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Can Games Build Financial Capability?

Financial Entertainment: A Research Overview

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Can Games Build Financial Capability?

Financial Entertainment: A Research Overview

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Doorways to Dreams Fund

Abstract

Can video games increase the financial capability of millions of financially vulnerable Americans? Doorways to Dreams (“D2D”) Fund seeks to address this question with its Financial Entertainment (“FE”) innovation, which leverages the power and popularity of casual video games to engage consumers in a financial education experience that links increases in financial knowledge and confidence to financial actions and real world behavior change. Following the presentation of a 5-step theory of change explicating how casual financial literacy video games can lead to improvements in financial capability, this paper presents and discusses data from FE projects conducted 2009-2012. While more rigorous research is needed, initial analysis suggest that the FE games can be successful at engaging consumers, cultivating financial self-efficacy and financial literacy, and enabling initial real-world financial action. The paper concludes with a discussion of next steps in Financial Entertainment, with a focus on how games can create sustained behavior change and ultimately allow consumers to realize positive outcomes.

1. Introduction¹

Can video games increase the financial capability of millions of financially vulnerable Americans? Doorways to Dreams (“D2D”) Fund seeks to answer this question with the Financial Entertainment innovation.²

Financial education programs are considered particularly important for low- to moderate-income (“LMI”) consumers, who both score lower on tests of financial literacy and benefit the most from such programs (Collins, 2010; Lyons, Change & Scherpf, 2006; Anderson, Zhan & Scott, 2005; Curley, Ssewamala, & Sherraden, 2009). However, such consumers often do not attend – or stay engaged in – traditional financial education programming (Parrish and Servon, 2006; Servon and Kaestner, 2008; Meier and Sprenger, 2007). In other words, one of the core challenges that the field faces is simply getting consumers to show up. While the traditional, classroom-based approach to financial education for LMI audiences has focused on the supply side, seeking to increase the availability of financial education programs, D2D has focused on the demand side, aiming to increase the appetite for financial education. To this end, taking cues from business and entertainment, D2D has developed Financial Entertainment (“FE”), an innovation which uses casual video games as a vehicle for financial education that is engaging, builds financial capability, and more closely links participants to action-taking.

Financial Entertainment aims to harness the popularity and immersive quality of casual video games to engage and build the financial capability of its players. With millions of players, casual video games are ubiquitous and present a tremendous opportunity to engage financially vulnerable consumers. In addition, the widespread adoption of smartphone devices (iOS, Android) and participation in online social network websites has fueled the growth and development of gaming on these platforms. For

¹ The authors would like to acknowledge Walmart, the Financial Literacy Center, and the Staples Foundation for supporting this work; Staples for their commitment to innovative research on Financial Entertainment; the creative partners which include FableVision, Enspire Learning, Ethan Mollick, Scot Osterweil, Caitlin Feeley, Ben Katz, and Jason Booth; and an array of distribution testing partners noted in this paper.”

² D2D is a non-profit established in 2000 that aims to strengthen the financial opportunity and security of low-to-moderate income (“LMI”) consumers by innovating, incubating, and stimulating new financial products and policies.

example, *Angry Birds* titles have generated over 1 billion downloads, and the original *Angry Birds* title sees over 200 million active monthly users (Lunden, 2012). The widespread popularity of casual video games is most pronounced among the middle aged female population and is generally reflective of their construct: (1) game mechanics that are easy and addictive; (2) game motifs that are popular and non-violent; and (3) game structures built for short, often episodic, play (Casual Games Association, 2007).

From 2008-2011, D2D designed, developed, and launched six Financial Entertainment game titles, each with its own financial learning objectives:

- Celebrity Calamity (credit card debt, spending),
- Groove Nation (budgeting),
- Farm Blitz (compound interest, debt, savings),
- Bite Club (saving and investing for retirement),
- Refund Rush (tax-time saving), and
- Celebrity Calamity Mobile (credit card debt, spending).

This paper represents a systematic review of all the data gathered on the Financial Entertainment innovation to-date and its ability to affect the economic lives of LMI Americans. Section Two presents D2D's theory of change for how casual financial literacy video games can lead to improvements in financial capability. Sections Three to Five present FE data – gathered through game development testing, distribution pilots, and research projects – that correspond to the first three phases of the theory of change model. Section Six concludes the paper with a discussion of the future of D2D's Financial Entertainment research and game development agenda.

2. Theory of Change

The theory of change presented here represents D2D's current thinking about how casual financial literacy video games lead to improvements in financial capability. The user is first engaged in the gaming experience by having fun and relieving stress. Gameplay leads to improvements in financial literacy and financial self-efficacy. Although the definition of both of these terms remains contested, the core idea is financial literacy represents financial knowledge and skills, while financial self-efficacy represents belief in one's capability to achieve one's financial goals (Remund, 2010;

Heckman and Grable, 2011). These improvements in turn prime the user to take initial financial actions and make sustained behavioral changes in the real world, which ultimately lead to improved financial capability. In order to investigate the viability and effectiveness of the Financial Entertainment approach, D2D has developed research and evaluation questions, listed below, that correspond with the 5-step Theory of Change.

1. *Engage Consumers.* Under what circumstances and in what settings will consumers, especially LMI consumers, play FE titles? What gameplay features keep consumers engaged?
2. *Cultivate Financial Self-Efficacy and Financial Literacy.* Do FE titles increase financial knowledge and skills? Do FE titles promote positive changes in financial self-confidence? Do players have fun? Does playing FE titles reduce stress and anxiety?
3. *Enable Initial Action.* How can FE titles prompt players to take real world actions related to their personal finances? What types of actions are viable targets?
4. *Support Sustained Behavior Change.* How can FE titles support the adoption of ongoing, positive financial behaviors? What attributes does a game library need to sustain an ongoing relationship with players?
5. *Realize Positive Outcomes.* Can FE ultimately lead to positive, tangible impact? Do players increase savings? Reduce debt? Participate in retirement plans? Eliminate mistakes and incurring fees?

3. Engage Consumers

Financial Entertainment aims to address the challenge of low demand for financial education through the appeal and immersive quality of casual video games. D2D utilizes three tools to generate engagement: (1) an attractive frame for the game, (2) credible partners for game distribution, and (3) tailored social marketing strategies.

In crafting a frame for the game, D2D uses popular motifs that will attract consumers and keep them entertained during gameplay. In the preliminary game development stages, D2D researches and tests game themes and characters through small-scale surveys and focus groups in order to inform these decisions. The FE games have

used celebrities, vampires, and farms, with the intent of re-framing the financial education experience.

D2D partners with the U.S. military, community colleges and universities, financial services firms, community-based organizations, and employers in order to introduce the games to LMI consumers. Additionally, D2D has collaborated with these partners to customize marketing and distribution campaigns using several methods, such as portal websites (a customized version of D2D's FE website), brochures, business cards, and organized game tournaments. This section reviews the results of such marketing and distribution strategies from two case studies: (1) Fort Hood and (2) Ivy Tech Community College.

3.1 Case Study: Fort Hood

From July 2010 through October 2010, D2D ran a pilot with the U.S. military base at Fort Hood, one of the largest Army installations in the world. Ford Hood has experienced challenges in engaging personnel using traditional financial education content and outreach. Leveraging the spirit of competition in this community, D2D launched a pilot *Celebrity Calamity* game tournament to engage young enlisted personnel, their spouses, and other family members in financial education. The tournament was promoted through several complementary social marketing strategies including a dedicated portal website, distribution of emails and branded business cards by the 100+ Army financial coaches on base, on-site computer labs for gameplay, on-site flyers and handouts, and a public awards ceremony.

The tournament generated over 5,300 visits to the Fort Hood portal site for an estimated total of over 6,000 plays of the *Celebrity Calamity* game. The table below shows the data from the players that registered and completed a demographic survey. These data indicate that the game reached the target demographic of LMI players, with 63% reporting household annual incomes under \$40,000. While women make up 14.25% of active military members, 33% of registered users in the tournament were female.³

³ In the deployment of Financial Entertainment pilots, D2D uses a customized partner portal site with a Drupal back-end database. The site is also programmed with Google Analytics to help gather additional tracking data. All players are encouraged to register which, if they are logged in, allows the site to retain their highest score in the database for any tournament which may be underway. However, site visitors do

Table 1: Demographics of Players at Fort Hood (n=1,099)

Gender*	Male	67%
	Female	33%
Race/Ethnicity	African-American/Black	28%
	Asian	3%
	Hispanic/Latino	18%
	White	43%
	Other	8%
Household Income	0-\$19,999	14%
	\$20,000-\$39,000	49%
	\$40,000-\$59,000	26%
	\$60,000 or more	12%
*Data in the Gender category is generated from total registered users (n=1,342) rather than only the subset of users that completed the online survey		
(Source: FE Portal Survey Database)		

The data demonstrate that FE deployed through this channel has the potential to reach and engage financially vulnerable Americans. The game was introduced through a trusted source, who offered the opportunity to play a video game to a soldier or family member. In addition, analytics show that the game reached into households of military participants. The following quote, from a Fort Hood family member exemplifies the power of the tournament format to generate sustained engagement as personnel were excited about the opportunity to upstage their peers and superiors: “I think it's a great idea to play for high scores against others in your military community. I played far, far longer than I would have otherwise and the repetitive play drilled the recommended procedures...into my head.”

3.2 Case Study: Ivy Tech

not have to register to play a game. Registered users are prompted to take a voluntary survey to provide additional information regarding demographics, like household income and race. As such, in the represented data, the number of survey respondents (collected using Drupal database) is a subset of registered users (collected using Drupal database), which in turn is a subset of website visitors (collected using Google Analytics). The number of times a game was played was also collected through Google Analytics and has no definite relationship to these other statistics. Lastly, as it is noted on the data tables, because gender is a question which all registered users must answer and not just those that took the survey, this statistic is reflective of a higher sample size.

Community colleges represent another distribution partner for FE as they have significant contact with financially vulnerable adults. Ivy Tech Community College is the nation's largest state-wide community college with single accreditation and the state of Indiana's largest public post-secondary institution, serving nearly 200,000 students a year. In conjunction with the Ivy Tech Marketing Team, in early September 2010 D2D launched a tailored portal site available to all 11 campuses in the Ivy Tech system. Since the site launched, D2D has run two tournaments: an October 2010 *Celebrity Calamity* tournament and a combined *Farm Blitz / Bite Club* tournament in early 2011.

The tournaments were promoted through marketing strategies that were catered towards the student audience. In addition to creating an Ivy Tech portal page, D2D leveraged the Campus Connect intranet system, posted a graphic on the Ivy Tech homepage, sent customized email messages according to segmented populations (traditional vs. non-traditional students), and utilized Twitter and Facebook.

This distribution effort generated over 45,000 visits to the portal site for an estimated total of over 45,000 gameplays. The table below shows the data from the sample of participants who completed a demographic survey. The results indicate that 80% of these players were female and 82% reported household income less than \$40,000 (and 52% reported household income less than \$20,000).

Table 2: Demographics of Players at Ivy Tech Community College (n=4,234)

Gender*	Male	20%
	Female	80%
Ethnicity	African-American/Black	11%
	Asian	1%
	Hispanic/Latino	3%
	White	82%
	Other	3%
Household Income	0-\$19,999	52%
	\$20,000-\$39,000	30%
	\$40,000-\$59,000	12%
	\$60,000 or more	6%
*Data in the Gender category is generated from total registered users (n=4,542) rather than only the subset of users that completed the online survey		
(Source: FE Portal Survey Database)		

3.3 Overall FE Distribution

These two case studies demonstrate the viability of Financial Entertainment to reach and engage LMI audiences in financial education. The registered users showed a high level of engagement with the games by *voluntarily* playing games for greater than 40 minutes on average. More importantly, the trend of reaching and engaging a LMI audience in high average gameplay time has been reflected in the broader distribution of the FE games (See *Appendix A* for a list of D2D distribution partners).

Table 3 provides data on total user engagement with FE games from all D2D game portal websites, 2009-2012. This table demonstrates that FE games have achieved over 280,000 site visits, which have translated into approximately 260,000 sessions of gameplay across all titles.

Table 3: Total Financial Entertainment Users, 2009-2012

Total Site Visits		281,918
Approximate # of plays	Total	260,785
	Celebrity Calamity	101,441
	Farm Blitz	65,180
	Bite Club	44,337
	Groove Nation	18,556
	Refund Rush	19,651
% of return visitors		18%
<i>(Source: Google Analytics)</i>		

Table 4 presents the demographics of the 11,656 FE users that have registered and completed an online survey in the last 3 years. Over 80% are LMI consumers, and over 60% of registered FE game players are female. The average registered user has spent a total of about 34 minutes playing FE games.

*Table 4: Demographics of Registered Users, 2009-2012
(n=11,656)*

Average time playing game		34 min
Gender	Male	36%
	Female	63%
Age	<18	19%
	18-29	45%
	30-59	34%
	>60	2%

Ethnicity	African-American/Black	17%
	Asian	4%
	Hispanic/Latino	9%
	White	64%
	Other	6%
Household Income	0-\$19,999	36%
	\$20,000-\$39,000	29%
	\$40,000-\$59,000	16%
	\$60,000 or more	19%
<i>Source: FE Portal Survey Database</i>		

4. Cultivate Financial Self-Efficacy and Financial Literacy

Beyond engagement of LMI consumers with financial education materials, Financial Entertainment aims to bridge the gap between learning and action by cultivating financial self-efficacy and financial literacy through the gaming experience. In addition to developing discrete areas of financial knowledge (e.g., budgeting, compound interest, etc.), D2D’s theory of change posits that the fun and interactive nature of casual video games can also increase players’ belief in their ability to accomplish financial goals. Experiencing success and lowering stress around the completion of financial tasks in the game environment allows players to feel more confident about learning and taking action. In addition, the frame of engagement—vampires, farms, and celebrities—reduces anxieties players might have about personal finances.

This section reviews data from several D2D efforts, conducted at varying points in game development, in assessing the impact of FE games on financial self-efficacy, measuring changes in financial knowledge and confidence.

4.1 Game Development User Testing: *Farm Blitz* and *Bite Club*

As with all FE titles, the game development process of both *Farm Blitz* and *Bite Club* involved user-testing groups conducted at three key milestones of development (“First Playable” game, “Alpha” version, and “Beta” version). Building these testing opportunities into the game development process provides user feedback for adjustments to gameplay and generates preliminary data about the game’s impact on financial knowledge and confidence. After game development, user testing was carried out in six

cities across the country by local organizations. The objectives were to identify areas where the games could be further refined, understand how the games may impact the target audience, and determine how each game performs in a variety of settings.

User groups consisted of nine to 18 participants, with recruitment focused on 18 to 35 year-old low-income females from a range of racial and ethnic backgrounds. During the “First Playable” and “Alpha” versions, testing sessions gathered qualitative data as feedback for game development. In the “Beta” version testing and the preliminary testing, users completed pre- and post-tests of financial confidence questions (on a five level Likert scale) and financial knowledge questions (adapted from the NEFE Financial Evaluation Toolkit).

Although the sample sizes were small and the games were not finalized, the testing sessions returned promising results. While the qualitative data advised D2D’s design modifications moving into final versions of the games, the quantitative results from the “Beta” testing and preliminary effectiveness testing questionnaires showed overall positive gains in financial knowledge and self-confidence.⁴

4.2 *Farm Blitz* Randomized Comparison Trial

D2D expanded its research portfolio by conducting its first randomized comparison trial in the Spring of 2011. In partnership with two local non-profit organizations, D2D implemented a 207 person experiment comparing the effects of *Farm Blitz* with a traditional form of financial education. Participants were randomly assigned to either play *Farm Blitz* or read a printed version of readily available online financial education material (“pamphlet”). They were given an intake survey followed by a baseline survey of financial confidence (12 questions based on a 5-level Likert scale) and knowledge (10 True or False questions). The participants then either played *Farm Blitz* for 45-60 minutes or read the pamphlet for 15-20 minutes according to their treatment group. Afterwards, they completed a follow-up survey of the same confidence and knowledge questions.

⁴ For more on this preliminary effectiveness testing, see Peter Tufano, Timothy Flacke, and Nick Maynard, *Better Financial Decision Making Among Low-Income and Minority Groups* (RAND Working Paper Series, October 2012).

Both groups achieved statistically significant improvements, from baseline to follow-up, on both the financial confidence and financial knowledge measures. A regression analysis comparing knowledge gains between the two groups finds that the pamphlet treatment was associated with a slightly greater improvement (See *Appendix B*).

Because the driving force of *Farm Blitz* and the use of casual games is their ability to draw consumers in, it is possible that, with this added advantage of attractiveness and comparable scores in confidence and knowledge improvements, that *Farm Blitz* is more effective as a financial education tool than a traditional informational pamphlet.

5. Enable Initial Action

Improvements in financial self-efficacy are a critical, but intermediate, step towards the initial actions that lead to improved financial capability. Although the evaluation of financial education remains a core challenge to the field (Huston, 2010; Financial Literacy and Education Commission, 2012), D2D has begun to test the potential of FE games to promote financial actions. This section reviews evidence from two such projects - the *Farm Blitz* RCT and a corporate partnership with Staples.

In addition to assessing core indicators of financial self-efficacy, the *Farm Blitz* RCT also tested an initial action component. After the follow-up survey, participants were presented with four financial offers: a request for more information about saving for emergencies, a three-month commitment to save, a free credit report offer, and the purchase of a \$25 or \$50 U.S. Savings bond using the research stipend provided from the experiment.

Nearly 70% of all participants decided to take action with at least one of the offers, with little differences between the two treatment groups. Specifically, about 60% of participants opted to receive more information on how to save for emergencies, 40% opted to make a three-month commitment to save, 36% opted to receive a free credit report, and 3% purchased a U.S. Savings Bond (See *Appendix B*). It is not surprising that offers with higher barriers yielded lower take-up. However, these results represent a promising initial gauge of the post-gameplay appetite for financial action taking, and an important first step for future research questions on the topic.

The second example draws on a corporate partnership with the office supply company Staples and their retirement services vendor New York Life Retirement Plan Services (NYLRS), in which D2D created a customized version of *Bite Club*, the vampire retirement planning game. In an effort to more closely link game play with financial behavior change, the game was designed to allow Staples employees to take real world financial action at certain points throughout play. The first opportunity, which represents a low barrier action, prompts users to fill in their email address for more information about saving for retirement. The game asks users about their current 401(k) contribution, and allows them to click a link within the game that takes them to their online Staples employee benefits accounts, where they can make changes to their retirement savings plan and their Health Savings Account (HSA). The customized version also has a Staples customized storyline, characters, and logos throughout the game.

Staples used a multi-pronged marketing strategy for engaging employees in *Bite Club*, including: a Staples portal page, creative marketing materials, and a coordinated roll-out communication plan. The Staples portal page hosted the customized game along with Staples logos, informational materials, and links to the other FE games. The creative marketing materials established by Staples included posters and placemats in the employee break rooms, as well as postcards, t-shirts, and stuffed animal characters. Finally, the coordinated roll-out plan was centered on Staples 401(k) open enrollment period, with segmented marketing interventions in the form of direct mailings and pilot tournaments for impact measurement.

Across the project, over 9,600 visits to the game were observed from over 7,500 visitors. Direct mailings that promoted the game yielded significant results. After a single direct mail piece promoting the game was sent to employees, a 3.5-4.5% response rate was recorded. Similarly, out of the recipients of a direct mailing postcard to Staples employees who were newly eligible to open their 401(k), approximately 11% took positive action in their online 401(k) accounts.⁵ In addition, game tournaments in two different districts both engaged about 80% of targeted store employees in the Staples FE portal site.

⁵ source: *New York Life Retirement Savings*

In comparison with other workplace financial education strategies, the Staples pilot was successful perhaps in spite of the fact that employees were not required to play, could not play on company time, and were not provided with any direct financial incentive for playing. Building on these results, motivating initial financial action and creating sustained behavioral change is an area of research and experimentation that D2D will explore moving forward with this work place intervention.

6. Conclusion: The Future of Financial Entertainment

The projects reviewed in this paper demonstrate the potential of Financial Entertainment to engage consumers, improve their financial self-efficacy, and drive them towards positive actions. The data around FE's ability to engage consumers is most robust, as shown in the Fort Hood and Ivy Tech pilots, while the game development user testing, RCT, and Staples partnership provides initial proof of concept that FE can promote financial self-efficacy, financial literacy, and foster initial action taking by users. However, while these results are promising, it is evident that they raise more questions than they answer, especially around creating sustained behavior change and generating positive economic outcomes.

D2D will continue to refine its games, deepening their understanding of what gameplay features improve financial confidence and knowledge. Future projects will require expanding current partnerships and developing new ones to test different game designs and social marketing strategies to promote them. Indeed, varying the types of real world actions players may take and the mechanisms for embedding these offers into a game environment is a promising area of future FE work. While the Staples pilot linked *Bite Club* to a retirement plan at discrete points in the game, D2D will also experiment with prompting players to take action at other moments of gameplay and to link gameplay to different types of financial actions (e.g., debt reduction, saving for college, teaching children sound money habits, and tracking spending).

Linking gameplay to financial actions should take into account how "light" or "heavy" a financial action is, in terms of the demand on the user. On the light side is to click through a website for further information, or to provide personal information, like an email address to which information or offers can be sent. Moderately demanding

actions involve actually reading further information, joining a group, signing up for a class or program (e.g., first time homebuyer class or signing up to get taxes done), or making a financial pledge (e.g., to save more, pay some debt, etc.). More demanding actions include sticking to the pledge, attending the class or program one signed up for, using personal financial management tools, making a deposit, enrolling in a 401(k), opening an account, or buying a bond.

In testing the mechanism and timing of embedding financial actions into gameplay, interruptions to game flow should also be taken into consideration, as they may hinder potential actions and behaviors if they significantly impact the fun and immersive quality of the game experience. Factors to be explored include:

- When to embed actions during the game: when a financial achievement is realized in the game (e.g., paying off all the credit card debt in *Bite Club*); when an important level or status has been bestowed in-game (e.g., reaching Farm God status in *Farm Blitz*, being promoted to a new celebrity in *Celebrity Calamity*, etc.); during a regular presentation at the end of each round; or randomized pop-ups throughout the game?
- The role of stress: does the gaming experience relieve stress and thereby remove barriers to action, or do stressful moments in the game (e.g., having a lot of debt in *Farm Blitz*) push the user into action?
- Should a game character make an offer, or should the offer come from a more serious window that connotes legitimacy and trust?

Beyond enabling initial actions, future work will explore how to translate initial action into sustained behaviors and positive economic outcomes. In other words, the games prime the pump through engagement, financial self-efficacy, and initial action; the next step is translating those cognitive changes into real world financial change. This returns the discussion to the defining question of Financial Entertainment – can casual video games improve the financial capability of LMI users, as measured by such data points as increased savings, reduced debt, more financial planning, informed investing, and increased income? One direction this may take is building on various trends in gamification, the use of game mechanics and game design techniques to enhance non-

game contexts.⁶ This could entail rewarding users for both game-based actions and real world financial actions, such that accomplishments and incentives complement each other or link across different games. Another potential direction is expanding the financial opportunities and institutions linked to gameplay.

With the increasing costs of retirement, health care, and education, the need for financial education remains compelling, as consumers continue to be responsible for making informed financial decisions in an increasingly complex financial services landscape. While the debate continues regarding the effectiveness of financial education programs, D2D proposes that we need to step back and consider how we define and design financial education, and further, how we link financial education to financial actions and behaviors. While traditional financial education is lecture-based and generally confined to a classroom or static site of learning, and often thought of as boring, FE represents a paradigm shift in two ways: 1) making financial education engaging, fun, and interactive, and 2) linking education more directly to action-taking by embedding offers and opportunities for real-world actions in games. Ongoing developments in technology and gamification will accelerate the growth of this concept.

⁶ For an in depth look at Gamification, see D2D's forthcoming Gamification white paper (Spring, 2013)

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Appendix A

FE Distribution Partners	
US Military	Fort Hood Fort Bragg Fort Jackson Fort Gordon
Employers	Staples State of Massachusetts US Military (see above)
Colleges and Community Colleges	Ivy Tech Community College Madison Area Technical Community College University of Southern Maine Iowa State University
Financial Services	Zions Bank Guaranty/Best Bank Old National Bank Mt. Washington Bank
Nonprofits	National Council of La Raza (NCLR) Baltimore CASH Campaign East Side University Village Community Learning Center Freedom House
Government	City of Boston State of Massachusetts PA Office of Financial Education

Appendix B

Farm Blitz Random Trial

Overview

This study had two main purposes:

- 1) To use a randomized trial design to test the effectiveness of the financial literacy video game *Farm Blitz* in improving the financial confidence and knowledge of low-income and minority adults.
- 2) To conduct preliminary Financial Entertainment 2.0 market research - exploring participants' responses to four "opportunities for action" made at the end of game play: signing up to receive free financial information, pledging to save money over a three-month period, pulling a credit report, and buying a \$50 or \$100 savings bond.

Two hundred seven research participants were randomly assigned into either a treatment group that played *Farm Blitz* for 45 minutes or comparison group that read a pamphlet with financial information and advice. The Student's t-test analysis of the data from the baseline/follow up test instrument found that both comparison and treatment groups achieved statistically significant improvements on several measures of financial confidence and knowledge, with the comparison groups improving slightly more than the treatment groups. Using a regression analysis to compare the two treatment groups, the results indicates that the pamphlet had a slightly higher effect on financial knowledge at the 5% significance level, which can largely be attributed to improvements in the math specific questions on the knowledge test. The comparison and treatment groups had similar take-up rates of the "opportunities for action," with the *Farm Blitz* treatment achieving a slightly higher take-up rate of the U.S. Savings Bond purchase.

The study's design made it very likely that participants in the comparison groups would improve on confidence and knowledge because they had the benefit of reading relevant financial information and advice *immediately before taking the follow up test*. Therefore, the fact that participants who played *Farm Blitz* achieved similarly positive improvements demonstrates the power of casual financial literacy video games as a pedagogical strategy for low-income adults.

This research study provided a \$50 incentive for participants to either read a financial pamphlet or play *Farm Blitz*. However, in the real world, lack of demand for financial education is a considerable barrier to its delivery. Herein lies the potential of the video game as a delivery mechanism. Future research should take into account the role of low-income, minority adults' motivation and interest to play *Farm Blitz* versus reading a financial pamphlet.

Method

Research participants were recruited through local community-based organizations, flyers, and advertisements on Craigslist. Participants were screened for age (age 17-35)

and ability to read and write English. The research was conducted at two testing sites: Location 1 on April 16th and Location 2 on April 23rd. Participants were compensated \$50 for a 90-minute testing session, with free food and coffee provided.

Research participants were randomly assigned to either a treatment group or comparison group. The protocol for all participants began with an intake survey to gather basic demographic information, and then a baseline test of questions related to financial skills self-confidence and knowledge. The comparison group was then asked to read a brochure of financial information and advice, while the treatment group played *Farm Blitz* for 45 minutes. After these activities, both groups completed the follow up test and were offered four opportunities to take immediate action on improving their financial well-being.

Results

The number of participants in each of the groups is summarized in the table below:

Table A: Number of Participants in each group

	Pamphlet	Farm Blitz	Total
Location 1	50	48	98
Location 2	55	54	109
Total	105	102	207

It is important to note that while there were minor differences in the administrations of the experiment between the two locations, the investigators do not believe that these differences are grounds for treating the two locations separately.

Demographics

The intake survey administered to all research participants gathered basic demographic data. While the experiment randomized participants into either the comparison or treatment group, the core demographic variables were generally equivalent between the two groups. Important to note are the differences between treatment groups among participants who responded that they had achieved “some college” and those who responded that they had “no [financial] assets.” These differences could have caused a bias in the reported effects of the treatments because of previous knowledge and experience which may make participants more or less likely to improve on measures of financial capability. The demographic data for the two research groups is summarized in the following table.

Table B: Experiment Demographics

	Pamphlet	<i>Farm Blitz</i>
Age		
17-25	41%	37%
26-35	41%	45%
Over 35	17%	18%
Race		
White	8%	9%
Black/African American	70%	67%
Asian	2%	0%
Native American	1%	0%
Multi-Racial	1%	4%
Other	7%	7%
Ethnicity		
Hispanic/Latino	11%	13%
Education Level		
Some High School	29%	19%
High School Graduate	29%	24%
Some College	29%	48%
College Graduate	13%	10%
Did not respond	1%	0%
Income		
Below \$20,000	64%	63%
\$20,000-\$30,000	22%	18%
\$30,000-\$40,000	6%	10%
\$40,000-\$50,000	4%	5%
Above \$50,000	1%	1%
Did not respond	4%	4%
Assets		
No assets	2%	35%
Under \$2,000	41%	39%
\$2,000-\$10,000	43%	15%
Over \$10,000	10%	5%
Did not respond	5%	6%

Knowledge

Methods:

Analyzing the results from the financial knowledge test, this study takes a two pronged approach. First, we aim to establish whether there was a statistically significant improvement between the baseline and the follow up knowledge tests within each group separately. Then, we compare the two groups to see how they the changes in scores differ by treatment group.

For the comparison of means between the baseline and follow up tests, the Student's T test is used for each group. An aggregate score of the nine financial knowledge questions was calculated for each participant. The null hypotheses of these tests are that the mean total score of the follow up test equals the mean total score of the baseline test for each treatment group.

Comparing the change in test scores across treatments, an OLS regression analysis is used. A simple regression of follow up test scores on a binary treatment indicator is shown in Model 1 of *Table E*. Though the randomization of the experiment should largely rule out confounding variables, "Employment Status" and "Education" were added to the regression as control variables because of slight differences between the treatment groups, correlation with the dependent and independent variable of interest, and because there is reason to believe that these variables may influence a change in financial knowledge (Model 2). The data was collected through a multiple choice survey, so each choice was converted into a binary variable before being included in the regression. The equation used to estimate these coefficients:

Finally, the questions were also grouped into three categories (definitions, math questions, capability questions) in order to gain further insights into how the treatments performed in comparison to each other on several key topics. The financial knowledge questions along with their categorization are shown in *Table B*. For analysis of the different categories of questions, a similar regression was used, substituting the total test score for each category in place of the follow up test score.

Table C: Financial Knowledge Test Questions & Categories

The interest rate (sometimes called APR) determines how fast money will grow. Whether that money is debt or savings. (Definition)
For you, the consumer, a loan (debt) with a 3% interest rate is a better deal than a loan with a 20% interest rate. (Math)
For you, the consumer, a savings account with a 3% interest rate is a better deal than a savings account with a 1.25% interest rate. (Math)
Compound interest is when your interest earns interest (Definition)
Compound interest makes your savings account grow faster (Capability)
Compound interest makes a loan (debt) grow faster (Capability)
Finance charges on debt typically grow faster than interest earned on savings. (Capability)
Finance charges are fees charged to the borrower to use someone else's money. (Definition)
Suppose you had \$100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than \$102, exactly \$102, or less than \$102? (Math)

Analysis of Knowledge Questions

The Student’s T test shows similar improvements for both treatment groups. Testing the null hypothesis that the change in mean total financial knowledge scores between the baseline and follow-up tests is equal to zero, the p-value indicates that this null hypothesis can be rejected at the 1% level, meaning there was a statistically significant improvement in financial knowledge for each treatment group (shown in Table D).

Table D: Student’s T Test for Change in Mean Financial Knowledge Test Scores

	Treatment	
H0: Δ knowledge = 0	Pamphlet (n=105)	Farm Blitz (n=102)
Z scores (P-value)	8.21 (0.000)	6.54 (0.000)

When the two groups are compared to each other using a regression analysis, however, the analysis shows that while both groups improved in the follow up test, the pamphlet performed slightly better than the games with a .616 coefficient on the treatment variable (statistically significant at the 5% significance level) when controlling for the demographic data (“Model 2”, Table E). This shows that, compared to *Farm Blitz*, financial knowledge test scores from the pamphlet improved to a greater degree. When the questions are grouped by the categories noted in Table C, the results show that Math and Definition categories of questions had a statistically significant and greater

improvement for the pamphlet treatment group with coefficients of .273 (statistically significant at the 1% significant level) and .223 (statistically significant at the 5% significance level) respectively, as seen in Models 3,4 and 5 of *Table F*. This suggests that the overall improvement of the Pamphlet treatment can perhaps be attributed to improvements in the Math and Definition related questions. Looking at the weights of the control variables, it is also clear that education level is a key possible determinant of performance on questions in these two categories.

Table E: Regression Analysis Models

Variables	Model 1			Model 2		
	Coef.	Std. err.	p-value	Coef.	Std. err.	p-value
Treatment (1=Pamphlet, 0=Farm Blitz)	0.484	0.305	0.115	.616*	.241	.011
Baseline Total Test Score				.515***	.056	.000
Employment						
Full time				1.783*	.771	.022
Part-time				1.807*	.746	.016
Unemployed and loing				1.356	.705	.056
Unemployed and not looking				1.439	.806	.076
Education Level						
Some High School				.680	1.751	.698
High School Graduate				.647	1.754	.712
Some College				1.595	1.753	.364
College Graduate				1.523	1.784	.394
Constant	6.543***	.217	.000	.914	1.883	.628
R-squared	.012			.448		
N. of cases	207			207		
* p<0.05, ** p<0.01, *** p<0.001						

Table F: Regression Analysis Models By Question Category

	Model 3: Math Questions			Model 4: Capability Questions			Model 5: Definition Questions		
Variables	Coef.	Std. err.	p-value	Coef.	Std. err.	p-value	Coef.	Std. err.	p-value
Treatment (1=Pamphlet, 0=Farm Blitz)	.273**	.098	.006	.140	.120	.247	.223*	.108	.040
Baseline Score for Category	.499***	.054	.000	.398***	.060	.000	.342***	.056	.000
Education Level									
Some High School	-1.973**	.711	.006	1.169	.875	.183	1.555*	.786	.049
High School Graduate	-2.090**	.713	.004	1.228	.876	.162	1.632*	.788	.040
Some College	-1.642*	.714	.022	1.392	.871	.112	2.093**	.787	.008
College Graduate	-1.692*	.727	.021	1.541	.884	.083	1.968*	.799	.015
Employment									
Full time	.513	.312	.101	.553	.385	.153	.782*	.345	.025
Part-time	.511	.302	.093	.555	.372	.138	.671*	.335	.047
Unemployed and looking	.427	.285	.136	.404	.352	.253	.533	.316	.094
Unemployed and not looking	.264	.326	.418	.465	.403	.250	.641	.362	.078
Constant	2.462**	1.303	.034	.134	1.530	.930	-1.028	1.421	.471
R-squared	.438		.258		.325		.402		
N. of cases	207		207		207		207		
* p<0.05, ** p<0.01, *** p<0.001									

Confidence

Methods

The test also measured the confidence of participants on a range of relevant financial skills. Participants were asked to rate their confidence on a Likert scale of 1 (not confident) to 5 (very confident). The data from these questions were analyzed using the Wilcoxon signed-rank test. This procedure compares each participant's baseline test answer to his/her follow up test answer for each question. This identifies, for each question, how many participants scored lower (negative rank), how many scored higher (positive rank), and how many stayed the same (ties). Based on these rankings, the Wilcoxon signed-rank test determines on which questions participants yielded statistically significant improvements. These data are summarized in *Table G* below.

Table G: Wilcoxon Signed-Rank Test for change in Financial Self-Confidence Score.

Rate your degree of Confidence in doing the following (1 to 5):	Treatment	
	Pamphlet (p value)	<i>Farm Blitz</i> (p value)
Not take on more debt than I can handle.	.001**	.021*
Start saving money.	.000***	.232
Avoid finance charges.	.464	.003**
Pay my debt on a regular basis.	.000***	.000***
Save money regularly.	.000***	.000***
Manage my finances.	.001**	-.900
Use savings to pay off debt.	.086	.000**
Allow savings to grow by not taking it out.	.000***	.013*
Avoid high interest debt.	.011*	.004**
Save for financial emergencies.	.000***	.000***
*Statistically significant at $p < .05$ **Statistically significant at $p < .01$ ***Statistically Significant at $p < .001$		

Analysis of Confidence Questions

The p-values from the signed-rank test show consistent and statistically significant improvement in financial confidence across almost all of the questions for both treatments. However, in comparing the two treatment groups, there is little evidence to suggest that there is a statistically significant difference in the financial confidence improvement between both treatment groups. It is important to note that while the responses from the *Farm Blitz* group to the confidence question "Manage my finances" declined between tests, this does not reflect the overall trend of the confidence questions. This decline in confidence in this case could be contributed to initial overconfidence by survey takers in this group.

Opportunities for Action

The table below summarizes the take-up rate for the four “opportunities for action” that were presented to all research participants at the conclusion of the study. These results show promising translation into action. The administrators of the experiment noted the increase in demand for each opportunity and the perhaps universal appeal of a free credit report. The statistics on the U.S. Savings Bond purchase are particularly interesting as they represent an immediate handover of money, which is a significant request for the participants given the income levels denoted in the demographics. The greater action on the U.S. Savings bond for *Farm Blitz* is noteworthy and cause for future investigation into the use of games to immediately improve financial behaviors.

Table H: Financial Action Opportunity Take-up

Opportunity	Treatment	
	Pamphlet (n=105)	<i>Farm Blitz</i> (n=102)
More information on how to save for emergencies	59	63
3 month commitment to save	37	41
Free credit report	40	34
Buy a U.S. Savings bond for \$25 or \$50 with experiment money	2	4

Limitations & Conclusions

Several limitations of the experiment should be noted. First, the small sample size for the experiment limits the conclusions that can be drawn from the analysis. Secondly, while both groups achieved statistically significant improvements from the baseline to the follow up tests, a control group was not used against which to compare the treatment effects. This lack of a control group calls into question what changes in confidence and knowledge could have occurred naturally between the baseline and follow-up tests.

As the data demonstrate, both reading a financial pamphlet and playing *Farm Blitz* had very similar positive impacts on financial confidence, financial knowledge, and prompting participants to take advantage of “opportunities for action.” These results are promising in terms of the potential of Financial Entertainment to improve financial capability. Future research should build such financial action offers into the game design itself in order to more directly explore this concept. Additionally, this experience outlines the need for further more robust research that compares *Farm Blitz* to both a more accurate alternative as well as a control group in order more deeply investigate the findings from this study.