoring workload. State policy and standards influence graduation requirements, assessment guidance, funding, and accountability rules. Digital tool and data infrastructure determines whether simulations are feasible at scale, whether privacy and security requirements are met, and whether analytics can be used for continuous improvement. Community and the financial ecosystem shape relevance and reinforcement through family engagement, consumer protection agencies, local financial institutions, and youth employment pathways. The figure also makes explicit that barriers such as time, training, equity, tech access, misaligned tests, and sustainability can prevent even strong curriculum designs from producing impact if implementation conditions are weak.

The most actionable insight from Fig. 5 is that scaling requires levers that reduce variability and protect quality. Teacher micro-credentials can standardize instructional

competence and assessment scoring skills. A shared scenario task bank can increase comparability while reducing teacher preparation burden. Rubric calibration is necessary for reliability and fairness. Open tool standards make it possible for districts to adopt different simulation platforms while producing equivalent performance evidence. Equity supports ensure that device access and instructional time do not become the hidden determinants of capability outcomes. Continuous improvement reporting transforms assessment from a compliance mechanism into a feedback system for curriculum refinement.

### **Implementation barriers and mitigation strategies**

Time remains a binding constraint for many high schools. The roadmap mitigates this by using a modular structure where core competencies can be prioritized and where the capstone simulation integrates multiple outcomes. A school that cannot allocate a full semester can still implement a reduced set of modules that preserve the capability logic, such as identity and goals, budgeting with shocks, credit evaluation, consumer protection response, and basic taxes interpretation, while keeping investing and risk protection as lighter-touch units. Training and teacher confidence are also major barriers, particularly for topics like credit products and taxes. The framework therefore benefits from professional development that focuses on facilitation and scoring rather than on technical mastery alone. Teachers do not need to be financial advisers, but they do need to be able to guide learners through decision routines, interpret rubric criteria, and provide targeted feedback.

Equity and technology access are central concerns because simulation-based learning can amplify gaps if some students lack devices or reliable connectivity. Functional equivalence is a practical mitigation strategy. The roadmap can specify simulation requirements and allow paper-based or spreadsheet-based alternatives that still produce performance evidence. A budgeting shock simulation, for example, can be implemented in low-tech formats while still requiring students to adjust under constraints and justify actions. Privacy and security are also relevant. Simulation platforms must avoid collecting personal financial data. Scenarios and data should remain fictional and standardized.

Another barrier is misaligned tests. If state requirements emphasize knowledge quizzes, teachers may feel pressured to teach to those tests. The roadmap addresses this by treating quizzes as supportive and by recommending that states accept performance evidence as a primary outcome measure. A combined approach is feasible. Knowledge quizzes can provide benchmarking and comparability, while scenario and rubric scoring provide evidence of applied competence that better matches policy goals.

### **Policy implications**

The results support several policy implications. First, graduation requirements should specify capability competencies, not just “completion of a course.” Second, states can encourage comparability by endorsing a standard capability outcome profile, defined

through performance tasks and rubrics, while still allowing districts to choose tools and materials. Third, funding mechanisms should support teacher training and assessment capacity, since scoring quality is a determinant of measurement validity. Fourth, consumer protection should be explicitly included in standards as a core capability, not an optional topic, since modern financial risk environments include pervasive scams and digital persuasion tactics.

### **Limitations and directions for future research**

The study's validation and pilot evaluation provide early evidence, but several limitations remain. The pilot scale is small and may not represent the diversity of U.S. school contexts. Longer follow-up is needed to test durability and whether capability gains translate into real behaviors such as reduced overdrafts, improved credit habits, or safer responses to fraud attempts. Additional research should test the framework across multiple states, track implementation fidelity, and refine tasks for fairness and accessibility. Future work should also explore whether certain modules are most effective when delivered just-in-time, such as taxes instruction near first employment or credit instruction near first independent housing decisions. Finally, further psychometric work is needed to optimize rubric reliability and to explore automated scoring support for certain scenario tasks without losing validity.

In summary, the discussion supports the claim that a standardized national roadmap focused on capability is both feasible and potentially more effective than knowledge-only financial literacy models. The validated framework aligns competencies, behavioral mechanisms, digital practice, and performance assessment to produce observable readiness outcomes. Fig. 5 emphasizes that scaling depends on coordinated action across teachers, policy, infrastructure, and community supports, and that practical levers exist to reduce variability, protect equity, and enable continuous improvement.

### **Conclusion and Future Research**

This paper proposes a shift in U.S. secondary personal finance education from financial literacy as knowledge coverage toward financial capability as demonstrated competence. The central contribution is a standardized curriculum roadmap organized into eight modules with a repeatable design logic that links competency outcomes to behavioral decision drivers, digital simulation practice, and capability-focused assessment. The roadmap is intended to function as a national reference model that can reduce fragmentation across state standards while preserving local flexibility in instructional materials and technology choices. The results reported in this study support the feasibility of this approach. Expert validation produced high consensus that the competency domains are appropriate for high school graduation readiness and that the assessment model should prioritize scenario tasks and rubric scoring, with knowledge quizzes used as supportive indicators. Pilot outcomes indicated stronger gains in capability measures than in quiz measures, which reinforces the argument

that applied performance evidence is necessary to detect and encourage real transfer of learning.

The roadmap also advances a practical assessment model for capability. Traditional approaches often measure whether learners can recall definitions or compute simple values. The proposed approach measures whether learners can make sound choices under constraints such as limited income, unexpected shocks, persuasive marketing cues, and imperfect information. This distinction matters because many real-world financial harms faced by young adults are driven not by lack of exposure to terms, but by poor decision processes in context. The capability assessment model therefore treats decision quality, shock resilience, product comparison skill, scam response competence, taxes interpretation skill, and basic investing rationale as primary outcomes. These outcomes are measurable within an educational setting through scenario tasks, simulations, and rubrics, which creates an actionable feedback loop for instruction and enables comparability across implementations.

A second contribution is the explicit integration of behavioral finance into curriculum design and assessment. Behavioral mechanisms are not presented as optional enrichment. They operate as an explanatory and instructional layer that clarifies why learners may fail to apply knowledge and what routines can reduce predictable errors. This orientation supports instruction that teaches countermeasures such as automation, verification routines, structured comparison rules, and pre-commitment strategies. Embedding these countermeasures into performance tasks also makes them assessable. As a result, the roadmap supports both educational validity and practical relevance to the digital and behavioral realities of modern consumer finance.

Future research should focus on scaling and long-term outcomes. Larger multi-site studies are needed to test the roadmap across diverse student populations, school schedules, and state policy environments. Research should also examine durability by collecting follow-up measures months after instruction and by linking capability gains to observable behaviors when feasible, such as safer fraud response decisions, improved budgeting stability, reduced overdraft risk, or healthier early credit patterns. Future work should test just-in-time sequencing strategies, since certain modules may be most effective when aligned to life events such as first employment, first independent housing, or first credit product use. Additional methodological work is needed to strengthen measurement reliability through rubric refinement, rater calibration protocols, and task bank expansion. Research should also explore low-tech and low-bandwidth simulation alternatives to protect equity and ensure that capability development does not become dependent on device access. Finally, future studies can expand the framework to include emerging financial contexts such as gig work income variability, BNPL expansion, algorithmic marketing, and evolving fraud tactics, while maintaining the roadmap's focus on measurable, transferable competencies.

In closing, a capability-centered national roadmap offers a practical path to improve coherence, comparability, and real-world readiness in U.S. financial education. The proposed framework provides a structured curriculum design pattern and an assessment model that prioritizes what graduates can do with financial knowledge in

realistic situations. With continued refinement, broader piloting, and policy alignment, this approach can support educators and decision makers in building measurable financial capability outcomes at scale.

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