Using Online Games To Teach Personal Finance Concepts

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ABSTRACT

This case study explores the use of online games to teach personal finance concepts at the college level. A number of free online games targeting such topics as budgeting and saving, risk and return, consumer credit, financial services, and investments were introduced to the experimental group as homework assignments. Statistical results indicate that integrating online games into coursework significantly enhanced student learning outcomes. We suggest extending our successful experience to groups of people who need financial knowledge the most.

Keywords: Game-Based Learning; Personal Finance; Teaching Methods

1. INTRODUCTION

In recent years, financial illiteracy has become an ongoing concern for policymakers, researchers, and educators. Uninformed financial decisions, an inevitable consequence of this knowledge deficit, tend to negatively affect the overall welfare of the economy. In their review of the literature concerning financial literacy and financial education, Agarwal et al. (2010) concluded that a large proportion of adults are not financially literate, and that this deficit in financial knowledge leads to sub-optimal financial decision-making. Meanwhile, studies have also documented that increased financial knowledge has a positive impact with regard to constituting more informed or self-advantageous financial decisions (Mandell and Klein, 2009). Despite the high stakes of financial illiteracy, policymakers and practitioners face significant challenges in motivating individuals to acquire financial knowledge (Hilgert, Hogarth, and Beverly, 2003).

In the classroom, instructors similarly observe among students an attitude of low motivation toward learning. To many students, financial literacy seems not to work like a standard academic subject; it is more a life skill of one's daily routine. Some topics are of more interest to those with ample financial resources, or to those who have experienced certain significant life events. On the other hand, certain simple concepts, like money budgeting and saving, are easy in principle but difficult in practice. For students who are not financially independent and who have not faced certain complex life decisions, an experience-based instructional tool is necessary in order to strengthen their motivation to learn and to illustrate the mechanisms of wealth management.

Computer game-based learning, which has become popular over the past decade, is a good candidate for facilitating personal finance learning. Online games are known for providing simulated scenarios which would otherwise be impossible or infeasible for learners to encounter. They also have the ability to show the consequences of making risky financial decisions. The simulated environment provides students a safe, low-cost, fun, yet realistic interface by which to practice the knowledge gained in class. Students can "live" in a virtual world which takes them from youth to old age, experiencing a wide range of financial decisions in as little time as one hour. Despite the many advantages offered by computer game-based learning, scholarly views concerning the effectiveness of game-based pedagogy are mixed. Advocates of computer game-based learning argue that games provide high levels of enjoyment in learning while producing learning outcomes equivalent to those obtained via traditional learning methods (Ebner and Holzunger, 2007). Detractors of computer game-based learning argue that games do not necessarily stimulate motivation to learn, especially among older students, such as those in college (Whitton, 2007). The purpose of this case study is to explore the implementation of online games in teaching personal finance at the college level. While some studies have treated incorporating computer games into classroom curricula, many such

studies have focused on elementary and secondary education, rather than higher education at the undergraduate and graduate levels (Tao, Cheng, and Sun, 2009). Moreover, the outcome of computer game-based learning tends to be open-ended and unpredictable (Licari and Ovedovitz, 2005). Therefore, it can be difficult for educational researchers to replicate a successful experience in the absence of a detailed cookbook. This case study fills this gap by investigating the phenomenon of computer game-based learning in a college financial literacy course.

The results of this experiment show that online games significantly improved student learning performance. The rest of this paper is organized as follows. Section 2 reviews the literature concerning adopting games/simulations for teaching business concepts at the college level. Section 3 describes the implementation and evaluation methods of the present study. The experiment results and implications are discussed in Section 4, and Section 5 offers a conclusion.

2. BACKGROUND

Computer games are effective in facilitating learning not because they are fun, but because they capture the essence of the human learning process, situated cognition (Eck, 2006). Computer games offer virtual contexts that allow learners to respond to problems as if they themselves were in a given situation. Computer games also have the advantage of letting learners work via repeated practice by means of an entertainment-coated vehicle.

In recent years, the implementation of games and simulations into course designs has become a popular pedagogical means of enhancing student learning. In marketing class, Gillentine and Schulz (2001) documented the use of a fantasy football league simulation in a sports marketing concepts course. In management courses, Shannon et al. (2010) adopted a simulation game to teach lean manufacturing implementation strategies, and Pasin and Giroux (2011) illustrated that the use of a simulation game in an operations management course provided an opportunity for students to master decision-making skills that would otherwise have been difficult to put into practice. In the area of finance instruction, simulated trading is now a standard component in most college investment classes. McClatchey and Kuhlemeyer (2000) pointed out that over 70% of finance professors surveyed reported using some sort of simulation exercise in their investment courses. Studies of the use of trading simulations in investment courses include those by Pavlik and Nienhaus (2004), King and Jennings (2004), Ascioglu and Kugele (2005), and Norton and Singleton (2005). Despite this abundance of research on the use of games and simulations in the finance field, little effort has been applied to exploring the application of computer games in the context of the subject of personal finance. Possible explanations for this lack of attention include (1) the status of personal finance as a relatively new course in the context of higher education, and (2) the fact that the subject of personal finance covers quite a broad range of knowledge, such that it is difficult to find a single game which can address the substantial variety of topics required.

3. IMPLEMENTATION AND EVALUATION METHODS

For our classroom experiment, we adopted a series of free online games offered by various not-for-profit organizations. The games were selected based on the following criteria: relevancy, level of rigor, time to complete, and ease of use. Since the objective of the course was to improve students' financial literacy, the games selected needed to cover a wide range of personal finance concepts, with the knowledge involved not touching upon the sort of difficult calculations taught in standard finance courses.

Table 1 lists the games or simulations adopted for the course and the corresponding learning topics of the course. Each role-playing game took around 30 minutes to complete, and the market simulation took place over the course of three weeks. The first three games, *Farm Blitz*, *Refund Rush*, and *Celebrity Calamity*, are distributed by the Doorways to Dreams Fund (D2D Fund), a not-for-profit organization promoting financial literacy among low and moderate income consumers. These games blend important financial knowledge and animated entertainment to deliver basic financial skills to players. The design of these games allows players to score points by performing such desired financial behaviors as confining spending to budgeted limits, paying debts earlier rather than later, understanding the financial risks in daily routines, and forming a habit of saving on a regular basis. It is worth noting that the design of *Farm Blitz* was inspired by the popular online games *Bejeweled* and *Farmville*. Therefore, students were eager to participate in the game, and it was ranked the favorite among all those assigned. *Financial Football*,

offered by PracticalMoneySkills.com, is a fast-paced game with a simulated NFL theme. Players are required to answer each financial question in as short a time as possible to earn yardage and score touchdowns. This game appeared to be especially attractive to those who enjoy sports. *Gen I Revolution*, provided by the Council for Economic Education, teaches a wide range of personal financial topics in a typical adventure-type game setting. There are 15 missions in this game, each with a specific finance topic. Due to the time constraints of the semester, only selective portions of the games were assigned. *Wall Street Survivor*, designed by Stock-Trak Group Inc., provides students a simulated real-time trading environment in which they have $100K of virtual cash to start the game. The game is similar to trading games frequently assigned in the investment course, but with a simpler format. Students have the opportunity through the game to get a sense of stock investment and portfolio management by engaging in paper trading.

In order to gauge the effectiveness of using computer games as a teaching aid in the personal finance course, the learning outcomes of two sessions of Personal Finance at a northeastern public university in the US were assessed. Both sessions were led by the same instructor, with 22 students in each session. The students of these two classes were non-business majors. There is no prerequisite for the course. One session (session A) received lectures along with traditional short essay/problem-solving type homework assignments. The other session (session B) received lectures along with games and simulations as homework assignments. Homework assignments were collected in paper format for session A. For session B, assignments were submitted either by finishing the assigned games directly online or by first playing the games and then handing in written learning reports. Homework assignments from both sessions were discussed and reviewed in class after they were due.

Midterm and Final exams were the method of accessing student learning outcomes. Tests were designed using a multiple choice format to avoid negative impacts on exam performance based on the students' essay-writing ability. The grading practice and the difficulty level of the tests were the same for each of the two sessions. Quiz results were not considered as a source of performance measurement because students tended to pay less attention to quiz preparation, and because the quiz outcomes were subject to bias based on a variety of irrelevant factors.

Table 1 List of Online Games/Simulations Used for Experimental Group[1]

Games/Simulation	Learning Topics	Type	Providers
Farm Blitz	• Compound Interest • The Importance of Savings • Debt Management	Role-Playing	Doorways to Dreams Fund http://www.d2dfund.org/
Refund Rush	• Use Tax Refunds Wisely	Role-Playing	Doorways to Dreams Fund http://www.d2dfund.org/
Celebrity Calamity	• Debt Management	Role-Playing	Doorways to Dreams Fund http://www.d2dfund.org/
Financial Football	• General Money Management Skills	Role-Playing	PracticalMoneySkills.com http://www.practicalmoneyskills.com/games/trainingcamp/
Gen I Revolution	• Consumer Credit • Financial Services • Consumer Purchasing	Role-Playing	Council for Economic Education http://www.genirevolution.org/
Wall Street Survivor	• Investing Fundamentals • Investing in Stocks	Simulation	Stock Trak Group Inc. http://www.wallstreetsurvivor.com/

[1] Farm Blitz, Copyright 2010, D2D Fund, Inc. Refund Rush, Copyright 2010, D2D Fund, Inc. Celebrity Calamity, Copyright 2010, D2D Fund, Inc. Financial Football, Copyright 2000-2011 Visa. Gen I Revolution, Copyright 2011, Council for Economic Education. Wall Street Survivor, Copyright 2011. Wall Street Survivor.

4. EXPERIMENT RESULTS AND THE FUTURE EXTENSIONS

Table 2 reports the learning outcomes for both sessions. As shown in Table 2, the average midterm score for session A was 62.81, as compared to 77.81 for session B. The average final exam score was 66.22 for session A and 75.63 for session B. The incremental difference between the sessions of the average scores on the midterm and final scores, according to t-test results, was statistically significant at 99% for the midterm and 98% for the final exam. The results of the Mann-Whitney U test also demonstrate that the data from session A were statistically different from those of session B. Overall, the empirical results suggest that integrating online games as a part of personal finance course activities improved student learning performance.

Table 2 The t and Mann-Whitney U Tests for Student Learning Outcomes

	Session A (Traditional Assignments)	Session B (Game-Based Assignments)	t-Test	Mann-Whitney U Test (p-value)
Midterm	62.8181 (12.8011)	77.8181 (11.4294)	-4.0997	0.0008
Final Exam	66.2272 (13.2949)	75.6363 (11.0175)	-2.5559	0.0168

The average exam scores from both sessions are reported. There were 22 students in each session. The figures in parentheses are standard deviations.

It is important to note that although we observed an increase in learning performance for the session using computer game-based assignments, game-based learning was only a part of classroom activities. Games are powerful in terms of offering a fun, interactive way to let learners practice applicable knowledge repeatedly without noticing they are studying the material. For example, *Refund Rush*, a game published by the Doorways to Dreams Fund, deliberately lets players score high if they allocate a part of their tax returns, after paying off all debts, into some form of savings. Based on encountering the same concept many times, players come to recognize the importance of savings. As pointed out by Corti (2006), games are a great vehicle for practicing knowledge gained, but bad at delivering a great deal of knowledge at the same time. Ebner and Holzinger (2007), who studied the implementation of an online game in a Master's level civil engineering course, also documented that as the course moved on to more complex content, learning with or without multimedia became equally difficult, and students became less motivated. Therefore, the adoption of a game-based pedagogy in the classroom should be designed as a supplement, rather than as the core instructional method. This sort of pedagogy seems especially useful for courses at the entry level.

We also find it necessary to point out a minor limitation of this experiment. The games and simulations adopted were not customized to the course. Therefore, not all the scenarios/questions given in the games were able to be referenced back to the course textbook. Such disharmony is a common issue educators face when adopting off-the-shelf packages in the classroom. This phenomenon may be a drawback for other courses, but it seems an advantage to a literacy-type course such as ours. Personal finance is multi-angled by nature, and students should be encouraged to extend their learning beyond the limits of the textbook. Some students reported difficulties answering the questions raised by the games on their first attempts. However, the students soon learned the new concepts and acquired the necessary knowledge by playing a given game repeatedly.

Although our sample size was not very large, our results in terms of increasing financial confidence and knowledge via game-playing were similar to those of Tufano et al. (2010), obtained in a study evaluating whether financial games improved the financial knowledge of a sample of 84 low-income adults across six locations in the US. This similarity implies that not only can finance educators implement computer game-based learning into a personal finance course curriculum, they can also extend this sort of successful experience to larger cohorts outside the classroom so that more people can acquire financial knowledge in a fun, rather than tedious, way. On campus, school administrators would do well to target students who have substantial student loans for such instruction. Off campus, a good group to start with might be people who are seeking tax assistance from the IRS Volunteer Income Tax Assistance (VITA) program. For students with substantial debts and people with low-to-moderate incomes, being financially literate is especially important. Data collected herein and in similar studies should benefit future research on the use of game-based pedagogy and assist in the advancement of financial game designs.

CONCLUSIONS

Studies have suggested that a substantial proportion of the population is financially illiterate. To promote financial literacy, schools at various levels have offered courses to remedy this deficit. However, teaching those who are young and who have only limited financial resources and experience is not easy, unless an effective pedagogy is adopted.

In this case study, we explored whether incorporating online games as a part of classroom activities improved student learning. Computer games proved to be appealing based on their potential to assist learning in this area, because they offer simulated scenarios that allow students to put themselves into others' shoes in reacting to potential financial problems. Our empirical results show that online games help to achieve significantly higher learning outcomes. We also suggest that online games should be treated as a learning aid, rather than the major learning vehicle, given that games are good at providing practice opportunities, but less good at transmitting large amounts of knowledge. We suggest extending this successful experience to target such groups as students facing substantial debt and people seeking tax assistance from the IRS Volunteer Income Tax Assistance program.

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