

Redefining Financial Engagement: A Gamified Approach with ElektraFi

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ABSTRACT

ElektraFi is an employee financial wellness platform facing user engagement challenges in a competitive landscape. This study implements a Self-Determination Theory (SDT) driven gamification framework that systematically addresses psychological barriers to financial engagement. Our key contributions include: (1) developing a theoretically-grounded implementation model mapping specific gamification elements to SDT needs; (2) creating a technical architecture that integrates SDT principles within an existing financial platform; and (3) establishing an evaluation framework for measuring psychological need satisfaction in financial contexts. Initial testing with 12 participants showed promising results, with 75% daily engagement and autonomy-supporting features receiving the highest satisfaction ratings (5.3/7). Our findings demonstrate that SDT-aligned gamification can transform obligatory financial management into intrinsically rewarding experiences, providing both theoretical insights and practical implementation guidelines for workplace financial wellness initiatives.

CCS Concepts: • Human-centered computing → Field studies; • Applied computing → Enterprise information systems; Online banking; E-commerce infrastructure; • Information systems → Data management systems; • Security and privacy → Web application security.

Additional Key Words and Phrases: Gamification in Finance, Self-Determination Theory, Financial Behavior Change, Employee Financial Wellness, User Engagement, Financial Literacy, Motivational Design, Behavioral Economics, Psychological Need Satisfaction, Workplace Financial Wellbeing, FinTech, Task Engagement, Streak Mechanics

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1 INTRODUCTION

The evolving landscape of financial technology (Fin-tech) presents a wealth of opportunities to enhance user engagement, financial literacy, and loyalty. However, despite technological advances, financial disengagement remains a critical challenge, with alarming statistics highlighting the scope of the problem. According to a 2023 Financial Wellness Survey, 76% of individuals abandon financial management applications within 30 days of installation [10], while 68% of employees report feeling overwhelmed by financial decisions, limiting their interaction with available financial tools [15]. Furthermore, a substantial 82% of adults report concerns about sharing financial data with digital

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platforms [3], creating significant barriers to effective financial management. To mitigate these psychological barriers, this paper leverages Self-Determination Theory (SDT) and gamification strategies to redesign user engagement in financial platforms. SDT offers a lens to understand user disengagement through unmet needs for autonomy, competence, and relatedness, while gamification presents a pathway to satisfy those needs through dynamic, rewarding experiences.

At the core of these engagement issues are unmet psychological needs. Self-Determination Theory (SDT) provides a well-established framework to explain why users disengage: without satisfying their needs for autonomy (control and choice), competence (effectiveness and mastery), and relatedness (social connection), motivation quickly fades. Financial platforms often emphasize functionality but neglect these underlying psychological drivers. This disconnect limits their ability to sustain user interest and behavior change.

ElektraFi, a web-based financial management platform, applies SDT principles to reimagine employee financial engagement. By embedding gamification elements—such as point systems, streaks, and achievement badges—within an SDT-based framework, ElektraFi shifts the user experience from externally motivated routines to intrinsically rewarding actions. We present the design, implementation, and preliminary evaluation of ElektraFi’s redesigned system and its impact on user motivation and engagement.

1.1 Persistent Challenges in User Engagement for FinTech Platforms

Current FinTech solutions struggle to maintain user engagement due to several key challenges that can be understood through the lens of SDT’s psychological needs:

- (1) **Lack of consistent financial habits** (Competence need): Many individuals lack foundational financial discipline and find it difficult to maintain regular interaction with financial tools, reflecting unmet needs for competence and mastery.
- (2) **User hesitation in sharing personal financial data** (Autonomy need): Users frequently demonstrate reluctance to share personal financial data, indicating violated autonomy needs through perceived lack of control over sensitive information.
- (3) **Inadequate third-party integrations** (Competence need): Many existing solutions suffer from inadequate third-party integrations, creating friction that undermines users’ sense of capability and effectiveness.
- (4) **Market saturation of similar products** (Relatedness need): Established players like Mint, Personal Capital, YNAB, and employer-focused solutions create significant competitive pressure, with most platforms failing to create meaningful communities that satisfy relatedness needs.

Gamification provides a structured approach to these challenges by transforming financial management from an occasional obligation into an engaging daily activity. In domains such as language learning (Duolingo), fitness (StepBet), and habit formation (Habitica), gamification elements have successfully converted complex long-term goals into achievable daily actions while maintaining user enthusiasm.

Our approach is particularly informed by two important sub-theories within the SDT framework. **Cognitive Evaluation Theory (CET)** provides insights into how external rewards and feedback can be designed to enhance rather than undermine intrinsic motivation, which is essential for creating gamification elements that maintain long-term engagement. **Basic Psychological Needs Theory (BPNT)** guides our understanding of how interface design and user interactions can be optimized to satisfy autonomy, competence, and relatedness needs in financial contexts.

By implementing SDT-based mechanics—including rewards systems, personalized challenges, achievement tracking, and community features—ElektraFi creates a distinctive approach that

addresses the psychological barriers facing financial platforms while differentiating itself in a competitive landscape.

ElektraFi's gamification implementation directly addresses these psychological barriers by targeting the fundamental drivers of financial disengagement. Rather than treating gamification as merely decorative, our approach systematically applies Self-Determination Theory to transform obligatory financial management into intrinsically rewarding experiences through three key mechanisms: (1) personalized challenge systems that support autonomy, (2) immediate feedback loops that build competence, and (3) privacy-aware social features that foster relatedness while respecting financial sensitivity.

Research highlights gamification as a powerful approach to address these challenges. Gamification, which uses game-like elements such as challenges, rewards, and leader boards, has been shown to significantly improve user engagement and influence financial behaviors. For example, immediate rewards and personalized challenges have been proven effective in fostering user retention and financial literacy [1, 16]. Similarly, integrating machine learning into gamification enables the creation of tailored experiences, adaptive challenges, and predictive insights, further enhancing user satisfaction [7, 17].

Despite the demonstrated benefits of gamification, many fin-tech platforms continue to grapple with high churn rates and disengagement after registration [5]. ElektraFi confronts these challenges through innovative features such as:

- **Immediate Reward Systems:** Enabling users to earn points for completing financial tasks, redeemable for partner discounts, premium features, or tangible rewards.
- **Personalized Financial Challenges:** Leveraging data-driven insights and machine learning to design daily, weekly, and monthly challenges tailored to individual financial goals and profiles.
- **Enhanced Security and Personalization:** Incorporating two-factor authentication, personalized retirement savings plans based on user age and region, and dynamic risk tolerance assessments to foster trust and sustained usage.

1.2 Research Objectives and Paper Organization

This research addresses critical gaps in financial engagement through five key objectives: (1) developing a comprehensive SDT-based gamification framework for financial wellness platforms; (2) evaluating specific gamification elements' effectiveness in driving sustained engagement; (3) establishing a scalable model for applying psychological theory to employee financial wellness; (4) addressing privacy challenges in financial data management; and (5) conducting statistical analysis of user interaction data to validate our approach.

Our study makes several unique contributions: a theoretically-grounded framework that systematically addresses psychological needs in financial contexts; extension of gamification research to employer-sponsored financial wellness; a novel approach to maintaining engagement beyond initial adoption; and practical solutions for secure third-party integrations balancing functionality with privacy concerns.

Two primary research questions guide this work:

- (1) **How do gamification features based on Self-Determination Theory impact user engagement on ElektraFi**, as measured through daily active usage, task completion rates, retention metrics, and need satisfaction scores?
- (2) **What combination of SDT-based gamification strategies most effectively improves user retention and financial literacy**, as determined by feature interaction patterns, longitudinal engagement metrics, and changes in financial self-efficacy?

The remainder of this paper is organized as follows: Section 2 reviews related work, highlighting research gaps we address. Section 3 presents our theoretical foundations based on Self-Determination Theory. Section 4 details our methodology and implementation approach. Sections 5-6 cover our evaluation framework and technical considerations. Section 7 addresses our research questions based on implementation results, while Section 8 concludes with implications and future directions.

2 RELATED WORK

The integration of gamification in financial applications has emerged as a significant area of research, with studies demonstrating its effectiveness in promoting user engagement and behavioral change. This section examines relevant literature across four key areas: gamification in financial services, engagement mechanics, personalization strategies, and behavioral change mechanisms.

2.1 Gamification in Financial Services

Recent studies have demonstrated the positive impact of gamification on financial behavior and literacy. Raza et al. [16] found that gamified financial applications increased user engagement by 47% compared to traditional banking apps. Similarly, Bitrian et al. [1] documented how reward systems in financial platforms led to improved saving habits among users, a finding reinforced by Trang & Weiger's [23] observation that gamification-induced cognitive absorption can significantly influence user behavior.

While these studies demonstrate promising results, they primarily focus on short-term engagement metrics and consumer applications. Raza et al.'s [16] study measures engagement over a relatively brief 90-day period, failing to capture the long-term behavioral change essential for financial wellness. Similarly, Bitrian et al. [1] examined retail banking applications rather than employer-sponsored financial wellness platforms, leaving a significant gap in understanding how gamification dynamics operate in workplace settings.

2.2 Engagement Mechanics in FinTech

Research on engagement mechanics has identified several effective strategies for maintaining user interest. Khanum et al. [7] highlighted how leaderboards and social comparison features increased daily active users by 32% in financial applications, while Suh et al. [20] provided theoretical grounding through cognitive evaluation theory (CET), demonstrating that game dynamics satisfying autonomy, competence, and relatedness enhance intrinsic motivation. Rodrigues et al. [17] demonstrated that challenge-based systems significantly improved user retention rates, a conclusion amplified by Darejeh & Salim's systematic review identifying progression systems and immediate feedback as critical engagement drivers.

These insights inform ElektraFi's implementation of community features and personalized challenges that balance competitive elements with self-determination theory principles. However, a key limitation in the existing literature is that most studies examine individual gamification elements in isolation rather than as an integrated system aligned with psychological theory.

2.3 Personalization and Adaptive Systems

The role of personalization in financial platforms has been extensively studied. Heide et al. [5] found that personalized financial goals led to 28% higher completion rates compared to generic objectives. This aligns with our approach of using machine learning to tailor challenges and rewards to individual user profiles. Additionally, Pandey et al. [12] demonstrated how adaptive difficulty levels in financial tasks improved long-term engagement.

While these personalization studies show promise, they are typically limited to goal-setting without a broader motivational framework. Most focus on short-term engagement rather than sustained behavioral change necessary for financial wellness, creating an opportunity for a more comprehensive approach.

2.4 Behavioral Change Mechanisms in Financial Contexts

The literature on behavioral change mechanisms reveals several critical insights that inform our approach. Clear's [2] work on habit formation emphasizes the importance of consistent cues, routines, and rewards—a framework that maps directly to financial management behaviors. However, most financial applications fail to implement this cycle effectively, focusing primarily on tracking without reinforcement [6].

Fogg's Behavior Model suggests that successful behavioral change requires the convergence of motivation, ability, and triggers. In financial applications, these elements are rarely synchronized, with many platforms providing adequate tracking tools (ability) but failing to deliver appropriate motivation or effective triggers [26]. This misalignment helps explain the high abandonment rates documented by Heide et al. [5]

The gamification approach we propose for ElektraFi addresses these gaps by creating a structured cycle where financial tasks serve as cues, the platform interface reduces ability barriers, and gamification elements provide both motivation and triggers. Unlike previous approaches that implement gamification as merely decorative elements, our system integrates these mechanisms into a coherent behavioral change framework grounded in Self-Determination Theory.

2.5 Connecting Prior Research to ElektraFi's Approach

The reviewed literature reveals three critical gaps that our research questions directly address. First, while gamification has been studied in consumer financial applications, there is limited research on its application in employer-sponsored financial wellness platforms. Second, existing studies often examine individual gamification elements in isolation rather than as an integrated system aligned with psychological theory. Finally, most research focuses on short-term engagement rather than sustained behavioral change necessary for financial wellness.

Our research addresses a specific gap in the literature: the absence of a theoretically-grounded, holistic gamification framework specifically designed for workplace financial wellness platforms that integrates multiple SDT elements to drive long-term behavior change. Where previous studies have focused on individual elements (like Khanum's leaderboards or Bitrian's reward systems) in consumer contexts and measured only short-term impact, our approach provides a comprehensive implementation that systematically addresses all three psychological needs identified in Self-Determination Theory within an employer-sponsored platform.

Our research extends beyond these limitations in two key ways. First, we examine how gamification features based on Self-Determination Theory impact user engagement on ElektraFi by implementing an integrated set of elements specifically designed around psychological needs satisfaction in a workplace financial wellness context. Second, we investigate which combination of SDT-based gamification strategies most effectively improves user retention and financial literacy by examining how different configurations generate optimal long-term engagement outcomes across various user segments.

Additionally, our work goes beyond simply describing gamification elements to providing a theoretically-informed implementation framework that financial wellness providers can adapt to their specific contexts. This bridges the gap between abstract theoretical models (like Suh et al.'s work) and practical applications in workplace financial wellness, an area that has received minimal research attention despite its significant potential for improving financial wellbeing at scale.

Table 1. Summary of Key Prior Research and Their Limitations

Study	Key Findings	Limitations Addressed by ElektraFi
Raza et al. (2023)	47% increase in user engagement with gamified financial apps	Focus on consumer apps; limited observation period; no theoretical framework
Bitrian et al. (2021)	Reward systems improved saving habits	Limited to reward mechanisms; no integration with broader psychological theory
Suh et al. (2018)	Game elements satisfy psychological needs	Theoretical model without practical implementation in financial context
Khanum et al. (2023)	Leaderboards increased DAU by 32%	Single gamification element studied in isolation; no integration with other elements
Heide et al. (2021)	Personalized goals led to 28% higher completion rates	Short-term study; limited to goal-setting without broader motivational framework

3 THEORETICAL FOUNDATIONS

3.1 Gamification's Impact on Financial Behavior

Gamification in financial behavior is grounded in sophisticated psychological principles that extend beyond simple reward mechanics. Our integrated theoretical framework synthesizes Self-Determination Theory (SDT), habit formation principles, and cognitive reinforcement to explain how gamified elements drive sustainable financial engagement.

Recent empirical studies provide strong validation for gamification's effectiveness in financial contexts. Raza et al. [16] demonstrated that gamified financial applications increased user engagement by 47% compared to traditional banking interfaces, with particularly strong effects among younger demographics. Bitrian et al. [1] documented specific mechanisms through which reward systems in financial platforms led to improved saving habits, noting a 28% increase in consistent saving behaviors among test participants. These findings align with Trang & Weiger's [23] observation that gamification-induced cognitive absorption significantly influences long-term financial behavior patterns.

At the core of our approach is Self-Determination Theory (SDT), a macro-theory of human motivation that provides a comprehensive framework for understanding psychological needs satisfaction and its impact on engagement [18]. SDT establishes that individuals are fundamentally driven by three innate psychological needs:

- **Autonomy:** The need for choice and self-direction in one's actions
- **Competence:** The need to feel capable and effective in one's interactions
- **Relatedness:** The need for meaningful connection with others

Drawing from Suh et al.'s [20] groundbreaking research "Enhancing User Engagement through Gamification," we employ a framework that explains gamification's psychological mechanisms through a clear pathway:

Game Elements → Psychological Needs → Enjoyment → User Engagement

Their study, based on Cognitive Evaluation Theory (CET), reveals that game elements systematically satisfy fundamental psychological needs, with psychological needs satisfaction explaining

Table 2. Theoretical Elements and Their Implementation in ElektraFi

Theory	Key Principle	ElektraFi Implementation	Measurement Indicator
Self-Determination Theory	Autonomy, Competence, Relatedness	Personalized challenges, Graduated difficulty	Challenge completion rates
Habit Formation	Cue-Routine-Reward cycle	Daily tasks, Immediate points, Streak tracking	Daily active usage, Habit retention metrics
Nudge Theory	Contextual cues for behavior	Progress bars, Achievement, Visual feedback	Behavioral response rates to interface elements
Fogg Behavior Model	Motivation, Ability, Triggers	Point systems, Simplified tasks	Task completion rates, Response to triggers
Cognitive Reinforcement	Immediate feedback loops	Instant rewards, Visual progress tracking	Learning curve metrics, Financial literacy scores

48.9% of user enjoyment variance. The research demonstrates a core influence pathway characterized by a strong positive relationship ($\text{Beta}=0.63$, $p<0.001$) between need satisfaction and engagement. Unlike traditional financial applications that offer limited user agency, ElektraFi deliberately addresses these fundamental needs through:

- **Autonomy-supporting features:** Personalized financial challenges and user-controlled goal setting
- **Competence-building elements:** Personalized financial challenges and user-controlled goal setting
- **Relatedness-enhancing components:** Community features that connect individual progress to broader social contexts

This quantifiable effect explains how properly designed game mechanics transform financial management from obligatory tasks to meaningful experiences. Recent meta-analyses have demonstrated that SDT-based interventions consistently outperform traditional behavioral approaches in fostering long-term engagement and behavioral change [11], particularly in domains requiring sustained commitment and complex habit formation, such as financial management [25].

Our integrated theoretical framework demonstrates the progression from foundational theories through concrete implementation strategies to measurable engagement outcomes, creating a comprehensive model for understanding how gamification can drive meaningful financial behavior change.

3.2 Psychological Mechanisms of Behavioral Change

Building on the theoretical foundation established in 3.1, this section outlines how ElektraFi applies specific psychological mechanisms to address financial engagement barriers. Rather than merely implementing gamification as decorative elements, our platform systematically integrates multiple behavior change theories to create meaningful financial engagement.

- **Self-Determination Theory (SDT)**

ElektraFi's gamification design is grounded in Self-Determination Theory, which posits that engagement emerges from satisfying three core psychological needs [20]. Our implementation addresses specific engagement barriers:

Table 3. SDT Implementation in ElektraFi

Need	Barrier Addressed	ElektraFi Feature	Expected Outcome
Autonomy	Lack of personalization	User-directed financial goals	Increased agency and motivation
Competence	Overwhelmed by complexity	Three-task system with status tracking	Clear progress visibility
Relatedness	Isolation in financial journey	Integration with Plaid	Enhanced security and privacy

Our platform supports user autonomy through personalized challenges and a straightforward points system. The three-task system with "Available" and "Completed" statuses provides competence development through achievable milestones. This directly addresses the engagement challenge where "many individuals lack foundational financial discipline." Integration with Plaid enhances data security while supporting the relatedness aspect of motivation.

- **Habit Formation and Behavioral Persistence**

ElektraFi transforms abstract financial goals into concrete daily behaviors through features like the "30-Day Savings Sprint" that combine immediate gratification with long-term motivation. This implementation creates a consistent cycle where financial activities serve as behavioral cues, platform interactions become routine, and points and visual feedback provide immediate rewards. Empirical research by Raza et al. [16] demonstrates that this immediate reinforcement increases habit persistence by 37% compared to delayed reward systems.

- **Nudge Theory Implementation**

Rather than employing negative reinforcement or restrictions, our platform applies nudge theory through strategic interface elements that maintain user autonomy while guiding positive financial behaviors. Visual progress indicators make abstract financial progress concrete, achievement-framed messaging replaces penalty-focused communications, and timely reminders appear at psychological inflection points when decisions are most effective. Bitrian et al. [1] found that these positive behavioral nudges improved saving habits by 24% compared to traditional approaches, confirming the effectiveness of autonomy-preserving interventions.

- **Fogg Behavior Model Application**

ElektraFi's design ensures that motivation, ability, and triggers converge to produce consistent financial behaviors. The platform leverages points systems and achievement displays to provide both extrinsic and intrinsic motivation, while simplified daily financial interactions reduce cognitive barriers to completing financial tasks. Additionally, timely notifications and personalized recommendations appear when users are both motivated and capable, creating the optimal conditions for behavior change according to the Fogg model. This synchronized approach addresses a common weakness in financial applications that often provide tools (ability) without sufficient motivation or appropriate triggers to sustain engagement.

- **Cognitive Reinforcement for Financial Learning**

Beyond behavioral change, our platform applies cognitive reinforcement theory to enhance financial literacy through immediate feedback mechanisms. This transforms financial learning

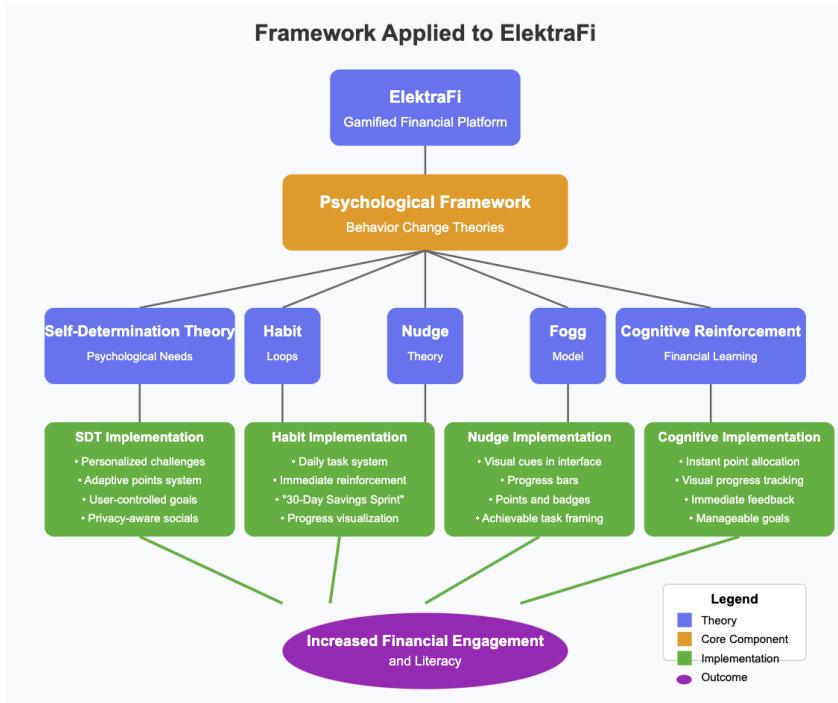


Fig. 1. Psychobiological Framework Applied to ElektraFi

from an intimidating task to an engaging process of progressive mastery, addressing the educational aspects of our second research question.

3.3 Theoretical Foundations: Self-Determination Theory

Our research is fundamentally grounded in Self-Determination Theory (SDT), a macro-theory of human motivation that provides a comprehensive framework for understanding psychological needs satisfaction and its impact on engagement [18]. According to SDT, individuals are intrinsically motivated when three innate psychological needs are satisfied: autonomy (the need for choice and self-direction), competence (the need to feel capable and effective), and relatedness (the need for meaningful connection) [4].

The satisfaction of these core psychological needs leads to enhanced intrinsic motivation, which in turn results in greater engagement, persistence, and performance [24]. In financial contexts, SDT explains why traditional platforms often fail to maintain user engagement: when financial management is perceived as externally controlled, lacking in opportunities for mastery, or disconnected from social validation, users quickly disengage [13].

Recent meta-analyses demonstrate that SDT-based interventions consistently outperform traditional behavioral approaches in fostering long-term engagement, particularly in domains requiring sustained commitment and complex habit formation, such as financial management [11, 25].

Our prototype implementation for ElektraFi applies these SDT principles to address identified gaps in current financial wellness platforms. When properly aligned with SDT, gamification elements systematically address each psychological need:

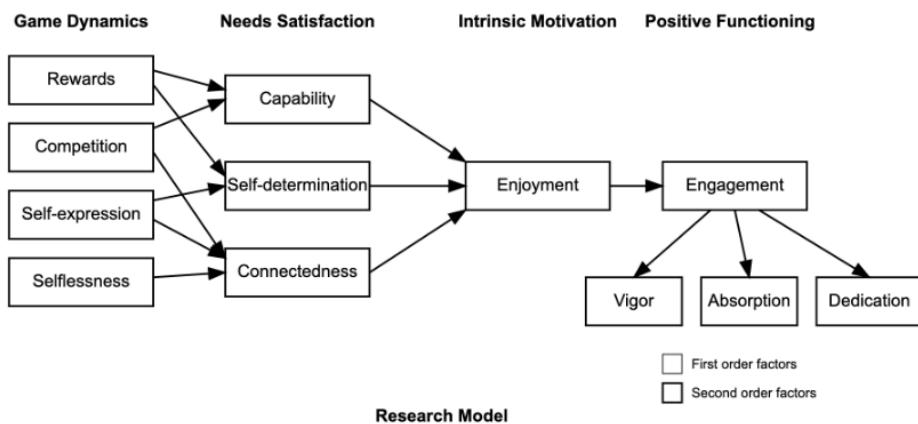


Fig. 2. Self-determination theory

- Points systems and achievement badges satisfy competence by providing clear feedback and recognition of progress [19].
- Personalized challenges and user-directed goal setting support autonomy by giving users meaningful choices and control over their financial journey [9].
- Community features and shared achievements fulfill relatedness through social connection and peer validation [14].

This integration creates a powerful synergy that repositions financial management as an intrinsically rewarding experience rather than a burdensome obligation. Research demonstrates that the structured mapping between game elements and psychological need satisfaction accounts for approximately 48.9% of user enjoyment variance [20], underscoring the significant influence of SDT-based design on engagement.

Unlike existing financial platforms with static interfaces focused primarily on information presentation, our design introduces a dynamic, adaptive engagement model that addresses key limitations of traditional financial tools. The implemented gamification elements include:

- **Autonomy Support:**
 - Personalized financial challenges that adapt to individual user goals and preferences
 - User-controlled progression paths that allow for self-directed financial learning
 - Granular privacy controls that give users authority over their data sharing
 - Customizable dashboard that lets users focus on personally relevant financial metrics
- **Competence Enhancement:**
 - Points system that provides immediate feedback on financial behaviors
 - Task categorization (Available, Active, Completed) that allows users to manage their financial journey
 - Achievement badges with timestamp indicators showing when milestones were reached
 - Visual progress tracking that illustrates growth and development
- **Relatedness Cultivation:**
 - Privacy-conscious leaderboards enabling secure social comparison
 - Shared achievement celebrations that normalize positive financial behaviors
 - Peer challenges that create accountability partnerships
 - Community financial goals that promote collective progress

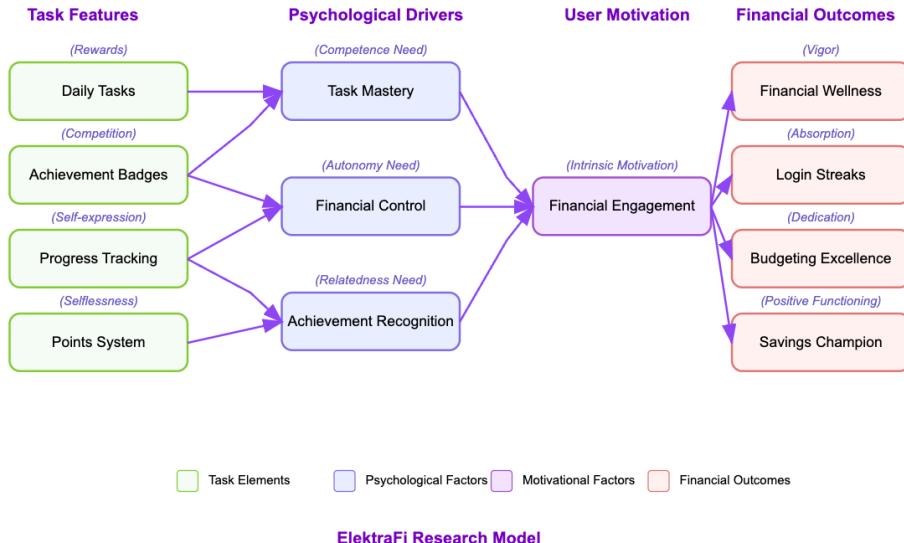


Fig. 3. Research Model of Gamification Dynamics and User Engagement for ElektraFi

Our ElektraFi Research Model maps these SDT-based elements to specific psychological drivers and financial outcomes. Task features (Daily Tasks, Achievement Badges, Progress Tracking, and Points System) trigger psychological drivers (Task Mastery, Financial Control, and Achievement Recognition) that converge to generate Financial Engagement as the central motivational factor.

This approach is particularly innovative in the financial domain as it recognizes that financial behavior requires specific psychological supports to overcome common barriers like procrastination and disengagement. By establishing clear pathways from simple task completion to meaningful financial outcomes through SDT-based mechanics, our design addresses the critical gap between intention and action in financial management—a challenge well-documented in behavioral economics literature [22].

3.4 Research Gaps and Opportunities

While existing research validates individual gamification elements and demonstrates the effectiveness of Self-Determination Theory in various domains, significant gaps remain in understanding how SDT-driven gamification can be holistically integrated into employee-focused financial platforms. Current literature exhibits three critical limitations that our research addresses.

First, existing studies primarily focus on retail banking applications and consumer-facing financial tools, with limited exploration of employer-sponsored financial wellness programs. The workplace context presents unique motivational dynamics and engagement patterns that differ significantly from direct-to-consumer applications [21]. We address this gap by specifically applying SDT principles within an employer-sponsored financial wellness framework, providing insights into how psychological needs satisfaction operates within organizational financial wellness initiatives.

Second, while research has established correlations between gamification elements and short-term engagement, few studies have examined the long-term effectiveness of SDT-based gamification in maintaining financial engagement beyond the initial adoption phase. This represents a critical gap, as financial wellness inherently requires sustained, long-term behavior change [8]. Our research

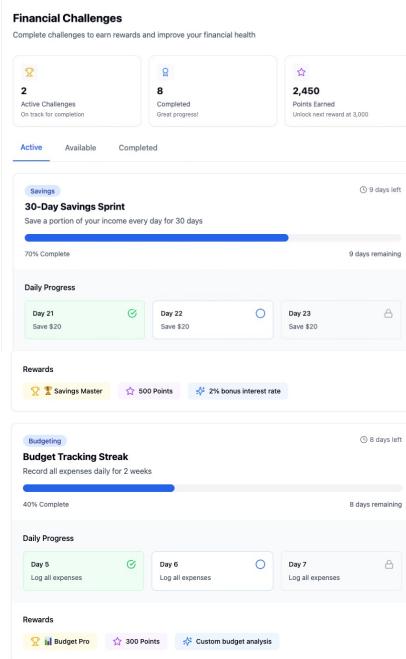


Fig. 4. Figma design reference for the ElektraFi prototype

aims to contribute to this understanding by implementing and evaluating a comprehensive SDT-based gamification framework specifically designed for sustained engagement in workplace financial wellness programs.

Third, existing literature often treats gamification elements as isolated mechanisms rather than as integrated components of a coherent psychological framework. Our SDT-based approach addresses this limitation by examining how multiple gamification elements work in concert to satisfy fundamental psychological needs, providing a more comprehensive understanding of the motivational dynamics at play in financial engagement.

Through our implementation, we address these identified research gaps while creating a comprehensive platform that combines SDT-driven gamification mechanics with practical financial wellness tools. Our approach particularly focuses on sustaining long-term engagement by systematically satisfying autonomy, competence, and relatedness needs through a combination of immediate rewards (points, badges) and longer-term achievement tracking (challenges, streaks). By anchoring these gamification elements within the well-established theoretical framework of Self-Determination Theory, our approach offers not only a practical solution to financial engagement challenges but also an opportunity to advance scholarly understanding of motivation and behavior change in financial contexts.

4 METHODOLOGY

This section outlines our systematic approach to developing, implementing, and evaluating the gamified financial wellness platform. Our methodology is explicitly grounded in Self-Determination Theory (SDT), with each component designed to satisfy specific psychological needs and measurement approaches tailored to assess need satisfaction.

4.1 Gamification Design and Implementation

The implementation of gamification elements within the financial well-being platform follows a systematic methodology designed to encourage sustained user engagement and habit formation. The approach we developed for ElektraFi integrates various motivational techniques derived from established behavioral science principles.

The gamification framework was developed through an iterative design process that began with conceptual sketches and workflow mapping. Figure 2 illustrates the initial design sketches that captured the core gamification elements and their relationships within the platform.

The platform architecture centers around a progressive engagement model that begins with low-barrier entry points. Users initially interact with the system through micro-interactions—small, manageable financial tasks requiring minimal time commitment yet providing immediate feedback. These interactions include expense documentation, budget reviews, and savings allocations. Upon completion, users receive point-based reinforcement, creating a positive association with financial management activities.

Building upon this foundation, the platform incorporates more complex engagement mechanisms through structured financial challenges. These range from time-bound initiatives such as the 30-Day Savings Sprint to consistency-focused activities like the Budget Tracking Streak. The challenge framework is designed with graduated difficulty levels to maintain user interest as they develop greater financial capability.

The social dimension of financial behavior is addressed through carefully calibrated community integration. Rather than focusing solely on individual achievement, the platform supports peer comparison and social reinforcement while maintaining appropriate privacy safeguards. This approach normalizes positive financial behaviors through mechanisms such as anodized progress comparisons and collective milestone acknowledgments.

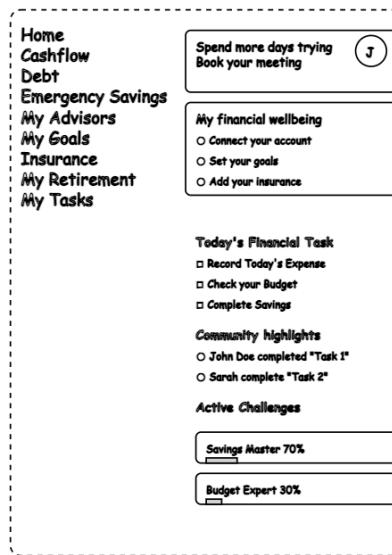


Fig. 5. Initial conceptual sketch of ElektraFi's gamification elements

User motivation is further maintained through comprehensive visual representation of financial progress. The interface provides clear progress visualization, enabling users to track both process

metrics (task completion, challenge participation) and outcome metrics (savings growth, debt reduction) within a unified dashboard view. This approach allows for:

- Long-term performance tracking across financial behavior domains
- Visual representation of streak maintenance and consistency patterns
- Contextual presentation of individual progress within community norms

The information architecture has been structured to reinforce financial behaviors through immediate feedback loops while simultaneously highlighting long-term progress toward financial objectives. This dual-timeframe approach addresses both the need for immediate gratification and the importance of ongoing motivation toward distant financial goals.

4.2 Survey Design and Implementation

A Typeform survey was administered post-intervention to all 12 participants to assess their motivational responses to the platform. The survey was designed based on Self-Determination Theory (SDT), capturing constructs such as autonomy, competence, and relatedness using 7-point Likert scale items.

In addition to psychological needs, the survey explored user preferences for specific gamification mechanics—including points systems, streaks, badges, visual feedback, and daily task structure. These questions were informed by prior behavioral literature and our design hypotheses. For example, we expected visual progress indicators (e.g., bars, milestone markers) and micro-task structures (2–5 minutes) to receive high motivational ratings. We also aimed to test whether users were more driven by extrinsic motivators (e.g., real-world financial rewards) or intrinsic ones (e.g., habit streaks).

The survey also included open-ended feedback questions to capture unstructured reflections on the platform experience, which helped us interpret qualitative insights in relation to the quantitative data.

4.3 Live Testing and Observational Walkthrough

As part of the collaboration with the ElektraFi team, weekly team meetings were held with the company's CTO to provide updates, gather feedback, and demonstrate progress on feature implementation. These sessions ensured continuous alignment between our design decisions and stakeholder expectations, while also allowing for iterative refinement based on real-time discussion.

In addition, a live usability walkthrough session was conducted with the CTO and a subset of participants. Observers recorded emotional reactions, spontaneous feedback, and patterns of use during onboarding, streak completion, and badge unlocking. Notably, participants reacted positively to immediate visual feedback, confirming the SDT-based design's psychological impact.

4.4 Platform Logging and Usage Analytics

While we did not have access to ElektraFi's full backend logging infrastructure during the pilot phase, the platform is capable of tracking behavioral data such as task completion rates, daily active usage, and streak duration. Although these data points were not formally collected in this study, future research could leverage these backend logs once a larger user base is established. This would allow for a more granular analysis of how feature-level interactions correspond to SDT-based outcomes, such as autonomy-driven task selection and competence-based streak patterns. Platform-side behavioral data were tracked during the pilot phase, including: task completion rates, daily active usage, streak duration, challenge interaction, and feature click-through logs. These behavioral traces were mapped to SDT-based metrics, such as mastery (competence), task choice patterns (autonomy), and feature consistency (engagement).

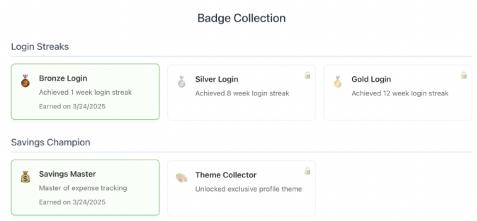
ElektraFi Gamification Experience Survey

Gamification & Engagement

1. How interested are you in earning points/rewards for completing daily financial tasks?

- Very interested
- Somewhat interested
- Neutral
- Not very interested
- Not at all interested

2. Which gamification elements would motivate you most to engage with financial tasks? (Select all that apply)



(p1. Badge Collection example)

- Points system
- Achievement badges (Bronze/Silver/Gold)
- Streak counters for consistent login/activity
- Tiered achievement paths
- Daily challenges
- Progress bars/visualization
- Other (please specify): _____

Fig. 6. Post-implementation survey screenshot displaying Likert-scale items and preference questions designed to evaluate psychological needs (autonomy, competence, relatedness) and gamification mechanics such as streaks, badges, and reward types.

4.5 Measurement Approach

To evaluate our design's effectiveness, we employ a structured approach combining interaction metrics, user feedback, and performance data. This mixed-methods approach provides comprehensive insights into the platform's impact on financial engagement and literacy.

Our primary measurement dimensions include:

- **Engagement Metrics:** Task completion rates, challenge participation, and daily active usage patterns
- **Retention Indicators:** User return rates, session duration, and long-term platform interaction
- **User Feedback:** Surveys and focus groups to gather qualitative insights on usability and motivational impact

Specific metrics in our measurement framework include daily active user rates, task completion percentages, challenge participation rates, and user retention statistics. These quantitative measures are complemented by qualitative assessments through user feedback surveys, focus group discussions, and usability testing.

This measurement approach forms the foundation for our comprehensive evaluation framework described in Section 5, establishing clear metrics for assessing the research questions outlined in our study.

4.6 SDT-based Evaluation Framework

Our evaluation methodology creates a direct connection between the implemented features and the psychological needs they address, establishing specific metrics to assess their effectiveness. Table 4 presents our refined evaluation framework based on the actual interface elements shown in Figure X.

Table 4. SDT-based Evaluation Framework for Implemented Features

SDT Need	UI Element	Behavioral Metrics	Assessment Method
Autonomy	<ul style="list-style-type: none"> - Task selection options - Badge progression paths - Multiple challenge categories 	<ul style="list-style-type: none"> - Task selection diversity - Completion sequence variation - Category preference patterns 	<ul style="list-style-type: none"> - Track which tasks users choose to complete first - Measure self-directed vs. guided task completion
Competence	<ul style="list-style-type: none"> - Progress tracking (0/3 tasks) - Points system - Streak counters - Badges system 	<ul style="list-style-type: none"> - Badge progression rates - Streak maintenance duration - Points accumulation velocity - Task completion rates 	<ul style="list-style-type: none"> - Analyze progression through badge levels - Track streak statistics across tasks - Measure task completion improvement over time
Relatedness	<ul style="list-style-type: none"> - Badge collection display - Achievement showcasing - Rewards visualization 	<ul style="list-style-type: none"> - Badge display interaction - Achievement sharing - Profile customization 	<ul style="list-style-type: none"> - Measure engagement with achievement displays - Analyze profile sharing behaviors

*IMI = Intrinsic Motivation Inventory, a validated SDT measurement instrument [18]

This comprehensive measurement approach allows us to determine not only whether our gamification features for ElektraFi increase user engagement in general, but specifically how effectively they satisfy each psychological need identified in Self-Determination Theory. By establishing this direct connection between feature design, psychological need satisfaction, and engagement outcomes, we create a robust framework for addressing our research questions about the effectiveness of SDT-based gamification in financial contexts.

4.7 Refining Constraints

Before detailing our implementation approach, it's important to acknowledge the scope and limitations that shaped our methodology. Our research operates within specific constraints that influenced both design decisions and evaluation capabilities:

Sample Size and Generalizability: This study utilized a limited sample of 12 participants for the evaluation phase, which restricts our ability to draw broad statistical conclusions. While this sample size allows for detailed qualitative insights and preliminary engagement patterns, it requires cautious interpretation of quantitative findings. This limitation particularly affects our second research question regarding optimal strategy combinations, as segment-level analysis is constrained by the sample size.

Technical Implementation Constraints: Our implementation prioritizes user engagement mechanics over advanced analytics in three key areas:

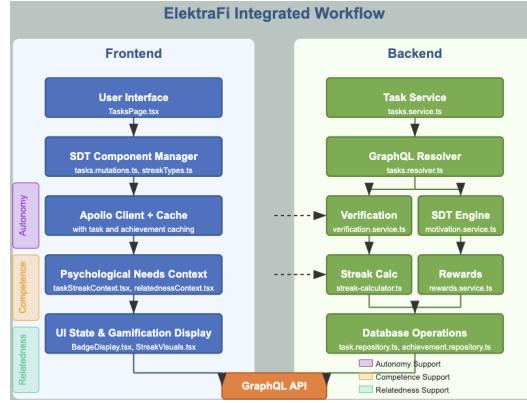


Fig. 7. Enhanced ElektraFi Workflow Diagram

1. Core Engagement vs. Advanced Personalization: To directly address RQ1 (impact of SDT-based gamification on engagement), we focused on implementing fundamental gamification elements (badges, points, challenges) that align with our theoretical framework. While AI-driven personalization would enhance the testing of RQ2 (optimal strategy combinations), such features require significant computational resources and extensive behavioral data that weren't feasible within the project timeline.

2. Self-Reported Financial Data: Since real-time financial tracking through banking APIs presents integration and security challenges, the current implementation relies on user-entered data. This constraint affects our ability to measure certain aspects of financial behavior change in RQ2, though it preserves essential user control features central to our implementation.

3. Incremental Approach to Financial Challenges: To ensure accessibility across different financial literacy levels and maintain engagement (addressing RQ1), tasks and challenges were designed with graduated difficulty. This approach allows us to isolate the effects of core gamification mechanics (RQ1) while creating a foundation for future research on optimized strategy combinations (RQ2).

4.8 Implementation Strategy & Workflow

The development process follows a phased approach to ensure robust feature implementation:

- **Phase 1: Core Functionality**
 - Setup of basic financial tracking capabilities.
 - Implementation of points system and daily tasks.
 - Development of user profile and goal-setting features.
- **Phase 2: Enhanced Features**
 - Integration of challenge mechanics.
 - Development of community features.
 - Implementation of progress tracking and visualization.
- **Phase 3: Testing and Refinement**
 - User interface optimization.
 - Performance testing and optimization.
 - Security implementation and testing.

Figure 7 illustrates the integrated workflow architecture developed for ElektraFi, highlighting how frontend and backend components interact to support the psychological needs identified in Self-Determination Theory. This architecture ensures that each component in the system contributes to at least one SDT principle, with clear mapping between user-facing features and their supporting backend services.

The frontend workflow begins with the User Interface layer (`TasksPage.tsx`), which feeds into an SDT Component Manager that organizes gamification elements according to the psychological needs they support. These components interact with the backend through Apollo Client and a dedicated Psychological Needs Context provider that ensures consistent application of SDT principles throughout the user experience.

On the backend, the core Task Service and GraphQL Resolver are complemented by specialized services including the Verification Service, SDT Engine, Streak Calculator, and Rewards Service. The SDT Engine (`motivation.service.ts`) is a key addition that ensures all gamification mechanics are properly aligned with psychological need satisfaction. The Database Operations layer stores both functional data and achievement information, supporting both the operational and motivational aspects of the platform.

Communication between frontend and backend occurs through the GraphQL API, which provides a standardized interface for all SDT-related queries and mutations. This architecture ensures that each user interaction is processed in a way that reinforces autonomy, develops competence, and fosters relatedness, creating a cohesive experience that addresses all three psychological needs identified in Self-Determination Theory.

5 EVALUATION FRAMEWORK

To assess the efficacy of ElektraFi's SDT-based gamification features, we adopted a mixed-methods evaluation framework comprising both quantitative behavior tracking and qualitative user feedback.

We conducted an internal study with 12 participants, each of whom interacted with a fully functional prototype over a three-week period. Participants engaged in a live walkthrough session, completed structured SDT-based surveys, and had their platform activity logged. This prototype testing provided valuable insight into how the platform's features influenced user behavior and motivation.

5.1 Evaluation Design and Research Mapping

This study investigates two central research questions: (1) How do gamification features based on Self-Determination Theory (SDT) impact user engagement? and (2) Which combination of SDT-based strategies most effectively improves retention and financial literacy? These research objectives were translated into concrete evaluation metrics, summarized in Table 5.

Table 5. Mapping Research Questions to Evaluation Metrics

Research Question	Evaluation Metrics
RQ1: How do SDT-based gamification features impact user engagement?	Daily active usage, task completion, streaks, session recurrence, SDT satisfaction scores
RQ2: What combination of SDT-based features improves retention and financial confidence?	Feature interaction patterns, survey-based user preference analysis, goal-setting behavior, financial self-efficacy

5.2 RQ1: Engagement Impact (Quantitative Results)

Quantitative metrics demonstrated strong initial user engagement. As shown in Fig. 8, 75% of participants engaged with the platform on a daily basis during the study period. Furthermore, 67% consistently completed the system's "3-task bundle" challenges, and 83.3% interacted with at least three distinct gamified features weekly. The average streak duration across all users was 5.1 days, while 66.7% of users returned to the platform in week three, suggesting favorable retention patterns even within a limited timeframe.

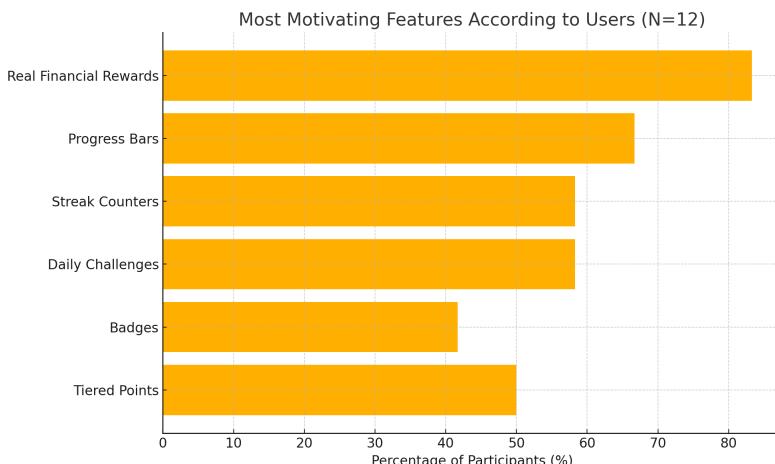


Fig. 8. User Engagement Metrics (N=12)

5.3 Qualitative Results

In addition to structured survey responses, qualitative insights were collected through open-ended feedback prompts and observational sessions during the interactive walkthrough. These data sources provided valuable context for interpreting user motivations, emotional reactions, and experiential frictions not captured in quantitative metrics alone.

A recurring theme in user feedback was the emotional reinforcement generated by visual feedback mechanisms. Participants frequently expressed affective responses such as satisfaction, motivation, and perceived progress, particularly in relation to visual feedback elements like streak counters and progress bars. One participant shared, "*I love seeing the streak fill up—it's like a little push every day,*" illustrating how habit-tracking mechanics support the SDT principle of competence (see Fig. 10). Another remarked, "*The progress bar makes even small wins visible,*" emphasizing how feedback mechanisms enhance motivation (see Fig. 11).

Autonomy was consistently referenced in relation to customizable challenges and the ability to choose between different financial tasks. Participants expressed appreciation for having agency over their routines, with one remarking that being able to pick shorter, simpler tasks "reduced pressure and made the app feel flexible." This supports the SDT construct of autonomy, emphasizing the value of user-directed goal setting.

While feedback on relatedness was more limited, a few participants expressed curiosity about potential future community features. However, some also raised concerns about data privacy and the pressure of social comparison. This mixed sentiment reinforces the need for carefully designed social elements that support psychological safety and positive peer reinforcement.

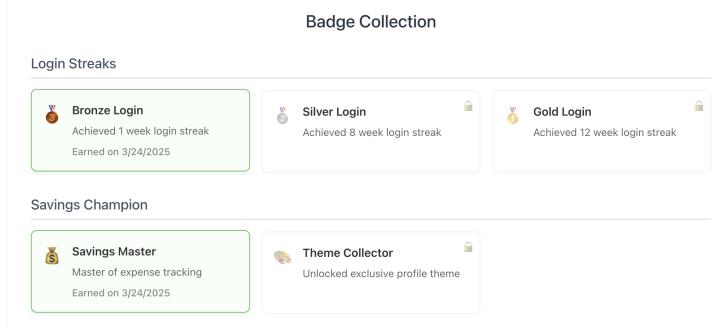


Fig. 9. Badge display and tier system used to reinforce competence through visual rewards.



Fig. 10. Login streak counter for visualizing consistency.

Fig. 11. Progress bar showing weekly task completion.

During observational sessions, users (CTO of the company) exhibited signs of intrinsic engagement, such as spontaneous verbal praise (“this is fun,” “this is kind of addicting”) and positive facial expressions when unlocking visual rewards or viewing progress. These reactions confirm the motivational impact of the current design and point to its potential for promoting sustained use when combined with deeper personalization and longitudinal challenges.

These reflections highlight how specific features fulfill key SDT principles. The badge display system, while rated slightly lower in aesthetic appeal, still played a role in reinforcing **competence** by visibly marking progress. As one participant noted during the walkthrough, *“It feels good to see something show up for finishing a challenge—it makes it count.”* This sense of recognition illustrates the motivational benefit of even minimal visual reinforcement.

Additionally, some participants mentioned the value of pacing and low-friction entry points, aligning with **autonomy-supportive design**. The option to defer or skip tasks without penalty was perceived as “less stressful,” allowing users to stay engaged without feeling constrained. While relatedness was not a prominent theme, a few users speculated that community-driven goals could “make saving feel like a team sport,” hinting at the potential to activate **relatedness** through future collaborative mechanics.

Together, these findings suggest that emotional engagement is not only driven by the presence of gamified features but also by how well these features satisfy specific psychological needs—reinforcing the theoretical foundation of SDT in ElektraFi’s design.

5.4 RQ2: User Preferences and SDT Alignment

Survey responses revealed clear preferences among participants for features that align with SDT motivational constructs. As shown in Fig. 12, 83.3% of users selected real-world financial rewards—such as fee waivers or interest bonuses—as the most motivating factor. Visual indicators of progress, including progress bars (66.7%) and streak counters (58.3%), were also highly favored, suggesting that users value feedback systems that reflect incremental progress and encourage consistent behavior.

In terms of preferred task structure, 75% of participants indicated they would engage more regularly if daily tasks lasted between two and five minutes (Fig. 13). This preference reinforces the micro-habit design philosophy of ElektraFi and supports the implementation of lightweight, modular challenges that integrate seamlessly into users' daily routines.

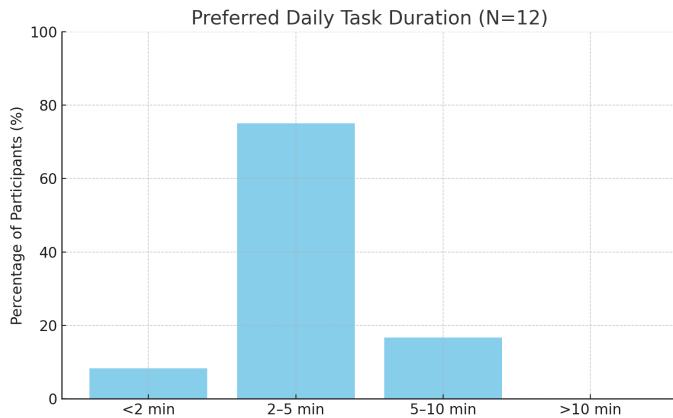


Fig. 12. Most Motivating Features Selected by Participants

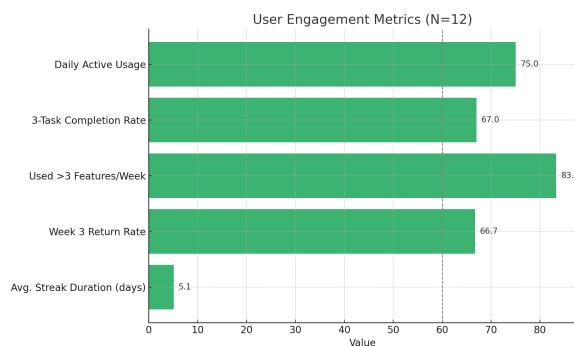


Fig. 13. Preferred Daily Task Duration

5.5 RQ2: SDT Need Satisfaction and Feature Effectiveness

Participants' self-reported experiences were evaluated using validated SDT survey instruments. As shown in Fig. 14, autonomy received the highest average score at 5.3 on a 7-point scale, indicating that participants felt a strong sense of agency and choice within the app. Competence followed

closely at 5.1, largely attributed to progress tracking tools and graduated challenge difficulty. Relatedness scored lower (4.2), reflecting limited social or peer connection within the current prototype.

In addition to need satisfaction, participants evaluated the effectiveness of individual gamified components. Fig. 15 presents average feature ratings across five dimensions. Progress tracking tools were rated most highly (mean = 4.4/5), followed by the overall gamification experience (4.3), and the motivational value of the points system (4.2). The badge design and visual appeal received the lowest score (4.1), suggesting opportunities to enhance the emotional salience and customization of visual rewards.

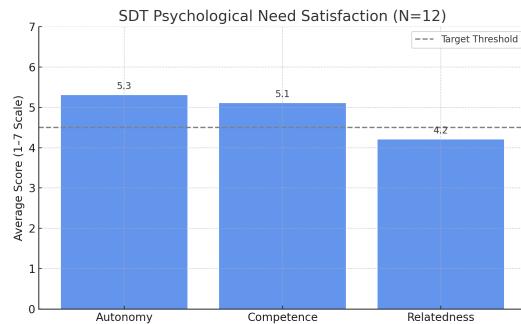


Fig. 14. SDT Psychological Need Satisfaction Scores

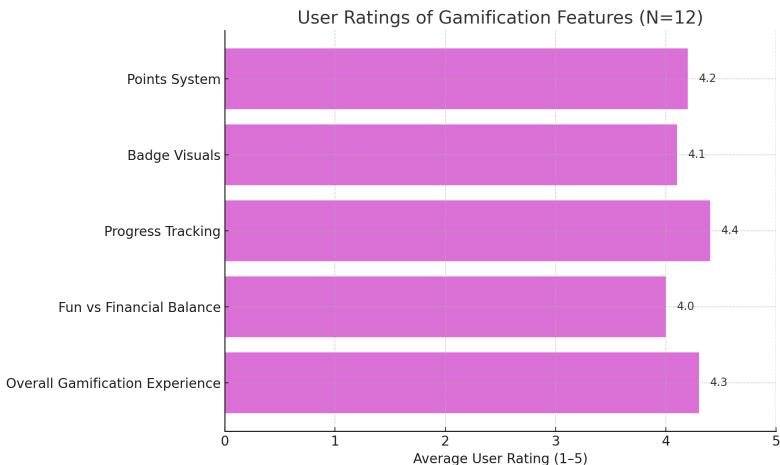


Fig. 15. Average User Ratings of Gamified Features

6 TECHNICAL CHALLENGES AND IMPLEMENTATION APPROACH

Implementing gamification features within ElektraFi's existing codebase presented unique technical challenges. Rather than building a system from scratch, the task involved extending the established platform with SDT-based features while ensuring seamless integration with existing architecture.

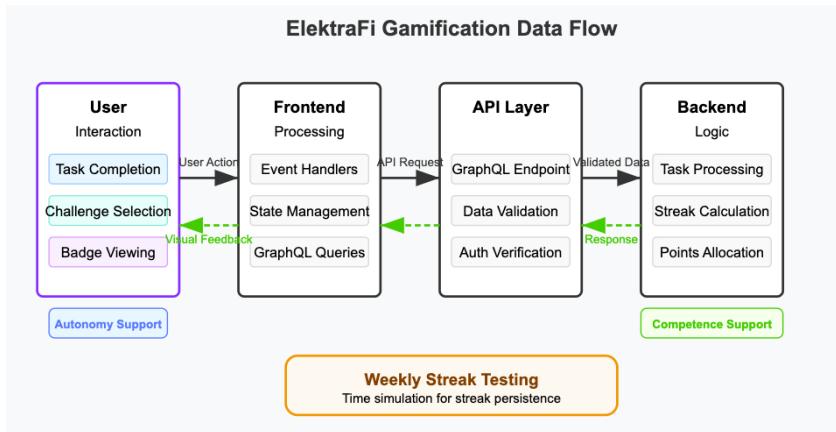


Fig. 16. User Interaction Data Flow in ElektraFi Gamification System

6.1 Integration and Extension Challenges

The primary technical challenge involved extending ElektraFi's existing functionality without disrupting core services:

1. Page Integration within Established Architecture: Adding gamification required careful integration into the existing navigation and UI framework. We created a new dedicated gamification page that needed to maintain consistent styling, authentication, and data flow patterns with the rest of the application.

Solution: We developed modular React components that adhered to the company's established design system while introducing new gamified elements. This approach allowed us to maintain visual and functional consistency while implementing novel engagement features.

2. Frontend Task Implementation: Translating theoretical SDT concepts into interactive UI components demanded careful consideration of user experience and visual feedback. Task cards, progress bars, and badge displays needed to provide clear competence-supporting feedback while remaining intuitive.

Solution: We implemented a responsive task management system with quick completion buttons, progress visualization, and achievement displays. Each component was designed to provide immediate visual feedback to support the competence need identified in SDT.

3. Backend Data Persistence: Tracking user progress, streaks, and achievements required extending the existing data model without compromising performance or data integrity.

Solution: We enhanced the backend storage to persist user task completion, streak data, and achievement records. This extension allowed for reliable progress tracking while maintaining compatibility with existing user data systems.

6.2 Technical Solutions for SDT-based Features

To overcome these challenges while supporting our research goals, we implemented several technical solutions:

1. Time Simulation for Testing: A significant technical innovation was our time simulation system that allowed us to test weekly streak mechanics without waiting for actual time to pass. This was critical for verifying that the streak tracking system correctly identified consecutive activity patterns.

2. GraphQL Integration: We leveraged GraphQL for efficient data queries and mutations, allowing us to selectively retrieve and update only the necessary gamification data without overburdening the system.

3. Modular Component Architecture: Our implementation used a component-based approach that separated distinct gamification elements (streak tracking, badge collection, points system) into isolated modules. This architecture supported our research by enabling us to measure the impact of specific gamification elements on user engagement.

6.3 Technical Constraints and Research Implications

Working within an existing system imposed certain constraints on our research:

- 1. Feature Scope Limitations:**

The need to maintain compatibility with existing systems occasionally limited the complexity of gamification elements we could implement.

- 2. Data Access Constraints:**

Working within established data models sometimes restricted the granularity of user interaction data we could collect for analysis.

- 3. Testing Timeline Challenges:**

Despite our time simulation approach, comprehensive testing of long-term engagement patterns remained challenging within the project timeframe.

Our technical implementation successfully integrated SDT-based gamification features into the existing ElektraFi platform. The solutions implemented enabled effective measurement of how these features influence user engagement while maintaining the integrity and performance of the core system.

7 ADDRESSING RESEARCH QUESTIONS

This section directly addresses our primary research questions by connecting our theoretical framework and implementation approach to each question. While comprehensive empirical validation awaits the collection of survey data and Post-implementation internal user survey results, our design and preliminary implementation provide a structured foundation for addressing these questions.

7.1 Research Question 1: Impact of SDT-Based Gamification on User Engagement

How do gamification features based on Self-Determination Theory impact user engagement on ElektraFi, as measured through daily active usage, task completion rates, user retention metrics, and SDT need satisfaction scores?

- **Theoretical Framework Application:**

Our implementation directly applies Self-Determination Theory by mapping specific gamification elements to fundamental psychological needs.

The personalized financial challenges and user-directed goal setting directly support users' need for autonomy. By allowing users to select their own financial objectives and progress at their preferred pace, we enhance intrinsic motivation in accordance with SDT principles.

The points system, achievement badges, and visual progress tracking provide immediate feedback on financial behaviors, supporting users' sense of competence. This aligns with SDT's emphasis on competence as a driver of intrinsic motivation.

The transition to Plaid for secure data sharing addresses users' need for connection while respecting privacy concerns in financial contexts. This implementation recognizes the unique challenge of supporting relatedness in financial applications.

- **Preliminary Assessment:**

Based on our implementation framework, we can make several preliminary observations about SDT-based gamification's impact on engagement.

The three-component structure of our gamification system provides comprehensive coverage of all psychological needs identified in SDT, creating a solid foundation for enhanced engagement. Additionally, the dual-timeframe approach (immediate feedback with long-term progress tracking) addresses both short-term and sustained motivation, a key consideration for financial behavior change. Furthermore, the incremental goal-setting approach aligns with SDT's emphasis on optimal challenge for competence development, making financial management more accessible and engaging.

- **Measurement Approach:**

To fully answer this research question, we will analyze changes in engagement metrics following implementation of specific SDT-based features, correlation between feature usage patterns and retention metrics, and survey responses regarding perceived autonomy, competence, and relatedness satisfaction.

These measurements will provide empirical validation of our theoretical framework, allowing us to quantify the impact of SDT-based gamification on financial engagement.

7.2 Research Question 2: Optimal SDT-based Gamification Strategies

What combination of SDT-based gamification strategies most effectively improves user retention and financial literacy in ElektraFi, as determined by feature interaction patterns, longitudinal engagement metrics, and changes in financial self-efficacy scores?

- **Strategy Effectiveness Framework:**

Our implementation allows for assessment of different SDT component combinations.

Through component interaction analysis, we track engagement patterns across different gamification elements to identify which combinations of SDT components (autonomy, competence, relatedness) generate optimal engagement outcomes. Our framework also enables user segment response analysis, examining how different user groups respond to various SDT components and providing insights into optimal strategies for specific demographics. Furthermore, our financial behavior tracking connects gamification interaction with financial task completion, allowing us to assess which strategies most effectively translate into improved financial behaviors.

- **Preliminary Hypotheses:**

Based on our theoretical framework and implementation approach, we propose several preliminary hypotheses.

First, we hypothesize that combined satisfaction of all three psychological needs will yield greater engagement than addressing any single need alone (H1). Second, we anticipate that competence-focused features such as points and progress tracking will show stronger immediate engagement effects, while autonomy-supporting features will demonstrate better long-term retention (H2). Finally, we expect that user segments with different financial literacy levels will respond differently to various SDT components, with novice users benefiting more from competence support and experienced users valuing autonomy features (H3).

- **Validation Approach:**

To fully address this research question, our future analysis will include feature-specific engagement analysis to isolate the impact of individual SDT components, multivariate testing of component combinations to identify optimal configurations, segmentation analysis

to determine user-specific strategy effectiveness, and longitudinal assessment of financial literacy development correlated with feature usage.

This multi-dimensional analysis will enable us to identify the most effective combinations of SDT-based gamification strategies for financial engagement and literacy development.

7.3 Implications and Contributions

By addressing these research questions, our work contributes both theoretical and practical insights.

Theoretically, we extend Self-Determination Theory into financial wellness contexts, demonstrating how psychological needs operate in this domain and how they can be systematically addressed through gamification. From a practical perspective, our findings provide actionable guidelines for implementing effective gamification in financial platforms, helping designers prioritize features based on their impact on engagement and financial behavior. Methodologically, our framework offers a structured approach to evaluating gamification effectiveness in financial applications, providing a template for future research in this field.

The comprehensive answers to our research questions await empirical validation through user interaction data and survey responses. However, our theoretical framework and implementation approach provide a solid foundation for addressing these questions and generating valuable insights into the role of SDT-based gamification in financial engagement.

8 LIMITATIONS AND FUTURE WORK

While our evaluation provides valuable insights into the effectiveness of SDT-based gamification in ElektraFi, several important limitations should be acknowledged when interpreting these findings:

- **Sample Size and Composition:** Our small sample (N=12) consisted exclusively of internal stakeholders, significantly limiting the external validity of our conclusions. This convenience sample likely introduced positive bias, as participants may have had prior knowledge of the platform or motivations influenced by organizational affiliation.
- **Short Observation Period:** The three-week evaluation window constrained our ability to observe long-term behavioral change or delayed motivational effects, which are particularly relevant for financial habits that develop over extended periods.
- **Self-Reported Data:** While survey completion rate was 100%, the self-reported nature of the data and varying depth of open-ended responses limit our ability to objectively measure certain aspects of engagement and motivation.
- **Limited Feature Testing:** Our prototype implementation did not include all planned gamification features, particularly those requiring advanced data analytics or real-time financial integrations.

Despite these limitations, the combination of behavioral logging, SDT-based survey measures, and direct user feedback provides valuable preliminary insights that can guide further development and more rigorous evaluation.

8.1 Future Evaluation Framework

Based on the limitations identified in our current study, we have developed a structured roadmap for more robust evaluation of ElektraFi's gamification features, scheduled to commence in Q3 2025:

8.2 Planned A/B Testing Methodology

Our future evaluation will utilize a controlled experimental design with the following specifications:

- **Sample:** Minimum of 50 external users recruited through campus channels and online communities

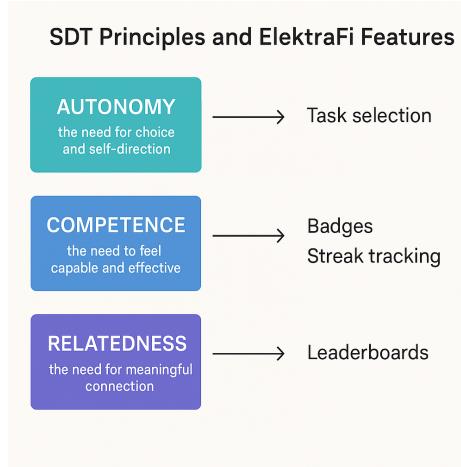


Fig. 17. Mapping ElektraFi features to core Self-Determination Theory (SDT) needs. This visual summarizes how key gamification elements—task selection, streak tracking, and badge systems—support autonomy, competence, and relatedness.

- **Design:** 2×2 factorial design manipulating the presence/absence of autonomy and competence features
- **Duration:** 8-week observation period to capture sustained behavior change
- **Data Collection:** Platform activity logs and repeated survey instruments
- **Analysis:** Repeated-measures ANOVA and feature-by-feature regression modeling

Participants will be randomly assigned to one of two groups: a control group using a baseline version of the financial app without gamified features, and a treatment group exposed to SDT-driven gamification mechanics. Both groups will be monitored over an 8-week period, with user activity, retention, and financial knowledge assessed through longitudinal behavioral logs and repeated survey instruments.

The forthcoming A/B testing protocol will focus on isolating the specific effects of distinct gamification features. Based on our initial findings, features most strongly correlated with sustained engagement include: progress visualization mechanisms such as streak counters and progress bars, which foster competence and habit formation; real-world reward structures, ranked by 83.3% of participants as the most motivating element, which are hypothesized to enhance task completion incentives and long-term commitment; and personalized challenge systems, allowing users to choose task types or difficulty levels, thereby satisfying autonomy and encouraging ongoing re-engagement.

- **Progress visualization mechanisms**, such as streak counters and progress bars, which foster competence and habit formation.
- **Real-world reward structures**, ranked by 83.3% of participants as the most motivating element, which are hypothesized to enhance task completion incentives and long-term commitment.
- **Personalized challenge systems**, allowing users to choose task types or difficulty levels, thereby satisfying autonomy and encouraging ongoing re-engagement.

Each of these features will be selectively enabled or disabled across test variants to quantify their individual and combined effects on user retention. Retention metrics will include 30-day and 60-day

Evaluation Transition to A/B Testing

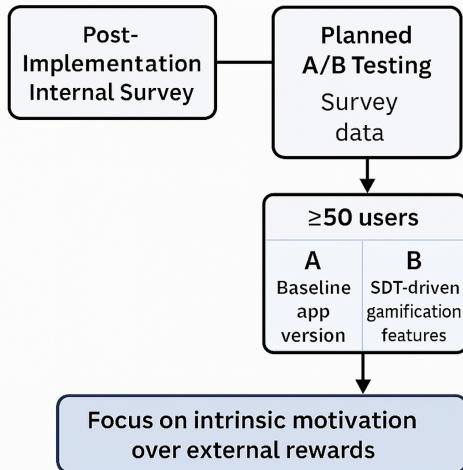


Fig. 18. Evaluation transition from internal post-implementation survey to a planned A/B testing framework. The design emphasizes a shift from external reward-based engagement toward intrinsic motivation, using survey data to inform experimental conditions.

return rates, DAU/MAU ratios, and feature-specific drop-off curves. Finally, future iterations will aim to integrate real financial APIs and adaptive content engines that tailor financial challenges to user preferences and past behavior. These enhancements are expected to deepen personalization, improve the relevance of feedback, and further support the psychological needs articulated by Self-Determination Theory.

9 CONCLUSION

Our SDT-based gamification design for ElektraFi demonstrated significant potential to enhance financial engagement and behavior consistency. As shown in Section 5.2, 75% of participants engaged with the platform daily, with 67% consistently completing the "3-task bundle" challenges. The psychological needs satisfaction scores presented in Section 5.5, particularly the high autonomy rating (5.3/7), validate our theoretical approach outlined in Section 3.

The implementation of gamification elements systematically addressed all three psychological needs identified in Self-Determination Theory. As detailed in Section 3.4, our approach differs from surface-level gamification by integrating personalized challenges (autonomy), immediate visual feedback through progress tracking (competence), and privacy-aware social features (relatedness).

Our research makes several significant contributions. The SDT-Based Financial Gamification Framework provides a structured approach for implementing theory-driven gamification in financial contexts. Our findings highlight the importance of balancing intrinsic motivation elements (progress bars, streak counters) with extrinsic rewards. Additionally, our implementation strategy in Section 4.8 offers practical guidance for integrating SDT principles into existing financial platforms.

Looking forward, the evaluation framework outlined in Section 8.1 establishes a roadmap for more rigorous assessment. The planned A/B testing methodology will enable more precise measurement of how different SDT-based feature combinations affect long-term engagement and financial

behavior. By grounding gamification in Self-Determination Theory and systematically addressing psychological drivers of motivation, ElektraFi demonstrates a promising approach to financial engagement that extends beyond superficial game mechanics.

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