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FINANCIAL FOREST: A SMART PHONE APP

by

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B.S. Northwestern University, 1998

A thesis submitted in partial fulfillment of the requirements
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ABSTRACT

Regular savings behavior is critical for low-income Americans to achieve financial mobility. New technology tools are being used to improve personal awareness and attention to financial goals. This thesis reviews mobile learning (mLearning) research and leading commercial personal finance smartphone apps, both of which inform the design of Financial Forest, a savings app. Participants in the 4-week Financial Forest savings study are found to have a statistically significant improved perception of the difficulty of building an emergency fund.

ACKNOWLEDGMENTS

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LIST OF ACRONYMS

Application (app)

eLearning (electronic learning)

Graphical User Interface (GUI)

mHealth (mobile health)

mLearning (mobile learning)

Mobile Assisted Language Learning (MALL)

Personal Data Assistant (PDA)

Quick Response Code (QR)

Short Message Service (SMS)

CHAPTER ONE: INTRODUCTION

Can Saving Save the Poor?

"Like so many things right and good, saving is hard to practice, it serves to list a few reasons why people in every corner of the world find it difficult to save. For starters, on first inspection, saving is not very attractive. It preaches abstinence and forbearance, always opts for the sensible shoes, and is probably registered with the local temperance union. Compared with the other things calling out to us and to our wallets, saving is just plain boring" (Karlan & Appel, 2011).

The Federal Reserve and Department of Commerce report personal savings rates in the United States on a quarterly basis, using independent data available to their agencies (the Federal Reserve uses Flow of Account Funds information provided by the banking sector and the Department of Commerce subtracts total consumption from total production). There is some controversy over both agencies' methods, which produce differing results. However, their trends agree. Savings rates have declined significantly in the past three decades (Guidolin & Jeunesse, 2007), though a modest bump has been noted since the Great Recession of 2007-20010 (OECD, 2013).

At the same time, median household debt has doubled (Parker, 1999). Among the poor, the statistics are worse. Those occupying the lowest-income quartile experienced a 308% increase in personal debt between 1989 and 2004. Nearly 1/3rd of lower quartile members spend more than 40% of their income in debt service (Fellowes & Mabanta, 2007). The rapid growth in debt accumulation can be explained by unprecedented credit opportunities offered to the poor,

including relaxed criteria for credit cards, mortgages, and expansion of alternative high interest financial services (payday lenders, check cashing services, tax refund loans). Simply put, financers have discovered that there is more profit in lending to the poor, than the wealthy (Warren & Tyagi, 2003). For the poor, access to readily available credit, even at unfavorable terms, has replaced the need to save. Dependence on credit, in turn, limits future saving and wealth building potential, creating yet another barrier to social mobility.

Paying off debt and saving an emergency fund are central to personal financial stability. Like a solid root structure firmly planted, they support future-oriented savings branches dedicated to down payment accumulation, education and retirement. Without a safety net, the ladder to stability and asset accumulation is cut short. It is imperative that counselors, governmental organizations and government agencies working on poverty issues promote debt elimination and personal savings growth.

Paying off debt and saving an appreciable emergency fund (3-6 months of expenses) require sustained attention. We know that consumers are surrounded by 'spend, spend, spend' messaging from multiple channels. To help arm against overspending, we need to develop ways to keep financial goals top of mind too. A smart phone, close at hand, is uniquely suited to serve as 'financial coach,' pushing consumers closer to their savings goals.

Though the term was coined 15 years ago by Ericsson (Sager, 2012), today's smart phones are characterized as having perpetual data connections and an operating system that supports a diverse library of applications or 'apps.' Fifty-five percent of American adults identify their phone as a smart phone. Sixty percent have used their phones to access the Internet, and 81%

have sent and received text messages. Smart phones are used for talking, texting, sharing, navigation, planning and recording. They are also used for learning.

CHAPTER TWO: MOBILE LEARNING

Mobile learning, or mLearning, has as many definitions as scholars. Some researchers focus on the technological affordances of smart phones, while others are technology agnostic, and identify mobility or the potential to learn 'on the go' as the key feature (Sharples, Taylor & Vavoula, 2005). Early research compares mLearning with eLearning (learning via a traditionally tethered desktop or laptop computer) unfavorably, itemizing limitations like small screens, awkward keyboards, and slow data transmission. Recent research allows mobile learning to stand on its own, casting a shadow on the limitations of eLearning. A review of seminal mLearning literature from the mid-2000s as well as more recent contributions reflects consensus on five major characteristics worthy of exploration: informal learning, context and mobility, sharing, personalization and the importance of "finding."

Informal Learning

The majority of learning in adulthood happens informally. D. W. Livingstone, an informal learning scholar, wrote, "Much of the most important learning adults do occurs in these moments of transition (whether it happens to be a birth, death, marriage, divorce, transition between careers or locations or some other major influential event) which provoke a concentrated period of informal learning" (1999). A learning instructor may call this a "teachable moment," recognizing that it is not the material alone that provokes learning, but the receptivity of the learner. Mobile phones offer something unique to the informal learning landscape in their ubiquity. When a moment of readiness occurs, the mobile phone is there.

The Life Center, a multi-university collaboration dedicated to researching the social foundations of learning, illustrates the dominance of informal learning during the lifespan (LIFE Center: Stevens, R. Bransford, J. & Stevens, A., 2005).

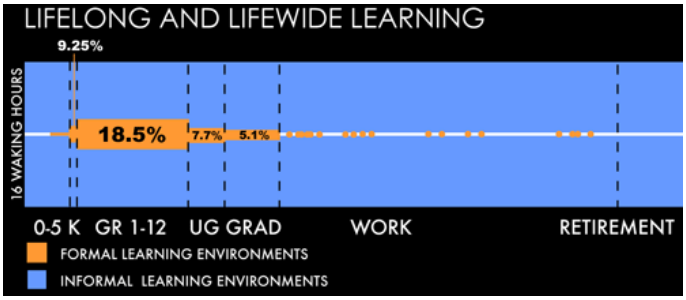


Figure 1: Lifelong and Lifewide Learning

Milestone-driven financial literacy education occurs before undergraduate education (UG), in the form of student loan counseling. During a later stage (work), consumers research (online and through discussion with friends and family) the home-buying process. During periods of financial distress, a consumer may reach out for credit counseling and/or bankruptcy counseling. Retirement education is typically offered in the workplace and is also available at the time of retirement, from a variety of sources.

A new class of smart phone app offers support to learners experiencing less dramatic transformations, including personal goal realization, specifically where no meaningful support previously existed. "Projects in an informal context would address the development of soft factors, social skills, the change of habits (diet)…" (Frohberg, 2006). Meal planners and calorie counting apps offer 24/7 feedback loops to those motivated to track their eating and exercise, while budgeting apps link to debit and credit cards, providing real time alerts when budget categories exceed their limits.

An important feature of informal learning vs. traditional learning, is the distribution of control. A traditional learning context concentrates control in the hands of the instructor, while informal learning is learner-centered. mLearning applications (particularly those related to 'sharing') enable the diffusion of control across many parties, including fellow learners and experts.

Context and Mobility

Many mobile learning projects for which peer reviewed research currently exists (conducted between 2004-2009) have been created without regard to context or mobility. These applications do not respond to the user's geographic location. We can classify the disregard for context and mobility as belonging to the 'additive stage' of mobile learning (Murray, 1997). These 'additive' realizations are adaptations of eLearning applications, which in turn were adapted from printed textbooks. Additive stage developers negligibly capitalized on interactive and/or the personalization potential of traditional computers, let alone the unique affordances of mobile technology (learning applications that take into account one's geographic coordinates, for example).

Yet many scholars contend that the *schwverpunkt* of mobile learning is mobility, not simply the convenience of learning anywhere and at any time. Classroom education strives to bring context to learning. Conversely, mLearning brings learning to context. Peters (2007) refers to this as "just in time" learning. Mobile learning projects in the natural sciences provide examples for how mobile devices can be used to help identify species in the field, as well as how they can be used as data collection devices. (Chen, Y-S et al, 2003, 2004). In the personal finance sphere, a host of popular applications use geographic coordinates and maps to help

consumers find the lowest cost gas, within a few miles of their location. Barcode scanning apps help consumers compare prices and features of similar items in their region, and consumer product reviews provide crowd-sourced feedback at point of purchase.

Sharing

The Amish don't use telephones because they believe that the technology discourages community: people should live within close proximity so that conversation can happen face-to-face. Whereas traditional telephones enable closed private conversations between two individuals, smart phones and social networking apps facilitate the opposite: open, multi-directional conversations within communities. Twitter hashtags helped Hurricane Sandy evacuees assess the damage to their towns before newspapers and local governments could release official communications. Citizen journalists applied Instagram filters and 140-character descriptions of breached sea walls and bridges, dispatching hyper-local information to temporarily exiled community members. Facebook groups unite University of Central Florida students around majors and disciplines, sharing events, job opportunities and group theme-related status updates. The very nature of community has expanded in the age of information networks. Family and friends, neighborhood, school, church and community of practice networks provide dynamic spaces for information exchange. Smart phones as learning tools are more than content distributors. They are the means by which people inspire and motivate each other: people that never have and never will meet as the Amish meet.

Sharing via social media sites continues to grow in popularity. Sharing activities include posting status updates, photographs, videos and location updates. According to the the Pew Internet Report, "14% of users say that connecting around a shared hobby or interest is a major

reason they use social media" (Smith, 2011). Smart phones and social networking make ideal dance partners, with lockstep adoption rates. Whereas the smart phone boasts the camera, the social network provides the place to broadcast, in real time. Taking pictures from the field is more enticing when a social network is standing by to view, like and comment on dispatches. And unlike desktops and laptops, the phone's notification and alert system (beeps, rings and vibrations) provides instant feedback.

Sharing and other social mobile activities represent the latest tool in mobile learning's ever expanding toolbox. "With mobile learning, the isolation felt in everyday situations can be reduced and thus create a number of powerful and positive effects," argues Fruhburg in *Mobile Learning is Coming of Age*.

Personalization

That mobile learning occurs on a personal media device is not inconsequential. Unlike desktop computers or laptops, which may be shared by many members of a household, a mobile phone is generally used by and belongs to a single person. Furthermore, mobile devices are typically carried on the body. The potential for personalization goes much deeper than ownership. Mobile learning applications can adapt themselves to the preferences of learners. Mobile banking apps allow users to customize push notifications based on preferences for low balance alerts (user sets >$50), debit alerts (if greater than >$500), and bill pay alerts ('your credit card is due in 3 days).

Real-time notifications based on personal preferences are already having a powerful effect on our behaviors. Apps that aggregate data from a user's credit cards and bank accounts

propose personalized budget recommendations, such as: eliminating coffee and fast food from your diet could save you $1500 and help you lose 15 pounds over the course of one year. Apps analyze a consumer's consumption patterns and recommend lower cost substitutions (shop for groceries here, go out for dinner there) while including coupons. Combining geo-location software with consumption patters could aid in recommending energy-saving driving routes and home-heating and cooling suggestions.

The Importance of Finding

Just as people no longer need to know phone numbers, directions, and other easily searchable information, they no longer need to know many things. Mobile phones have become an extension of our memory. It's the ability to find (and find quickly) that replaces the need to recall. As global positioning technology delivers directions just in time so do other instructional applications made possible through mobile technology, where "finding information rather than possessing it or knowing it becomes the defining characteristic of learning" (Traxler, 2007). As mobile phones are always with us, and with data plans, always available to serve up information, their very companionship relieves us of cognitive stress required to recall and navigate on our own. Does this reliable companionship free up mental and emotional bandwidth for inquiry-based learning? Does the fact that Google is 'always there' to answer our questions provoke us to ask more questions?

Summary

In summary, mobile platforms have the unique potential to stimulate informal learning, in motion, in context, while connected to greater communities, responding to our personal learning styles, and enabling "finding," or an inquiry-based exploration of our world. These mobile characteristics set mLearning apart from eLearning, and signal mLearning's abundant potential as we move rapidly into the *mobile* information age.

CHAPTER THREE: MOBILE LEARNING AND LEARNING THEORY

A number of prominent learning theories can be applied to the unique features of mobile learning. In 2005, Sharples, Taylor and Vavoula, pioneering mLearning researchers, applied Pask's Conversation Theory (Pask, 1976) to the domain of mobile learning, whereby learning is the constructed result of interactions between members of society. The authors assert that mobile learning's enabling of "conversations across contexts … could be an opportunity for technology to bridge the gulf between formal and experiential learning."

It should come as no surprise that mobile learning would find a promising theoretical foundation in "situated learning" literature (Lave & Wenger, 1991). Mobile devices provide learning support 'in situ' as well as access to relevant communities of practice, regardless of geography. Participating in a community of practice is inherently a social activity, enabled by real-time sharing features. John Traxler in *Current State of Mobile Learning* (2009) adds that mobile learning encourages authentic learning. "By authentic learning, we mean learning that involves real-world problems and projects that are relevant and interesting to the learner."

Brown, Allen and Duguid (1988) also wrote on learning in situated contexts, "knowledge is fundamentally a coproduction between the mind and the world, which like woof and warp need each other to produce texture and to complete an otherwise incoherent pattern." Brown et al. stress not only the importance of learning by doing (vs. knowing by learning), but also the importance of attaining access to authentic professional cultures, or cultures of do-ers. By highlighting the cultural aspect of learning, the authors stress the social aspect of learning. Written more than 20 years ago, it would seem the problem of decontextualized education may

find its solution in mobile learning, where learning supports can be brought into the world, and learners can gain access to diverse and remote cultures of do-ers.

The social aspects of mobile learning reflect Vygotsky's "zone of proximal development," whereby a community of learners help to provide the "training wheels" to advance a learner's capabilities. While Vygotsky's writings (1978) focused on the developmental stages of children, adults too have the capacity to learn and grow throughout their lifetime. Mobile devices offer the necessary support to pull learners up to their expanding potentials.

There is no shortage of media stories on the negative effects caused by youth's new best friend: the smart phone. Texting is blamed for low literacy, social networks are criticized for enabling cyber-bullying, and the phone has replaced blue jeans as the "it" status symbol. mLearning's great potential to address widely acknowledged limitations of traditional education stands in ironic contrast to the smart phone's poor reception among educators, who have largely banned them throughout the K-12 landscape. Despite widespread concern over the phone's negative influence, innovative researchers have placed it at the center of learning experiments in a wide array of domains. Chapter Four focuses on innovative mLearning projects, engaging the above-described features of mobile phones, and including available data on their effectiveness.

CHAPTER FOUR: INNOVATIVE PRACTICES IN MLEARNING

In the Beginning

Price and Rogers' seminal research, "*Let's get physical: The Learning benefits of interacting in digitally augmented physical spaces,*" published in Computers & Education in 2004, provides compelling concept architecture for projects aiming to marry mobility, physical and virtual manipulation, in a way that tethered computers cannot. "One benefit of doing so is to provide different ways of thinking about the world than interacting solely with digital representations or solely with the physical world." By opening up learners' minds to interactions and manipulations not possible in either, on their own, the combination of the physical and virtual enhances learning. Price and Rogers profile early experiments in augmented reality via mobile technology, including a color-mixing activity designed for young children ("Chromarium") and an ecology exercise ("Ambient Wood"), where older students explore a wooded area with a personal digital assistant (PDA).

Though they don't specifically refer to mobile learning, findings highlight core features which in later years will define successful projects:

- Awareness: mLearning tools turn regular moments into teachable moments. They are ever-present virtual teachers, layering meaning into day-to-day activity. Additionally, they have the potential to redirect attention toward desired information.

- Authenticity: Effective mLearning activity should resonate authentically with normal life. The authors favor project designs that are not exercise-driven (the opposite of popular eLearning flashcard programs), but inquiry-based learner-led exploration of physical space.
- Collaboration: Whereas traditional screen-heavy eLearning is a solitary pursuit, the authors saw the potential for mobile learning to be social and collaborative. In Ambient Wood, the students used PDAs as tools, while conversing openly with each other, as they explored the physical setting.

Other qualities highlighted by the authors include experience (benefits to physicality over sedentary learning), anticipation (using augmentation to provoke surprise and introduce the unfamiliar with the familiar), and exploration. Price and Rogers work can help with the evaluation of innovative practices in the field in recent years.

The Past 5 Years

In the past 5 years, the research literature on mLearning is concentrated in the following domains: mHealth (using mobile technologies to convey public health information, monitor personal health and/or inspire specific health-related behaviors), foreign language learning (via phone-enabled multimedia dispatches and regular listen-in pre-recorded messages and lectures), global development (campaigns designed to educate the world's poor in farming techniques and entrepreneurship, many in conjunction with micro-loan programs) and the emerging location-aware mLearning (mobile device as data collector and reference guide).

mHealth

The largest body of qualitative research for mLearning belongs to the domain of healthcare. A review of studies published in June of 2009, led by Heather Cole-Lewis of the Yale University School of Epidemiology and Public Health, provides evidence for the effectiveness of text messaging campaigns. Twelve studies comprising messaging interventions that spanned 3-12 months were included in the review. "Of 9 sufficiently powered studies, 8 found evidence to support text messaging as a tool for behavior change." (Cole-Lewis, H & Kershaw, 2010). Studies covered in the review focused on weight loss, smoking cessation, and diabetes management. One study compared delivery of reminders via text message versus email, finding increased blood glucose monitoring in those who received the text messages. A series of reminders sent to patients were short and simple: "Reminder. It's time to check your blood sugar." "In case you missed the first reminder, it's time to check your blood sugar." "Just a repeat reminder, it's time to check your blood sugar." Responses to submissions included "Great Job! Please remember that sugars greater than 300 must be treated and re-checked." (Hanauer, 2004).

While many studies utilize reminder-based designs (one-way communications), other mHealth research required subjects to use their cell phones as data collection devices for inputting weight, blood glucose levels, blood pressure readings and physical activity information (via pedometer), which was then reported to researchers and physicians. New technologies are putting many of the collection and assessment tools in the hands of the patient, encouraging self-management of health, as well as increasing the patient's perceived interaction with health care professionals (even though text messages are automated and sent by a computer). In one study

which encouraged reciprocal communication, participants received direction on food intake and were prompted to report their weight on a daily basis. The experimental group lost significantly more weight than the control group, 9.9 lbs vs. 2.4 lbs (Haapal, et. al, 2009).

Language Learning

Agnes Kukulska-Hulme has spent 10 years researching and writing about developments in Mobile Assisted Language Learning (MALL). Kukulska-Hulmes reports on a variety of MALL projects designed around the traditional teacher-learner relationship, where the learner is the receiver of text-based information (a one-way communication model). While some initiatives have attempted to band students together in language learning communities of practice (through social networking platforms), student-student collaboration has been minimal. Qualitative reviews of MALL-installations lack control data to establish effectiveness over other forms of language learning. However, it is important to note that most development projects do not ask the question 'is mobile language learning more effective than classroom learning?' because there are no resources for classroom learning. The questions asked focus on design, rather than medium: can target populations sufficiently learn a foreign language through mobile technology, in the absence of any other learning structures? What affordances of mobile technology can best facilitate learning gains (multimedia, social and/or creative tools)? Whereas leading foreign language learning programs via mobile do successfully direct attention toward foreign language resources, the majority of MALL-projects reviewed by Kukulska-Hume can be said to lack authenticity. Language learning is a social activity not well supported by one-way audio (or text) streams.

Research papers published within the last 2 years show more creative applications of mobile technology in the MALL-domain. In Singapore, Chinese-language learners were provided with smart phones and asked to take photos representing common idioms. Learners were instructed to add text to their photos and post them in a shared Wiki, where they were critiqued by other students. This kind of research marks an evolution in MALL-learning in its effective use of collaboration and creative meaning-making. Findings demonstrate heightened engagement by the students. (Wong & Chen 2009).

mLearning and Global Development Work

To find examples of projects marrying mobile technology and financial behavior, we must look to the developing world.

In Peru, Bolivia and the Philippines, researchers based a text messaging study on the theory that "limited attention" could explain, in part, why savings account holders failed to make regular deposits. They surmised that account holders are distracted by the needs of the day and fail to make deposits that will offer bigger pay-outs in the future. "When people overlook future expenditures, they will over-consume today: the true valuation of future consumption is higher than they anticipate today." (Karlan, D., et al., 2010). The research team designed a series of messaging campaigns (primarily through short message service, or SMS, though some participants received letters in the mail). In Bolivia, those receiving monthly reminders deposited more money than those who did not receive reminders (6% more, on average). In Peru, generic savings reminders had no effect on savers, but those that referenced the savers specific savings goal saved 16% more than those receiving the generic reminder or no reminder. In conclusion, the authors report, "Individuals are more likely to attend to opportunities in the future that have

high salience today. That is because increasing the salience of a future opportunity in the current period will increase the probability of attention to that opportunity today." This study highlights the importance of personalized campaign content.

In Uganda, researchers tested the relative effectiveness of three variables to increase on-time repayment of micro-loans. The variables tested included two incentive-based variables (offering a lump sum cash reward equal to 25% of the loan upon full on-time repayment, or a 25% reduction in interest rate on the next loan) and one reminder-based variable (borrowers were sent a monthly text message reminder, 3 days prior to due date). Results showed that all 3 variables had an equal effect on loan repayment, increasing on-time payments by 7-9%, and reducing late payments by an average of 2 days. Researchers assert, "a large number of borrowers previously seem to have paid late not for strategic reasons but because they were unable to keep track of their payment schedule without the help of simple reminders," (Cadena & Schoar, 2011). This reinforces the limited attention theory referenced in the previous example. When evaluating results by demographic, Cadena and Schoar found that the SMS reminders were significantly more effective for younger borrowers (aged 30 and younger). "We believe that this result indicates a difference in familiarity with mobile technology across generations."

"Under-Savers Anonymous: Evidence on Self-Help Groups and Peer Pressure as a Savings Commitment Device" (Kast, et al., 2012) corroborates the power of reminders in a study comparing three treatments on Chilean personal savings rates: the effect of peer group participation and a related text messaging campaign, a non-peer group related text messaging campaign, and a third interest-incentive with no text messaging or peer component. There was also a control group of depositors who did not participate in a peer group, a text messaging

campaign or a financial incentive treatment. The authors questioned whether gains in savings experienced by those who participated in a savings peer group (with public savings declarations and weekly face-to-face meetings) could be replicated by a text messaging campaign, not associated with peers, and finally how those effects measure against financial incentives (higher interest rates). The researchers wanted to know if it was the social pressures associated with the peer group that encouraged savings, or the regular attention to saving that a weekly peer group cultivated. Could a peer group be replaced with frequent text message reminders that prompted the same redirection of attention? The depositors participating in the peer group + text messaging campaign deposited 3.5 times more than the control group. However, researchers achieved nearly 80% of the same effect in the treatment that included a text messaging campaign without peer group affiliation. Surprisingly, the financial incentive had little effect on savings rates.

Location-Aware mLearning

Location aware mobile learning is a loose configuration of mLearning applications that happen in the field. These are projects like the early Ambient Wood experiment, those developed for museums, archaeological digs, and others that incorporate mobile technologies into authentic, situated experiences. Whereas the above-described research studies feature content pushes regardless of location, location-aware mLearning enables content pushes based on location. Developers in this new frontier are experimenting with a variety of technologies and interactions that push the boundaries of authorship and sharing, like Japanese urban screen "mash-ups" of user-generated and user-commented local hotspot submissions via quick response (QR) code (Seeburger & Hee-jeong Choi, 2011) and image-recognition systems that allow networks to augment physical spaces with additional data, multimedia and links (Takacs, G. et al, 2008).

Some experimentation has been done with location-based augmented reality games, but little is known about their effect on learning objectives (Specht, et al., 2011).

There has been experimentation with mobile learning in museums, where students are provided mobile phones and encouraged to use them to access data and record notes and images from their museum-experiences, which are collected on a website for later review and reflection (Pierroux, P., 2007). This process of capturing and creating multimedia, comments and reflections on specific learning experiences is meant to enhance student engagement with artifacts and exhibits. Many exhibits now incorporate QR-codes, enabling visitors to access additional information via mobile device, during their museum visit. QR-codes can also serve a marketing function, allowing users to easily like and share an exhibit on Facebook as well as engage in public interaction with the exhibit. The Smithsonian's Natural History Museum used a QR code to direct visitors to a website where they could create a picture of themselves as a Neanderthal ("Meanderthal") and then share it with their friends. This application helped users learn more about Neanderthal facial features and helped promote the exhibit through social media interactions.

In summary, mLearning featuring one-way information pushes (health care reminders, language lessons and bill-pay prompts) reveal consistently favorable results for provoking learning and desired behaviors. Designs have been largely dominated by text messaging, likely due to the ubiquity of the text messaging feature on mobile phones.

More innovative mLearning projects lean toward greater authenticity, collaboration and location-awareness, but these project designs are more ‘proof of concept’ than ‘proof of learning.’ mLearning in the next few years will undoubtedly incorporate newer smart phone affordances like the intersection of geo-location technology and personalization (merging where you are with who you are) and creative apps for making and editing media while learners are in the field, otherwise known as the field of life.

CHAPTER FIVE: CRITICAL DESIGN REVIEW OF BEHAVIOR CHANGE APPS

Detailed above, mHealth and financial institution messaging campaigns have improved self-awareness and self-regulation of different types of behaviors (diabetes management, weight loss and bill pay). Consumer smart phone applications also offer tools to help users modify behavior. Before detailing my design for Financial Forest, I present a review of several behavior change applications available in the iPhone App Store.

There are many goal-setting and tracking apps currently available. The following criteria were used to select apps for evaluation.

1. Relevance to goal tracking
2. Number of reviews (the more the better)
3. Favorable reviews (the more favorable the better)
4. Affordability (free to $3.99)

Furthermore, each app will be described in terms of four key attributes:

1. Set-up: how complicated is goal-setting?
2. Maintenance: how does the user self-report goal progress?
3. Feedback: how does the app respond to user inputs?
4. How does the design relate to the goal domain and/or support behavior modification?

Simple Goals: User-Defined Goal Tracking App

Simple Goals is a free app designed to help users set and track their goals.

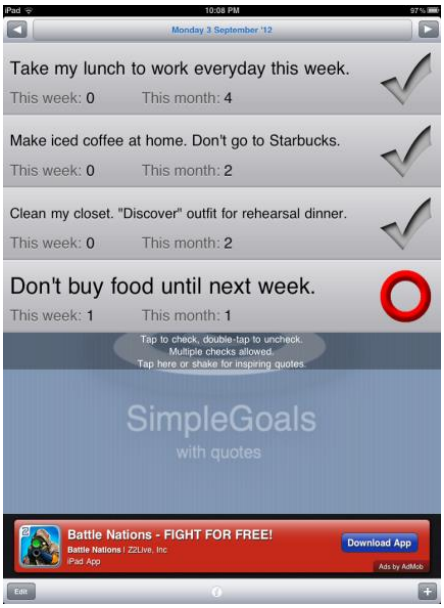


Figure 2: Simple Goals Goal Setting Screen



Figure 3: Simple Goals Motivational Message Screen

Set-up: The user enters positive and negative goals (such as ‘go for a 1 mile walk’ or ‘don’t eat chocolate’).

Maintenance: Once the goal is input, the user taps the goal every time it has been completed. With each tap, the tally grows.

Feedback: Feedback is a dashboard with running tallies. Inspiring quotes are accessible by shaking the phone or tapping a bar: “Hard work spotlights the character of people: some turn up their sleeves, some turn up their noses, and some don’t turn up at all. – Sam Ewing.” Quote sources range from Thomas Jefferson to Whoopi Goldberg and provide encouragement, in general, not tailored to the user’s specified goals or profile.

Design: Simple Goals marries the bull’s-eye and checklist, making the visual statement that by checking off tasks, you’ll ‘hit the bulls-eye’ and accomplish your goals. The clouds likely reference dreams.

This app lives up to its name. It is simple. It uses visual cues to distinguish between positive and negative goals, providing green checks for the former and a big red circle for the latter. Some sophistication might provide better user rewards than a number tally. These could include visual reinforcement (trend lines, letter grades, star charts, or a thermometer showing progress) where a user could track their goals over time, or benchmark their actual achievements against their stated target. Inspiring quotations are a nice addition, but they would be more powerful if they were tailored to specific goals, or even include custom aphorisms provided by the goal-setter. We often set goals in moments of peak passion and interest. Reflecting back those aphorisms later could help the goal-setters stay the course.

Wonderful Day: Habit Tracking App

Wonderful Day is a user-defined habit-tracking app.

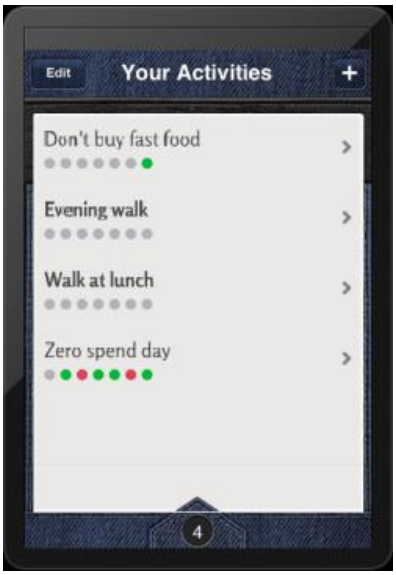


Figure 4: Wonderful Day Activities Screen



Figure 5: Wonderful Day Week Snapshot



Figure 6: Wonderful Day Feedback Screen

Set-up: Similar to Simple Goals, in Wonderful Day, the user creates a series of habits. There is no allowance for "negative habits," as this app is designed to measure actions, not the absence of action.

Maintenance: The user is pushed a message each morning, reminding them of their Wonderful Day activities. The user taps check marks to report positive information and a red arrow to report negative activity. A progress screen uses red and green dots to represent the number of days the user has successfully performed their defined habit. By pressing the Twitter logo at the bottom of the tracking screen, users can share, or tweet, their performance.

Feedback: The main dashboard "Your Activities" page provides feedback for the past week. The grid, however, provides an endless feedback scroll. A summary displays at the bottom,

reminding the user how many days they have been using this program, how many “hits” they have and how many “misses” they have.

Design: Wonderful Day incorporates a denim back-pocket visual. Like a pair of blue jeans, this program is not fancy. It’s everyday wear, and fits in your back pocket, tucked in your phone. User-defined push intervals could provide more utility, depending on the goal. Twitter integration encourages the user to involve their social network in their goal progress.

Like Simple Goals, Wonderful Day is simple and focuses exclusively on habits/actions without including any mechanisms that track or report results. Presumably, the behaviors we define in these apps are part of bigger goals (don’t buy fast food could be part of both a financial goal and a weight loss goal, for example). Grouping desired habits under broader goals may provide more opportunities for personalized motivational content and inspiring feedback from the app.

My Fitness Pal: Weight Loss App

With nearly 400,000 reviews in the app store and double as many ‘likes’ on Facebook, My FitnessPal is one of the most popular apps promoting behavior change for weight loss goals.

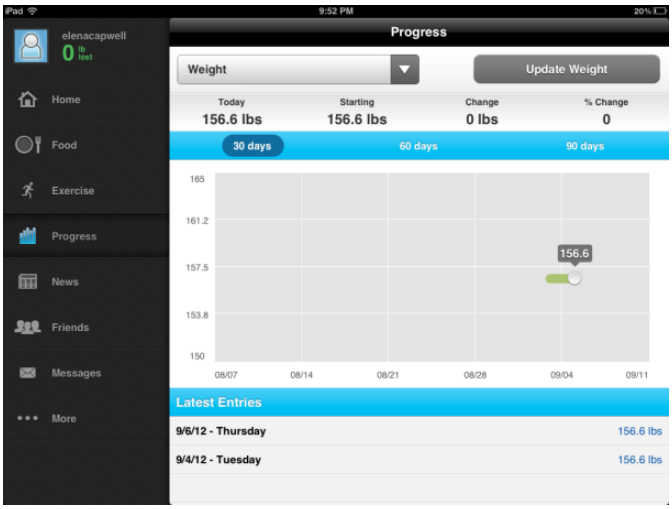


Figure 7: Progress Screen

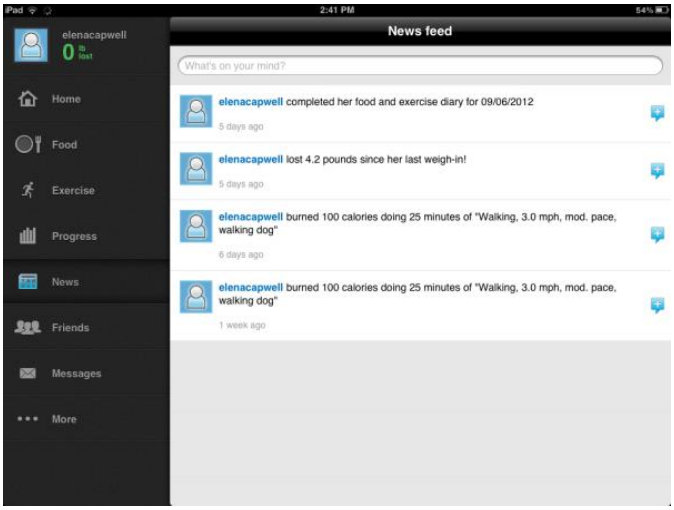


Figure 8: News feed

Set up: The user begins by entering their current weight, their goal weight, and the rate at

which they'd like to lose weight (1/2 lb/week, 1 lb/week). The system calculates how many calories the user must eat each day to achieve their goal weight at their chosen pace.

Maintenance**:** Based on the information entered during set-up, the system assigns the user a daily calorie allotment. The user must then report on their food intake and exercise. As the user enters breakfast, lunch, dinner and snacks, a running total of available calories is reduced. As the user enters exercise, the tally increases. Food entry is made easier by the program's database of foods and recipes, which has over 1,000,000 references (largely crowd-sourced). For example, when you report eating a banana, it gives you a choice between small, medium and large and the calorie counts for each. Additionally, the user can scan the barcode of a packaged item, enter the serving size, and the calories will be automatically added. Finally, the user can build a recipe and the app will calculate calories, based on the ingredients (and portion sizes).

Feedback: The most frequent feedback mechanism is the real time calorie tracker, which responds to food and exercise entries. It is gratifying to see the tally go up after a walk and motivating to skip snacks throughout the day as to not deplete it too quickly. Other feedback features include a pie graph showing the day's food intake: carbs/fats/protein. For a deeper dive, users can choose 'See All Nutrients' where the program breaks reported food intake down, showing estimated sodium, saturated fat, sugar, vitamins and other nutrients. Once a category exceeds recommended thresholds, the numbers turn red. This holistic approach directs a user (who may have initiated the app for weight loss only) to focus on other aspects of their diet that may benefit from attention.

The app asks for a daily "submission" requiring the user to sign off for the day. After

submitting, the app tells the user "if every day were like today, you'd weigh XXX in 5 weeks." Other rewards include a weight loss graph (not zero based so small losses are magnified) as well as a generously sized running tally of "lbs lost" since commencing the program.

Design: This app uses the diary metaphor. This is important for a behavior change application, because it stresses the day as the essential unit in weight loss tracking. One of the biggest problems with most budgeting programs (and 'how-to' approaches to budgeting) is that the month is the essential unit of time. A month is too long. Feedback loses its power when it arrives three weeks after negative behavior. Requesting the user to submit their calorie totals promotes daily ritual, and providing encouraging feedback helps keep the user motivated.

My Fitness Pal has built-in social networking features, including a news wall to post statuses and respond to friends, as well as a message center. Unlike Simple Goals and Wonderful Day, My Fitness Pal ties efforts to results. My Fitness Pal is a powerful tool that makes tracking calories and fitness goals easier, more rewarding and more interactive than traditional tools (pen and paper, for example).

Debt HD Free: A 'getting out of debt" app

Debt HD Free is an app designed to help people create a personal plan for paying off their debts.

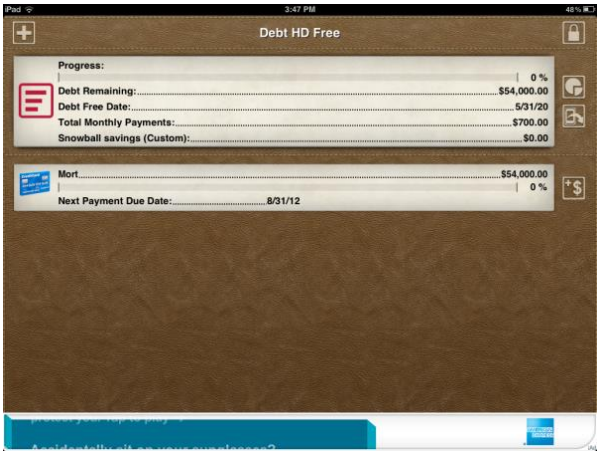


Figure 9: Debt Screen progress screen

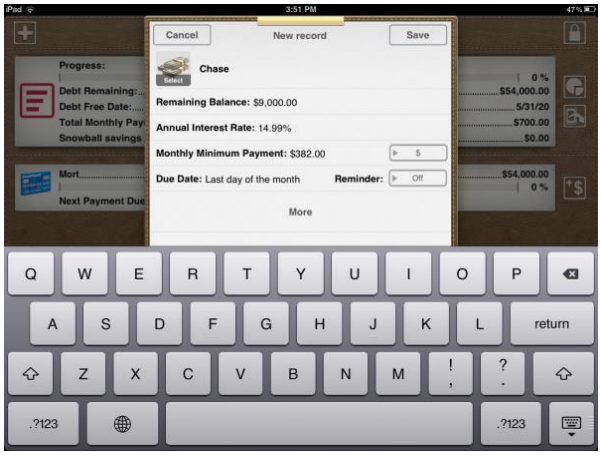


Figure 10: Debt Free debt entry screen

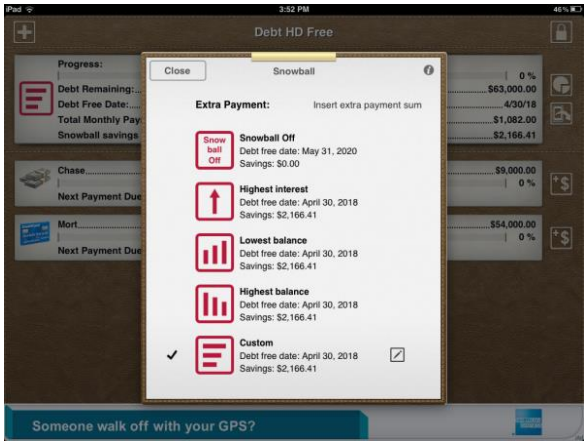
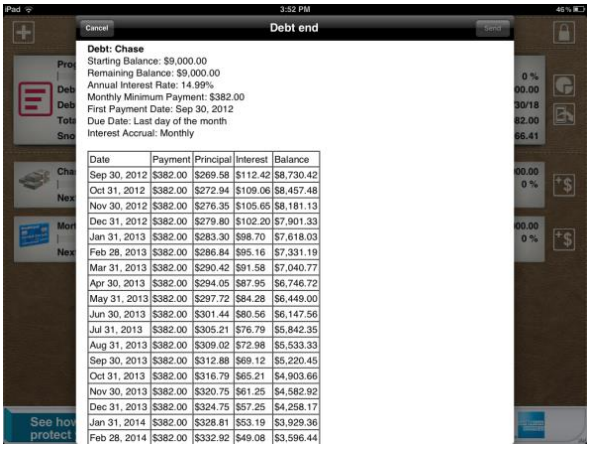


Figure 11: Debt Free payment strategy screen



Date	Payment	Principal	Interest	Balance
Sep 30, 2012	$382.00	$269.58	$112.42	$8,730.42
Oct 31, 2012	$382.00	$272.94	$109.06	$8,457.48
Nov 30, 2012	$382.00	$276.35	$105.65	$8,181.13
Dec 31, 2012	$382.00	$279.80	$102.20	$7,901.33
Jan 31, 2013	$382.00	$283.30	$98.70	$7,618.03
Feb 28, 2013	$382.00	$286.84	$95.16	$7,331.19
Mar 31, 2013	$382.00	$290.42	$91.58	$7,040.77
Apr 30, 2013	$382.00	$294.05	$87.95	$6,746.72
May 31, 2013	$382.00	$297.72	$84.28	$6,449.00
Jun 30, 2013	$382.00	$301.44	$80.56	$6,147.56
Jul 31, 2013	$382.00	$305.21	$76.79	$5,842.35
Aug 31, 2013	$382.00	$309.02	$72.98	$5,533.33
Sep 30, 2013	$382.00	$312.88	$69.12	$5,220.45
Oct 31, 2013	$382.00	$316.79	$65.21	$4,903.66
Nov 30, 2013	$382.00	$320.75	$61.25	$4,582.92
Dec 31, 2013	$382.00	$324.75	$57.25	$4,258.17
Jan 31, 2014	$382.00	$328.81	$53.19	$3,929.36
Feb 28, 2014	$382.00	$332.92	$49.08	$3,596.44

Figure 12: Debt Free amortization table

Set-up: The user must enter their debts into the program, including the balance, interest rate and minimum monthly payment.

Maintenance: The user must enter their monthly payments.

Feedback: Debt HD Free provides few feedback tools. It takes the user's debt balances, interest rates and monthly payment information and compares payback strategies (paying off the lowest balance first vs. paying off the one with the highest interest rate first). There's also a progress bar that reinforces progress toward the goal. The app provides amortization tables for

each debt that can be emailed to the user, however Debt HD Free does not display this information in a mobile-friendly way. This app may better serve its user by taking a cue from My Fitness Pal and swapping information tables for statements like “if every month were like this month, you’d be debt free in one year.” Finally, Debt HD Free allows the user to create custom bill payment alerts when they enter their accounts.

Design: Debt Free HD is set against a leather backdrop, possibly meant to represent a wallet.

Debt Free HD is a useful tool for organizing debt payments and setting up reminders with payment alerts. It’s not clear why a user would return to this app, however, after setting up a program for themselves. Most of the feedback is designed for ‘getting started.’ There’s little for the maintenance phase, other than a progress bar. The leather interface projects an old-world formal image. Since paying off debt is hard to sustain over time (especially with amortization schedules that stretch into the next decade), this program could use more maintenance rewards and stimuli.

Mint: Integrated Personal Finance App

The Mint.com app, released by financial software heavy weight Intuit, is a highly sophisticated personal finance app that provides users with many useful tools.

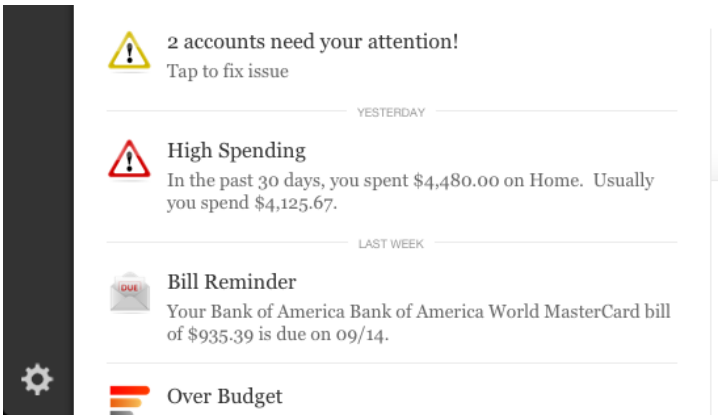


Figure 13: Mint Alerts

Mint provides a variety of charts and graphs to help users visualize their spending and/or their goal progress.

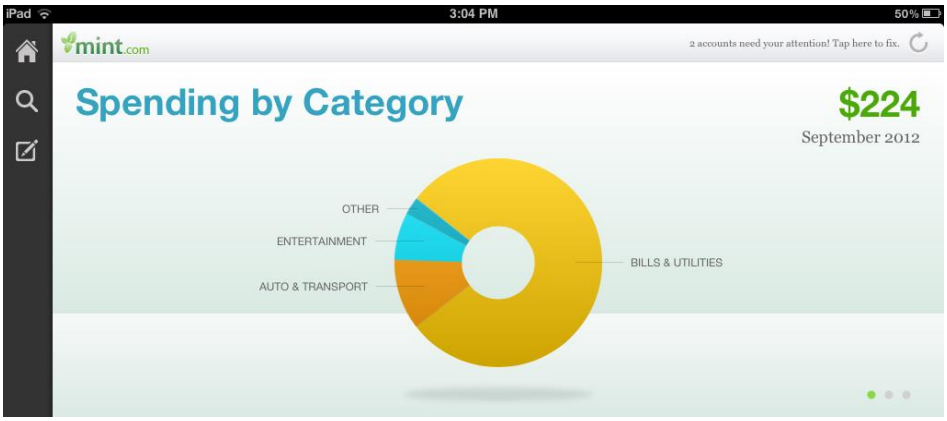


Figure 14: Budget Wheel

Set-up: Setting up the Mint app requires users to enter their usernames and passwords for all of their bank accounts, credit cards, mortgages, and investment accounts. When launching, the program updates balances and transactions from data pulled from these institutions. Other set-up activities include creating budgets and savings goals.

Maintenance: There is little maintenance required on the part of the user because the tool is able to retrieve information about the user's financial transactions and classify them into budget categories. For example, if the user ties a savings account to a savings goal, the app retrieves balance information and reports progress to the user.

Feedback: Mint's feedback is highly targeted and timely. Alerts appear on the user's newsfeed as well as text messages and/or email. Alerts remind users about bills due, high spending, bank balances (approaching overdraft), and other potential financial pitfalls. The app provides customized financial advice based on purchase history, mortgage interest rates, credit score and market conditions and makes recommendations, such as: "Refinancing may lower your mortgage payments to $1,090 per month."

Design: The Mint.com app does not make use of an organizing metaphor. It's a simple, clean interface. Most people have complicated personal finances, with multiple bank accounts, credit cards, and loan obligations. Mint helps users see their full financial portfolio on one dashboard. It also redirects their attention to areas requiring attention. Alerts call attention to acute needs (budget overdrafts) or raise awareness about something that may require research (a mortgage refinance, or uncompetitive credit card interest rate).

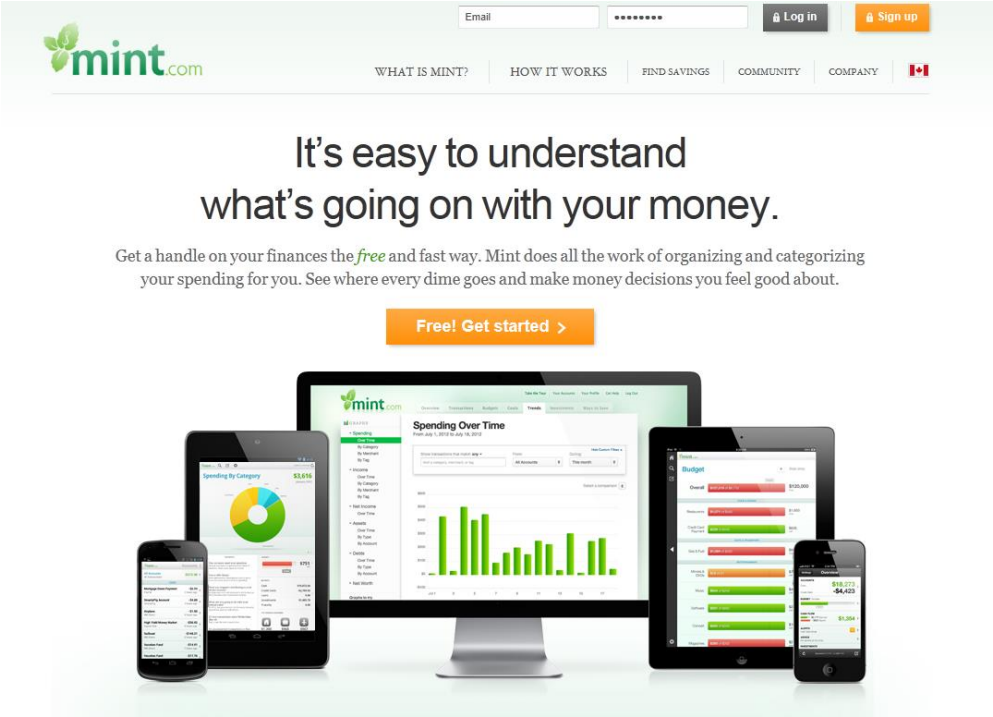


Figure 15: Mint.com Homepage

Mint promotes itself as a tracking tool, rather than a behavior change tool.Their pitch to consumers is "Mint does all the work of organizing and categorizing your spending for you. See where every dime goes and make money decisions you feel good about." Where Mint could spend more time is in "make money decisions you feel good about." Mint could be improved by using more of its crowd data to motivate good habits. Alerts like this may be useful to someone who regularly exceeds their food budget: "76% of Mint users with a similar household size spend less than you on groceries." Alerts like these could then link to forums or other community features where users discuss and/or share savings tips. Currently, Mint.com hosts a deep library of personal finance content, but it exists exclusively outside of the app.

CHAPTER SIX: WHAT IS SAVING?

Search for saving apps and you'll find many programs designed to help users save money through the act of consumption (GasBuddy, Giftmeister, RetailMeNotCoupons, etc.). Savings has been reframed in the popular imagination as something a person does when shopping. Banks and credit unions have capitalized on this re-framing by creating consumption-oriented savings accounts, like Christmas clubs.

For the purpose of this research and project, saving shall be defined as actions that result in sustained accumulation of cash and reduction in debt, to the extent that personal net worth increases. While saving money is achieved by not spending money or spending less money than one otherwise would, teaching people to abstain and forbear is difficult. Charles Duhigg writes in *The Power of Habit* the "golden rule" of behavior change: to change a habit, you have to replace it (Duhigg, 2012). This concept can be found at the heart of many weight loss and smoking cessation programs, which focus on creating new routines (and habits), not on abstinence. With regard to personal finance, we in the personal finance education industry need to offer rewards for saving and paying off debt as well as a structure for tracking new behaviors. We need to stop telling people what *not* to do and start telling them what *to do*. Saving money needs to be an action in itself, and not defined by the lack of spending.

The link between financial education and financial behavior is weak. "Financial education itself rarely changes individual's financial circumstances," (Lyons & Neelakantan, 2008). Research into the effectiveness of various financial literacy programs targeting low-income populations concludes that programs focusing on short-term simple goals (as opposed to

complicated financial concepts) show better results (Lyons, Change, Scherpf, 2006). Financial literacy programs aim to alter behavior, but perhaps we should be looking at financial behavior change programs that aim to promote literacy.

Adult financial literacy workshops teach saving from an investor's point-of-view. Savings is taught in tandem with concepts like compound interest, annual rate of return, certificates of deposit, and retirement accounts. This typical approach to savings stresses slow, long-term gains, which are revealed and predicted through mathematical formulae. Financial Forest approaches savings from a behavioral perspective, where saving and paying off debt are daily activities that can be tracked, measured and habituated. Financial Forest approaches savings as a short-term goal. The glories of compound interest are, in the current banking climate, hypothetical, and retirement savings is impractical for low-to-moderate-income Americans servicing debt and living without an emergency fund.

CHAPTER SEVEN: FINANCIAL FOREST - A PERSONAL FINANCE GOAL SETTING AND TRACKING APP

Financial Forest is designed as a "starter personal finance app," for a consumer with low-to-moderate-income. The primary goal of the app is to facilitate setting and tracking a micro savings goal: a reserve fund consisting of one month of expenses. To put this goal into perspective, numerous personal finance studies confirm that nearly fifty percent of Americans have less than $2000 available to handle an emergency, like a car breakdown or temporary loss of employment (Lusardi et al., 2011).

Development Process

Financial Forest was developed by the author, assisted by a team of four Digital Media University of Central Florida undergraduates, during their senior year. Two team members, Michael Fried and Jaffy Escarcha, focused on graphic design and usability issues while the other two team members, Greg Zanmiller and Brett Connolly, focused on programming the application. The development process was highly collaborative. The team met frequently to discuss progress, assign tasks, and test prototypes. App development commenced in September 2012 and was completed in May of 2013.

The student team worked on Financial Forest from September 2012 to December 2012 as part of a for-credit app development course. Students were compensated $2500/each for their work from January 2013 to May 2013, thanks to the generous support of a FinCapDev smart phone app development grant. FinCapDev, through the financial support of the Clinton Global Initiative, Citibank and others, sponsors app development targeting low-to-moderate-income consumers. Financial Forest was chosen, along with 12 other apps, as a finalist in the annual app

development contest, and awarded $10,000 in grant funds. FinCapDev mentors at global technology consultancy Deloitte and financial app innovator Yodlee were regularly made available to the team to review the prototype and answer questions.

Target Demographic

The target demographic for Financial Forest is low-to-moderate-income adults living paycheck-to-paycheck. Target demographic characteristics include the following:

- Annual household income range: $15,000-$50,000
- Savings: <$1000

Behaviors consistent with the target demographic include: difficulty with saving money and lacking budgeting experience or knowledge. The Financial Forest user is pre-budget: interested in improving their financial situation, but not yet able to create and track a monthly budget.

Smart Phone Adoption in Target Demographic

According to Pew Internet research, smart phone adoption among the lower income demographic correlates inversely with age (higher adoption in younger demographic) and is growing rapidly. In May 2013, 77% of 18-29 year olds in households with less than $30,000 in annual income reported owning a smart phone and 81% of those in $30,000+ households reported owning a smart phone. Those aged 30-49 reported 47% adoption rate in the less than $30,000 annual income range and 68% in the $30,000+ income range. Adoption rates continue to grow at 10-15% year (Smith, 2013).

The digital divide found in other technology adoption (high-speed internet, for example) is notably smaller with regard to smart phones. For many lower income consumers, a smart phone is the primary (or sole) access to the Internet, social networking and email (Zickuhr & Smith, 2012). Barriers to adoption are lower, as smart phone costs are wrapped into 2-year payment agreements from service providers, versus large up-front payments.

Graphical User Interface (GUI)

The graphical user interface of Financial Forest was motivated by a desire that the app be non-intimidating for a consumer with little to financial technology experience. The visual tree metaphor is meant to convey an earthy, organic-feeling and tie the concept of regular savings to consistent growth. Furthermore, the app favors curvy, artistic lines (with a hand-drawn appearance) over straight lines and corners associated with typical financial tools (spreadsheets and calculators). When developing the GUI, the team consulted the design of "soft apps" from outside financial services, like cooking and recipe tools.

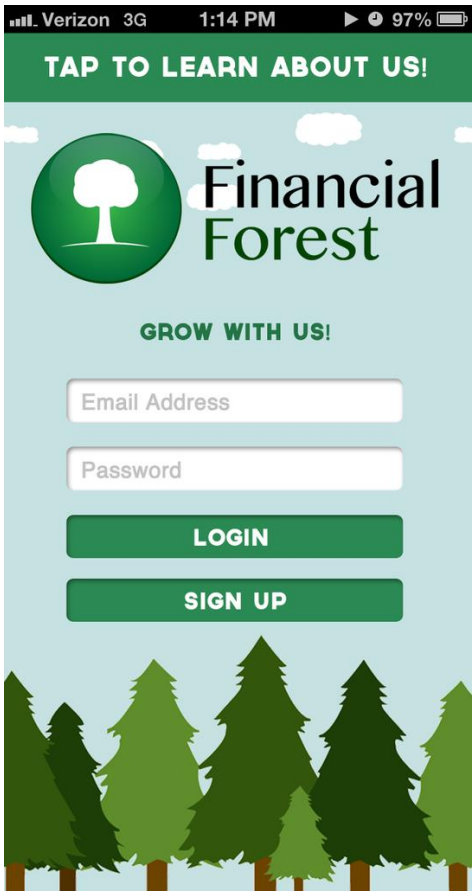


Figure 16: Financial Forest Login Screen

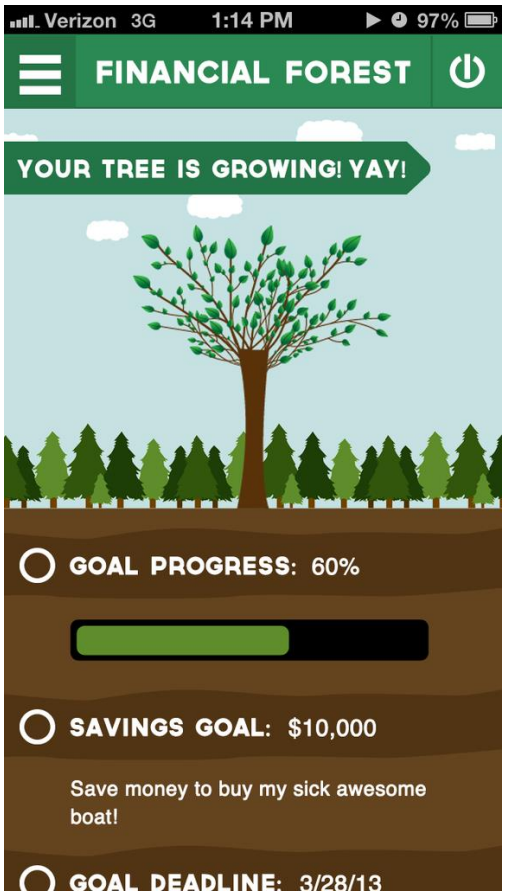


Figure 17: Financial Forest Progress Screen

Functionality

Creating an Account

To use Financial Forest, users create an account by entering a User Name, First Name, Last Name, Email, Phone Number, Mobile provider, and password (see Figure 18).

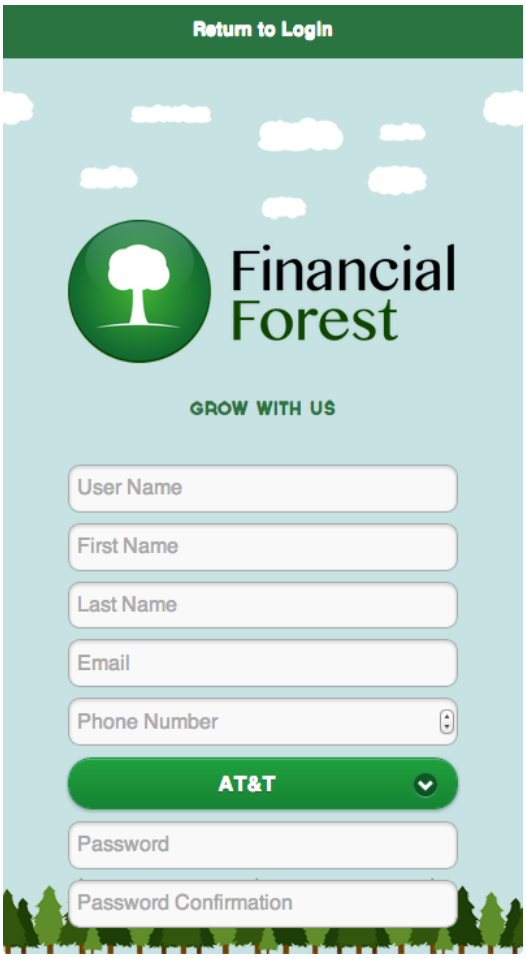


Figure 18: Financial Forest Account Creation Screen

Setting a Goal

After creating an account, the user is prompted to identify one month of living expenses. The user then must choose a savings duration. The app provides a dropdown menu with 4 choices: 3 months, 6 months, 9 months and 1 year. To submit the goal, the user pushes the 'submit button' at the bottom of the screen (see Figure 19).

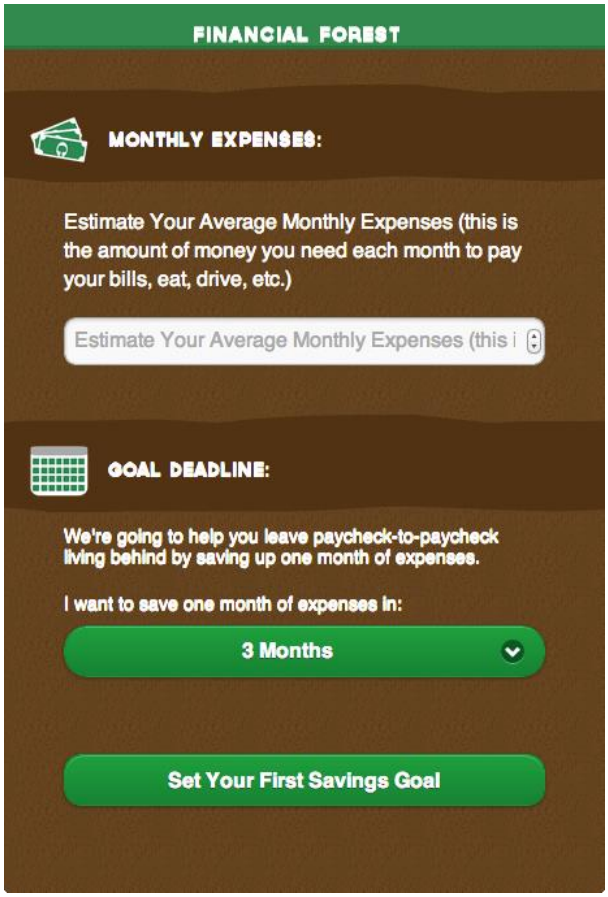


Figure 19: Financial Forest Goal Setting Screen

Goal Pacing & Tracking

After the user has established a savings goal of one month's expenses, the app's sign-in screen will prompt the user to enter their current savings account balance. With this information, the app divides the remaining goal total by the number of months available to meet the goal and provides the user with a status bar indicating how close they are to achieving their goal, their daily savings goal and their weekly savings goal (see Figure 20).

Financial Forest goal pacing is designed to focus the user's attention on smaller units of time than traditional budgeting programs, which generally favor the month as the primary tracking and reporting period. Thus, the progress screen emphasizes the day and week, instead.

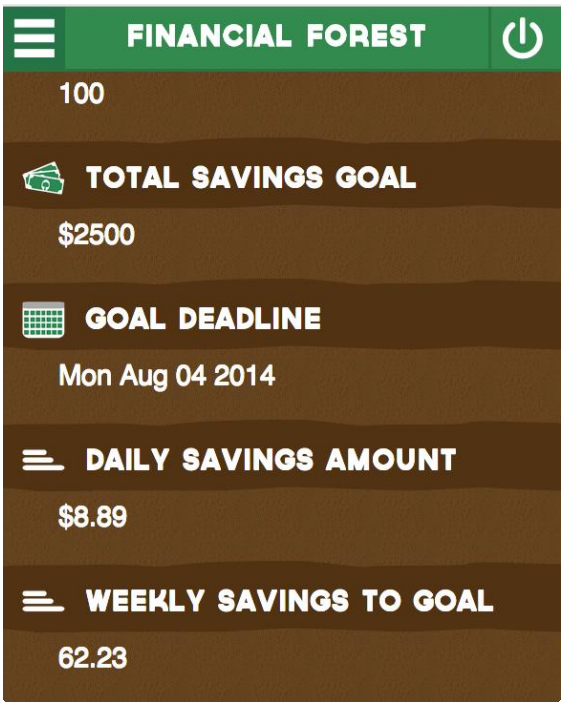


Figure 20: Financial Forest Goal Status Screen

Data Visualization

Financial Forest uses a growing tree to represent goal progress. As the user adds money to their savings account, a seed grows into a sapling, then a small tree, then a larger tree. Upon reaching the savings goal, the tree is large and bountiful (see Figures 21-24). Currently, there are ten tree iterations.

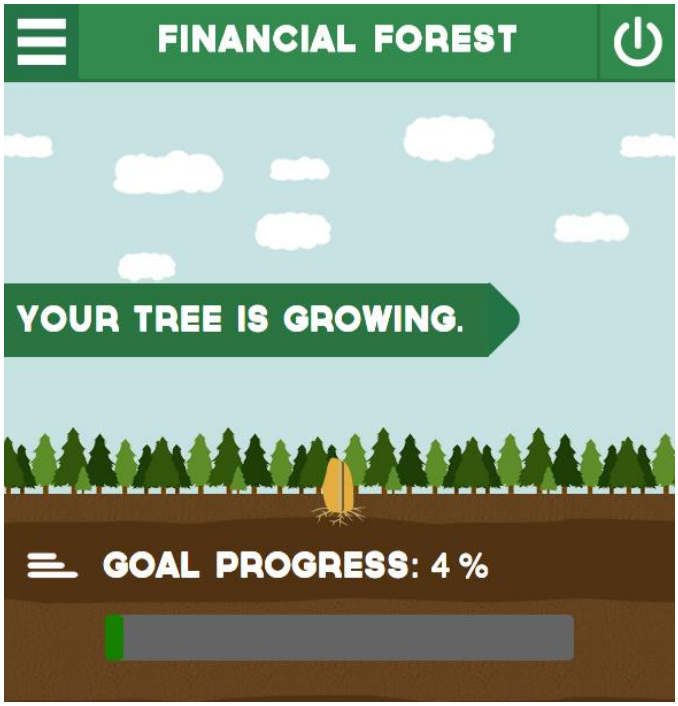


Figure 21: Financial Forest 4% Visualization

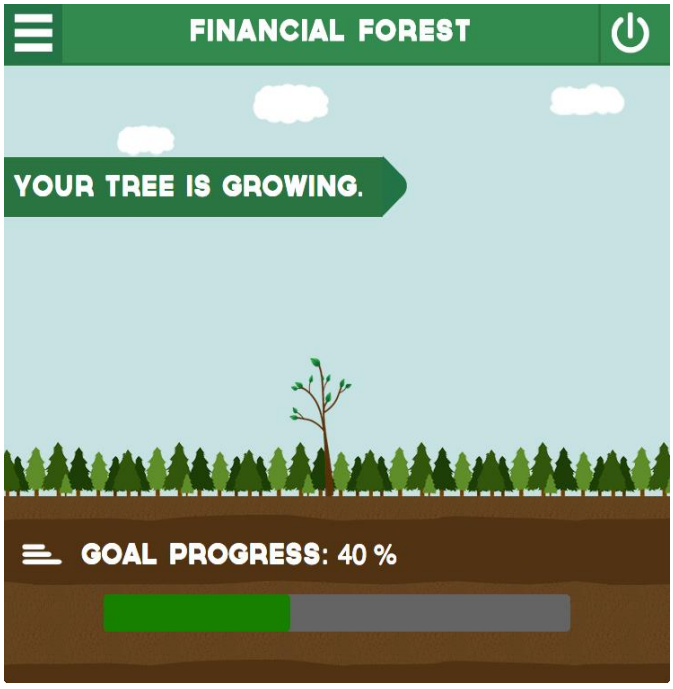


Figure 22: Financial Forest 40% Visualization

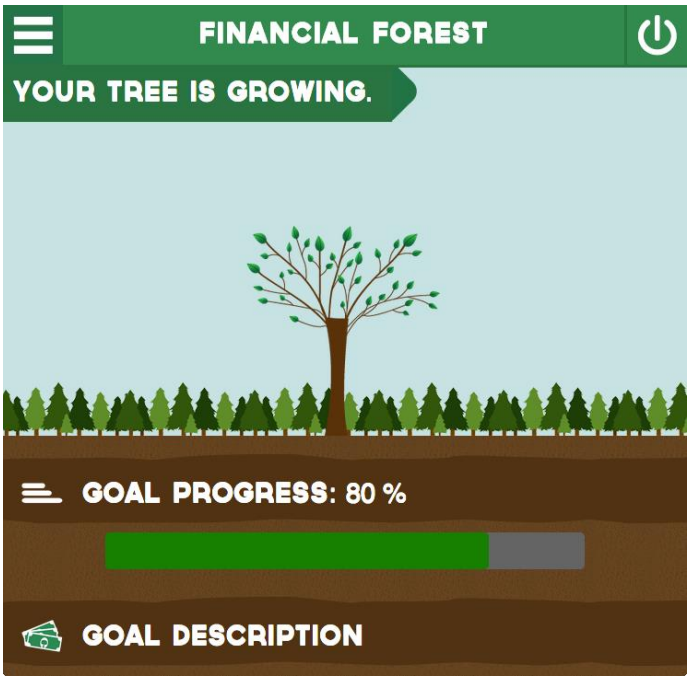


Figure 23: Financial Forest 80% Visualization

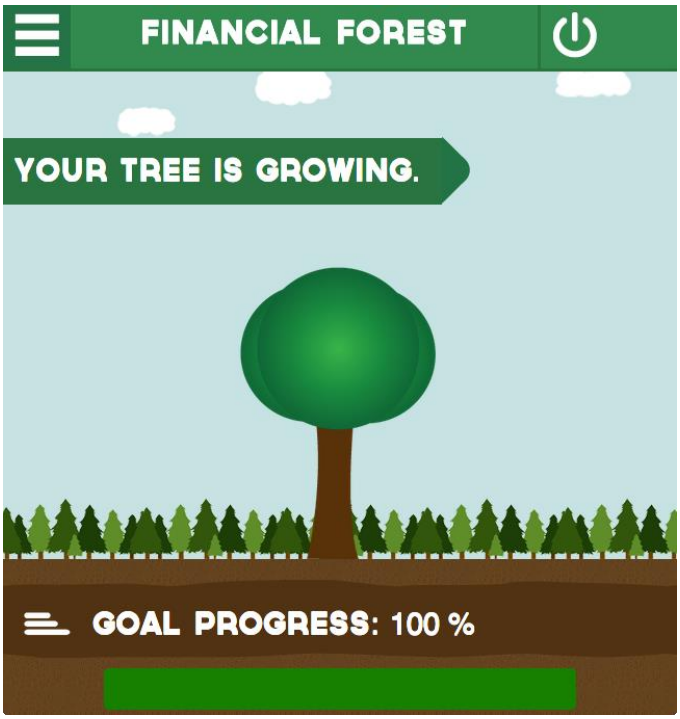


Figure 24: Financial Forest 100% Visualization

Messaging

Frequent text messaging is an essential feature of Financial Forest. In order to keep the user's savings goal top-of-mind, messages are dispatched at a frequency of six per week. The messaging schedule observes the following pattern:

1. Friday morning (generally payday for most people): A text message is dispatched which prompts the user to make a weekly savings transfer, the total determined by the app's calculator.
2. Friday afternoon: A reminder app to complete the savings transfer.
3. Saturday: Empowering personal finance fact.
4. Monday: Motivational message designed to push users to exceed their weekly savings goal by $10.
5. Wednesday: Motivational quote (not related to personal finance).
6. Thursday: Prompt to update savings balance within the app.

The Financial Forest programming team developed a back-end dashboard enabling "one click" publication of text messaging to the user study population. Figure 24 shows the messages dispatched to this test population.

	Week One	Week Two	Week Three	Week Four
Friday 9AM	FF: Deposit goal amount into your savings today Submit	FF: Deposit goal amount into your savings today Submit	FF: Deposit goal amount into your savings today Submit	FF: Deposit goal amount into your savings today Submit
Friday 4PM	FF: Report your balance. Did you make your goal this week? Submit	FF: Report your balance. Did you make your goal this week? Submit	FF: Report your balance. Did you make your goal this week? Submit	FF: Report your balance. Did you make your goal this week? Submit
Saturday	FF: Minimum credit card payments are mostly fees and interest. Only 1-3% of the balance is paid down. Submit	FF: Children with savings accounts are more likely to attend college and finish. Submit	FF: Cut one monthly bill from your budget. What can you live without? Save the difference. Submit	FF: Keep debt to 10% of your income or less. Submit
Monday	FF: Push yourself. Transfer $10 to savings today. Submit	FF: Push yourself. Transfer $10 to savings today. Submit	FF: Push yourself. Transfer $10 to savings today. Submit	FF: Push yourself. Transfer $10 to savings today. Submit
Wednesday	FF: Be faithful in small things because it is in them that your strength lies - Mother Theresa Submit	FF: All great achievements require time - Maya Angelou Submit	FF: Today you are you! That is truer than true! There is no one alive who is you-er than you! - Dr. Suess Submit	FF: If you are going to achieve excellence in big things, you develop the habit in little matters. Excellence is not an exception, it is a prevailing attitude - Colin Powell Submit
Thursday	FF: Report your balance.Prepare to make a deposit tomorrow. Submit	FF: Report your balance.Prepare to make a deposit tomorrow. Submit	FF: Report your balance.Prepare to make a deposit tomorrow. Submit	FF: Report your balance.Prepare to make a deposit tomorrow. Submit

Figure 25: Financial Forest Text Messaging Dashboard

Financial Forest Behavior Change Design

Financial Forest's primary goal is to help regulate the user's financial behavior by encouraging him or her to set an attainable goal. The app is designed to sustain the user's awareness of the goal through frequent text messaging. The app is designed to facilitate behavior change by facilitating the following actions

1. Set a financial goal
2. Pay attention to your goal
3. Pay yourself first (make a transfer on payday morning)
4. Track your progress (watch your tree goal)

5. Reach your goal
6. Repeat

CHAPTER EIGHT: FINANCIAL FOREST USER STUDY

A user study was designed to test Financial Forest's influence on the user's perception of their ability to meet savings goals. The study was submitted to the Institutional Review Board and received approval on May 1, 2013 (Appendix A).

Study Demographics

Fifteen participants were recruited for the study from the Habitat for Humanity Orlando home recipient program. This population was targeted for two reasons: low income and a desire to improve their financial situation. Maximum gross annual income for a two-person Habitat participant household is $28,080. Additionally, Habitat participants are not apathetic about their poverty. They are working hard to improve their lives, most notably by becoming homeowners. Financial Forest is designed to help people who earnestly want to improve their financial situation, therefore the Habitat population is a good fit for testing.

Participants completed a pre-study survey (Appendix B), which collected demographic information, information on savings habits and past goals, and information on the saver's perceptions of their own ability to save for various short and long-term financial goals.

Gender

Fourteen of the research participants were female and one was male. Female dominance reflects the Habitat participant population, which favors single parents, and not a preference on behalf of the researcher. The research was not designed to measure gender differences.

Age

The age distribution is as follows: 20% between the ages of 18-24, 40% between 25-34, 20% between 35-44, and 20% between 45 and 54. Age does often correlate with technology adoption, though owning a smart phone was a pre-requisite for the study. Low-tech adults, defined as those who have not yet adopted a smart phone, were excluded from the study. To assess the participants' comfort with technology, however, they were asked to share their experience with a range of smart phone activities (texting, checking email, online banking, watching a film). 100% of participants used their phones for texting, and all but one used it to check email. Roughly 50% of participants were using their phones for financial management (checking bank account balances, making online deposits). Highest levels of smart phone financial management behavior was found among the 18-24 and 25-34 year-old groups, with all but one (of nine) engaging in online banking. Of the 35-54 year old participants, two (of six) were engaging online banking.

Income

Eighty percent of participants stated income of $2500/month (take-home) or less. The remaining 20% had monthly income between $2500 and $4000/month (take-home). The researcher's goal of measuring the app's use among a low-to-moderate income population was satisfied by these participants.

Pre-Study Savings Frequency & Goal Setting

Ten of the participants (66%) were not regular savers (defined as saving on a weekly or monthly basis). Five (33%) participants were regular savers and responded that they saved on a weekly or monthly basis.

Roughly half (8) of the participants had set a savings goal within the last five years, and half (7) had not. Thus Financial Forest compelled half of the participants to set their first savings goal in five years.

For those who had set a savings goal in the past five years, these were the kinds of goals set:

- "Go back to school and save money for my kids"
- "I hope to buy a new SUV next year and hope to pay it in 4 years"
- "I set a goal to pay off 3 credit cards and a student loan and a car note by the end of the year. The first three credit cards will be paid off next month and my last car note as well. I will then pay off the last two credit cards and my student loan by the end of the year."
- "My goal was to pay off my car of $21,000 and I did it in 28 months."
- "So far, I've only been able to save $50 that I don't touch until right before my next payday. I also have a 401K. I hope to save $1000 but I have to get that started with $83/month. I have not yet."
- "The goal is to build on my emergency fund. I did not set the goal correctly. So I have been saving but emergencies happened have not been able to keep the money without using it."
- "$400 to buy a Blendtec blender, also $1000 to pay off a credit card."

- "MacBook Computer $1500, not accomplished because got a windfall that paid for it. Vacation: $2000; iPad $600; New Furniture: $1000. Should be noted that my method of saving sometimes involved appropriating money I knew was coming (tax return) to the savings goal vs. doing it over time."

The majority of the participants fell into the "low savings" category, with 40% having less than $100 saved, 60% having less than $500. Twenty percent had between $1501-$2000. One participant had more than $2000 saved.

Participants were asked to assess the level of difficulty they faced when saving for a variety of short and long-term goals in both the pre-study survey and post-study survey. The only statistically significant difference found between the pre and post-study surveys, was for the following question: How difficult is it for you to save for the following: An Emergency Fund? The mean moved from 2.75 to 2.03 (p value = .005), where 3 represents "Somewhat difficult" and 2 represents "Somewhat easy." This is not surprising since all participants set a savings goal, which represented one month of emergency savings, and the text messages received over the course of four weeks reinforced the importance of maintaining this goal and of emergency savings.

Table 1: Perception of Savings Difficulty, How difficult is it for you to save for (5 point scale, 1: very easy, 5: impossible)

Savings goal	Before Study Mean	After Study Mean	P value
An automobile purchase	2.5	3	.138
An emergency or rainy day fund	2.75	2.083	.005
A computer	2.6	2.4	.509
A down payment for a house	3.182	2.909	.277

A new phone	2.273	2.182	.724
Television	2.6	2.2	.221
Improve my home	3	2.9	.758
Child's education	2.5	3	.104
Retirement			1
Furniture	3	2.9	.678

There was no significant difference for questions assessing the participants' perception of their own personal finance knowledge where the mean was maintained at "above average." Additionally, participants did not change their feelings about how important it was for them to be financially literate: nearly all participants choose "high importance" in both surveys. Finally, there was no change in the response to the question "How well do you manage your money" where the mean was maintained at "above average."

Savings Frequency, Pre and Post Study

Regarding saving frequency, participants did show improvement from the baseline established in the first survey. Pre-study, only five participants were classified as regular savers (saving at least once in a month). In the post-study survey, eleven participants managed to make at least one savings deposit during the 4-week study. Ten of the participants were able to make their deposits at least twice, and five were able to make savings deposits at least three times.

Though the participants were able to engage in savings behavior, the total amount saved during the study period did not increase in a statistically significant way.

Past Savings Goals vs. Future Savings Goals

Both pre- and post-study surveys ask participants to detail their past and future savings goals. More than 50% (8) of the participants had not set a savings goal in the past 5 years. Savings goals for those who had set at least one in the past 5 years are detailed above. Below are savings goals participants set in the post-survey:

- "I want to have a rainy day fund"
- "1. Emergency money, 2. Kids school, 3. Vacation"
- "Emergency Fund"
- "Emergency fund"
- "Just to have extra money for any occasion I wish to use it for"
- "Rainy day fund"
- "A general rainy day fund to not have to go to anyone else when I'm in need"
- "Partial costs for a vacation"
- "Emergency funds & luxuries"
- "A home"
- "Emergency fund"
- "I purchased a car back in June and am trying to rebuild my savings account"
- "Emergency/down payment on house"

Compared to the pre-study goals, these goals align with the mission of Financial Forest: to build an emergency fund (starting with one-month of reserve expenses). These goals

reflect fewer consumption-oriented goals (electronics, car, vacation), and more financial security-oriented goals (emergency fund, home).

User's Comments on the Text Messages Received

Users were asked to describe the text messages they received from Financial Forest and to recall any specifically, if they could. Here are their comments:

- "It was really inspiring and motivating but hard to do"
- "Remember to set aside your weekly goal amount today. To save $10,000 in a year, set aside $20 each week" [actual message said, "To save $1000" in a year, set aside $20 each week].
- "Today is payday, remember your financial forest obligation or something similar. Savings around the holidays is do-able."
- "Is a reminder which is great because we are going to forget to save"
- "Around this time of year in December we spend a lot remember to save for yourself and get to your goal. Also keep debt below 10% income. These reminders are half little information to keep my mind up to date"
- "The one about budgeting holiday expenses. Also the one about reminder to deposit a weekly amount the breakdown it made the goal more reachable"
- "When it was a text message out of the blue stating to put aside $10 I love it due to that it's things that you may not think about during the week because I am the type of person that only put money aside on days I get paid but I love the texts that I receive from financial forest"

- "I received messages meant to motivate, although I do not recall any particularly. I do remember it reminding me to make the transfer at least twice."
- "they were inspirational and memorable"

Fifty percent of participants (7) believe that the text messages affected their savings behavior. Participants were asked how they felt about the text messages. Half of the users (7) selected "the text messages reminded me of my goal which helped me stay motivated." Roughly 40% were "inspired by the messages." 20% of participants selected "I felt guilty for not saving enough," and one participant selected "the text messages stopped me from making impulsive purchases." Nobody said they were too frequent, which was a major concern of the researcher. Additionally, no participants selected "I ignored the messages."

Conclusions

Financial Forest was able to turn non-regular savers into regular savers during the course of the study. It also increased the frequency of saving for regular savers. There was a statistically significant shift from "somewhat difficult" to "somewhat easy" in users' perceptions of difficulty in saving for an emergency fund. This is likely due to the program's design, which prompts the user to define an emergency-fund goal (amount and date) and breaks that goal down into manageable weekly chunks. After 4-weeks of reminders and goal-attainment success for most participants, at least fifty percent of the time (2 weeks), users felt more comfortable with this savings goal. Financial Forest did not have an impact, however, on users' perceptions of difficulty level for other kinds of financial goals, especially long-term goals. Financial Forest users reviewed the frequent goal-oriented text messages favorably and did not feel that 6 messages per week was excessive.

The study was conducted during the December holiday season, generally one of the most expensive months for consumers. While savings behavior increased for the participants, savings dollars did not, possibly because participant expenses were higher than usual during this time. Repeating the study outside of the high-spending holiday season would be useful to see if absolute savings improved for participants.

Challenges

Technical difficulties were encountered during the 4-week study, most significantly that users with non-Verizon mobile phone providers were not able to receive text messages generated from the application. A workaround was designed, which included using a third-party messaging tool. While this manual solution was possible with low numbers of study participants, it's not easily scale-able.

Ideally, Financial Forest would import data from user's checking and savings accounts and trigger personalized real-time messaging based on user behavior. Integrating financial institution data via API, the way Mint.com and other financial apps do, would incur $20,000 in programming costs and an additional $10,000/year to maintain, for a low user base (less than 5000). This is not realistic without significant investment. Future research on the effects of frequent goal-oriented text messaging will be conducted on pre-existing personal finance management software.

CONCLUSIONS

This project was conceived at a time when financial goal tracking apps were limited to a small number of sophisticated tools offered by major financial technology companies like Intuit and large consumer banks. During development and research, over the course of 18 months, the playing field has become crowded with a variety of innovative financial apps that cover budgeting, saving, bill-pay, debt pay-off, retirement planning and couponing. Many tracking apps integrate real-time with users' financial data from banking and credit institutions and use frequent personalized text messaging to inform and stimulate positive financial behaviors.

The new frontiers for savings-related apps are in gamification and social media. SaveUp, for example, models itself after a credit card rewards program, whereby users earn points through saving, which can be used to redeem discounts and merchandise from partners. With "Save to Win," Michigan credit unions are experimenting with savings accounts linked to lotteries, whereby small deposits earn tickets for big winnings (MachNeil/Lehrer Productions, 2013). These programs are designed to mimic the mechanisms that typically stimulate overspending on credit cards in search of points and the low risk/high reward lottery psychology.

Making finances social represents one of the biggest challenges and deepest wells of opportunity for budgeting, saving and goal-setting. Budgeting and saving are typically lonely pursuits, but they don't have to be. Goal-setting communities similar to those being formed around wearable fitness trackers like FitBit and Nike's Fuelband can be created to help budgeters and savers come out of the financial closet and benefit from the help of supporters. Crowd-sourced information on spending can be shared to motivate better behavior. Increasing engagement with a community of goal-setters and receiving frequent, relevant, personalized

information related to financial goals will further heighten the user's awareness, helping them stay on what is typically a long, hard road.

The mobile information age represents unparalleled opportunities for people to help craft and control the messaging they receive. We cannot change our consumer culture. We cannot stop the Google ads, the Facebook ads, the billboards, television commercials, and entertainment product placement that tell us to buy and teach us that we are what we drive and wear. But we can elevate the volume and frequency of our own messaging – messaging that *we* choose to help us invest in ourselves and our futures. Currently, there's no better device than the smart phone to serve as ambassador for this kind of self-empowering, self-selected media.

That Financial Forest improved users' perception of savings difficulty from 'somewhat difficult' to 'somewhat easy' reveals that a resource-challenged population with low savings frequency can quickly view their savings potential in a new light. Future research on savings frequency and amounts will be conducted using third party apps with a larger feature set, that include integration into personal financial accounts, personalized messaging that reflect back specific goals, and broader rewards.

APPENDIX A: IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Karen J. Carlson**

Date: **May 01, 2013**

Dear Researcher:

On 5/1/2013, the IRB approved the following human participant research until 4/30/2014 inclusive:

Type of Review:	UCF Initial Review Submission Form
Project Title:	Financial Forest Savings Study
Investigator:	Karen J Carlson
IRB Number:	SBE-13-09341
Funding Agency:	
Grant Title:	
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

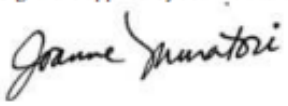
If continuing review approval is not granted before the expiration date of 4/30/2014, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 05/01/2013 04:10:37 PM EDT



IRB Coordinator

APPENDIX B: PRE-STUDY SURVEY

1. 1. Please provide contact information so that we can follow up with you after the 4-week study period. This information will be stored separately from your survey responses. All efforts will be taken to maintain your confidentiality.

Name:

Company:

Address:

Address 2:

City/Town:

State:

ZIP:

Country:

Email Address:

Phone Number:

2. What is your gender?

- Male
- Female
- I prefer not to answer

3. Which category best describes your age?

- 18 to 24
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 to 74
- 75 or older

4. How frequently do you save money?

- I rarely save money.
- I don't save money on a regular basis but save when I receive "extra" money (birthday, holidays, bonuses, tax return).
- I save money every year.
- I save money every month.
- I save money every two weeks.
- I save money every week.

5. Have you set a savings goal in the last 5 years?

- Yes
- No

6. If you set a savings goal in the past 5 years, please describe the following:
What the goal was for; how much it was; if you accomplished the goal
(example: an iPad, $500, yes or downpayment, $10,000, no)
List as many goals and outcomes as you can recall from the past 5 years.

7. Do you have a designated savings account? (an account separate from your checking account)

- Yes
- No

8. If you have a designated savings account, do you have automated funds transfer set-up for that account (this is where you have automated deposits transferred from another account or your paycheck on a regular basis).

- Yes
- No

9. How much money do you currently have saved (not including retirement accounts):

- less than $100
- between $100-$500
- between $501-$1000
- between $1001-$1500
- between $1501-$2000
- more than $2000

10. In your opinion, what prevents you from saving money? (check all that apply)

- My income is too low to save money.
- My expenses are too high to save money.
- I don't know how to budget.
- I haven't made it a priority.
- I have too much debt to save money.
- I don't have the self-discipline.
- I am not motivated to save.
- This question does not apply to me. I save money regularly.

11. Which best describes your level of personal finance knowledge (your knowledge about money management, budgeting, and saving):

- 1. Superior personal finance knowledge
- 2. Better than most
- 3. Average
- 4. Below Average
- 5. I'm financially illiterate.

12. On a scale of 1-5, how well do you manage your money?

- 1. I am excellent at managing my money
- 2. I manage my money pretty well
- 3. I'm average
- 4. I don't manage money well.
- 5. I manage money very poorly

13. How important is it for you to be financially literate?

High Importance: 1	2	3	4	5: Low Importance

14. How difficult is it for you to save for the following:

	Very easy.	Somewhat easy.	Somewhat difficult.	Very difficult.	Impossible.
An emergency or rainy day fund.	○	○	○	○	○
A down-payment for a home.	○	○	○	○	○
Money to improve my home.	○	○	○	○	○
A new phone.	○	○	○	○	○
A computer.	○	○	○	○	○
A new television.	○	○	○	○	○
New furniture.	○	○	○	○	○
An automobile purchase.	○	○	○	○	○
My retirement.	○	○	○	○	○
My child's education.	○	○	○	○	○

15. Which category best describes your monthly household income (take-home pay)?

- ○ Less than $500/month
- ○ $500-$1000/month
- ○ $1000-$1500/month
- ○ $1500-$2000/month
- ○ $2000-$2500/month
- ○ $2500-$3000/month
- ○ $3000-$3500/month
- ○ $3500-$4000/month
- ○ $4000-$5000/month
- ○ More than $5000/month

APPENDIX C: POST STUDY SURVEY

1. Please provide the following contact information.

Name:	
Email Address:	
Phone Number:	

2. Please describe the savings goal you set in Financial Forest. What was the total and what is the deadline for your goal?

3. What are you saving for? Please be specific (example: a vacation or a new car or a general rainy day fund)

4. Describe the text messages you received from Financial Forest. If you recall any in particular, please type the messages below. What made them memorable?

5. Did the messages you received from Financial Forest affect your savings behavior?

- ○ Yes.
- ○ No.

If yes, how so?

6. How did you react to the text messages you received from Financial Forest (check all that apply)?

- ☐ I felt guilty for not saving enough.
- ☐ I was inspired by the messages.
- ☐ I ignored the messages.
- ☐ When I met my goal, I liked the messages. But when I didn't meet my goal, they annoyed me.
- ☐ They were too frequent.
- ☐ The text messages stopped me from making impulsive purchases.
- ☐ The text messages reminded me of my goal which helped me stay motivated.

Other (please specify)

7. How did you feel about your Financial Forest tree? Please describe your reactions to seeing it grow and/or shrink based on your savings behavior?

8. How much money did the App remind you to deposit on a weekly basis?

- Between $1-$25
- Between $26-$50
- Between $51-$100
- Between $101-$200
- More than $200

9. How often were you able to make your weekly savings goal?

- Every week.
- Three of the four weeks.
- Two of the four weeks.
- Only once.
- I wasn't able to make my weekly savings goal for any of the weeks.

10. Do you have a designated savings account (an account separate from your checking account)?

- Yes.
- No.

11. Do you have automated funds transfer setup for your savings account (this is where you have automated deposits transferred from another account or your paycheck on a regular basis).

- Yes
- No

12. If you do not have automated funds transfer set up, do you plan to set it up in the near future (within the next month)?

- Yes.
- No.

13. How much money do you currently have saved (not including retirement accounts)?

- less than $100
- between $100-$500
- between $501-$1000
- between $1001-$1500
- between $1501-$2000
- more than $2000

14. Which best describes your level of personal finance knowledge (your knowledge about money management, budgeting, and saving):

- 1. Superior personal finance knowledge
- 2. Better than most
- 3. Average
- 4. Below Average
- 5. I'm financially illiterate.

15. On a scale of 1-5: how well do you manage your money?

- 1. I am excellent at managing my money
- 2. I manage my money pretty well
- 3. I'm average
- 4. I don't manage money well.
- 5. I manage money very poorly

16. How difficult is it for you to save the following?

	Very easy.	Somewhat easy.	Somewhat difficult.	Very difficult.	Impossible.
An emergency or rainy day fund.					
A down-payment for a home.					
Money to improve my home.					
A new phone.					
A computer.					
A new television.					
New furniture.					
An automobile purchase.					
My retirement.					
My child's education.					

17. How important is it for you to be financially literate?

High Importance: 1	2	3	4	5: Low Importance

18. To help the designers improve on the application, please describe any user issues you had with the Financial Forest App. Include difficulties you had with the technology or parts you found confusing.

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