Experiential Learning on the Internet: A Case Study of the Internet Agricultural Bank Simulation Game[1]

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Abstract

Few agricultural studies have studied experiential learning on the Internet. In this study, an experiential learning tool focused on agricultural banking was updated to serve as an Internet based simulation game (www.agbanksim.org). The game offers a "real world" experience in which management decisions affect institutions interacting in a geographic market, enhancing understanding of the complex, competitive environment within which commercial banks operate. In the past, agricultural lenders and students who played the software based game learned key financial, economic, and banking lessons. Questions arose as to whether participants playing Ag Bank Sim in a virtual environment would have the same positive increase in learning key concepts. Results of pre- and post-tests of Louisiana State University students in a senior-level capstone agribusiness strategic management course and Oklahoma State University students in an undergraduate agricultural finance course illustrate learning of key concepts as a result of playing the Internet based game.

Introduction

Experiential learning enhances student learning. Experiential learning takes a set of fundamental concepts and reinforces them by testing new scenarios via a concrete experience; then reflecting upon the outcome; and then repeating the process (Boehlje and Eldman, 1978). Many studies have found evidence that this method of learning does indeed enhance learning of a wide array of agricultural students. Whether these students are seniors taking a capstone agricultural course (Andreason, 2004), have no farm/agricultural background (Rhykerd et al., 2006), are college students participating in a lab or simulation setting (Wilson and Nelson, 2009; Ball et al., 2006; Peel et al., 1995; Blank, 1985), or are in high school (Balschweid, 2002), experiential methods were found to enhance student learning. Yet, most of these studies have been conducted in a standard classroom. Many classes are taught via distance education, and often delivered in a virtual world where the Internet serves as the 'classroom.' Thus, teachers need to know if the Internet either hinders experiential methods of instruction or can be used to enhance the experiential learning experience of students.

The objective of this study was to identify whether an experiential learning tool could be successfully delivered via the Internet. It was expected that using the Internet to facilitate an experiential learning tool would enhance student learning. This contention was based on studies that found multimedia use in the classroom enhanced learning objectives. McAndrews et al. (2004) found that a computer based program increased students' perceptions of learning key principles in an introductory agronomy class. A computer based financial model was found to increase student test

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scores compared to traditional methods of instruction (Melvin et al., 2004). Agricultural education students, using a computer-based tool, scored higher on a leadership concept exam as compared to the students not using the computer to enhance learning (Boyd and Murphrey, 2002). Students demand and are willing-to-pay a premium for educational material delivered using multimedia tools (Boyer et al., 2009).

To meet this study's objective, the Oklahoma Bank Simulation Game (OBSG), an established experiential learning tool that has been used successfully in a traditional classroom, was modified for Internet delivery as the Agricultural Bank Simulation Game (Ag Bank Sim). Results of the study suggest that the Internet was a platform that could enhance student-learning of class objectives. Students at Oklahoma State University (OSU) and Louisiana State University (LSU) played Ag Bank Sim and improved their understanding of key banking concepts as assessed through pre- and post-test scores. Students and banking executives commented that the game was easy and fun to use.

Background on the Agricultural Bank Simulation Game

The history of the agricultural bank simulation game is quite extensive. During the 1970s, OSU agricultural economics faculty, along with representatives from the Oklahoma Bankers Association (OBA), saw a need to train and educate the next generation of bank managers. From these training programs came the idea for a simulation game that would complement the training programs by enhancing the bank employees' understanding of the management decisions made in a bank. As a result, the OBSG was born. The OBSG is based on primary and secondary data collected from rural Oklahoma banks. From this data, statistical and simulation techniques were employed to develop a competitive market where agriculture is the predominant activity. Since the data reflects a rural competitive market, any student familiar with basic financial and economic concepts can play the game (i.e. the student does not have to be from Oklahoma or familiar with Oklahoma agriculture). Students unfamiliar with agriculture simply need to understand that the business of agriculture is much like any other business; some loans are short-term and others are long-term, depending on what the loan is used to finance. A detailed explanation of the game's econometric and theoretical models is available in Petermann et al. (1998).

While many bank simulation games exist, the OBSG distinguishes itself because of its simplicity. This is not to say the OBSG is so simple that real world lessons are lost, just that it keeps the game focused on key decisions (setting loan interest rates and deposit interest rates, buying and selling investments, hiring and firing loan officers, setting advertising dollars, etc.), allowing players to see the importance of basic banking, finance, and economic concepts. Learning is accomplished by assigning players/students to manage a bank, where they compete against two other student-managed banks. All banks make key decisions to generate as much profit as possible while also being a good community steward. Without becoming mired in the details, it is sufficient to say that the OBSG allows players to develop a fundamental understanding of what it takes to manage a bank.

The game and the lessons of the OBSG have been taught to a wide variety of students. Through a partnership with OSU, OBA has used OBSG in its Intermediate School of Banking for more than thirty years. Other outreach audiences include regulators with the Federal Reserve Bank of Kansas City and instructors at other academic institutions. At the university level, undergraduate students in the department of agricultural economics at OSU, at University of Minnesota and at LSU played the game in agricultural finance and strategic management classes.

Nearly all students from the various classes indicated the OBSG was successful, yet there were some significant disadvantages to the game. These disadvantages primarily stem from the fact the OBSG was limited to in-class instruction. The first disadvantage is that the OBSG took a lot of time to play. Students were required to spend a significant amount of class time making decisions. Then, the instructor had to input all decisions into a computer program to run the simulation. The other big disadvantage was that the students had to be in a classroom in front of the instructor to play the game. They did not have physical access to the user interface. Limiting the competitive environment to the classroom walls is a disadvantage, especially since financial markets and banks operate in a global environment.

To alleviate these disadvantages, the OBSG moved to a virtual environment, operated over the Internet and Ag Bank Sim was born. The name was changed to reflect its move to a more general environment with more students playing the game virtually. Efficiencies were gained because students spend their time working in groups to make and enter their decisions, which frees up the instructor's time allowing him /her to focus on answering player/student questions regarding the key decisions they must make. Moreover, undergraduate

students, from OSU and LSU, stated that a multi-institutional competition and the ability to have "real-time" decisions would greatly benefit the OBSG and better facilitate their experiential learning of the fundamental concepts taught in the OBSG.

Methods

To assess whether or not Ag Bank Sim would enhance student learning, a pre- and post-test were given to students to measure their understanding of banking principles: agricultural bank's primary source of loanable funds, factors that affect loan supply and demand, factors that affect the after-tax returns on investments, etc. The questions chosen for the pre- and post-test were selected based upon discussions between banking professionals and professors at OSU and LSU to reflect the aforementioned key concepts.

Table 1 contains the ten questions used in both the pre- and post-test. While all ten questions center on fundamental banking principles, each question has a slightly different emphasis on two general topics of finance and management. Questions 1, 2, 3, 5, 6, 9 and 10 have a larger emphasis on finance. These questions range from being able to calculate equivalent taxable yields on bonds (question 2) to sources of revenues and expenses (question 3 and 5) to financial ratios (question 10). The remaining questions focus on management decisions made at a bank. These management decisions include estimating loan demand (question 4), setting margins (question 7), and planning (question 8).

The same questions were administered on both the pre-and post-test to allow for the measurement of the impact of the agricultural bank simulation game on student learning. The test composed of both multiple choice and true/false questions which lend themselves well to quantitative data analysis.

Students who participated in this pre- and post-test were from OSU and LSU. In addition to varying students by university, different courses were used to test the ability of the Internet agricultural bank simulation game to teach fundamental banking and finance concepts. OSU students were enrolled in a junior-level agricultural finance course, while LSU students were enrolled in a senior-level, capstone agribusiness strategic management course.

To hold constant the method of instruction and explanation of the game across universities and classes, guest lecturers were used to administer and instruct the students while playing the game. These instructors were very familiar with the game, its concepts and how to play the game.

Before playing the game, the pre-test was administered, and scores were recorded. Then, following the game, the same test was administered as a post-test. Post-test scores for each participant

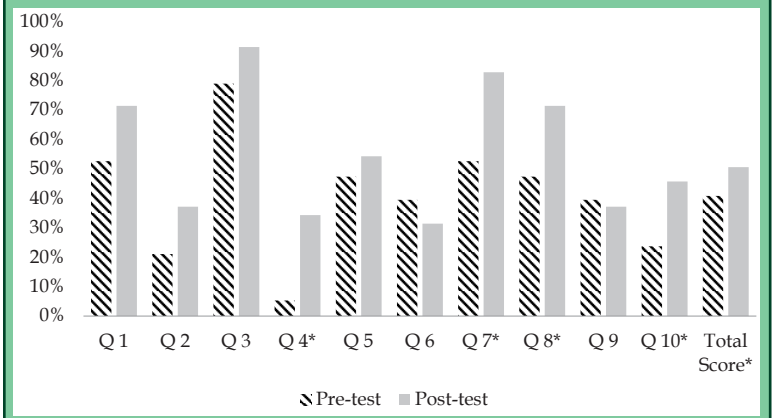
Table 1: Pre- and Post-Test Questions

Please select the choice that best answers each question.
Q1. An agricultural bank's primary source of loanable funds are: * a. Fed funds ***b. Deposits*** c. Investments d. Cash
Q2. Assuming the bank's marginal income tax rate is 35%, the equivalent taxable yield for a tax-free municipal bond that pays 4.75 percent interest is: a. 13.57% ***b. 7.31%*** c. 4.75% d. 3.09%
Q3. Employee salaries, number of loan officers, interest rates charged on deposits, and interest rates charged for loans affect net income of a bank. ***a. True*** b. False
Q4. Which of the following will not affect the amount of new agricultural production loans, that a bank could possibly make: a. Setting the amount of desired agricultural production loans to the maximum allowable amount b. The decisions made by other banks in the county c. Estimates on agricultural profitability ***d. Agricultural production loan charge offs (loan losses)***
Q5. For a bank, sources of revenue include Certificates of Deposit, Money Market Deposit Accounts, Negotiable Orders of Withdrawal, and Savings Accounts. a. True ***b. False***
Q6. When a bank does not have enough cash to meet operating needs and Federal Reserve requirements on deposits, Federal Funds are sold. a. True ***b. False***
Q7. The difference between the loan interest rate you charge customers on loans and the deposit rate you pay customers is essentially the banks: a. Return on assets b. A measure of liquidity ***c. Profit margin*** d. A measure of solvency
Q8. In order to avoid missing a revenue generating opportunity, it is important for a bank management team to do what at the beginning of every earnings period (monthly, quarterly, biannual, annual, etc…)? ***a. Estimate funds available for loans and investments*** b. Calculate the return on assets of all competitors c. Make sure the bank has cash funds in excess of the Federal Reserve requirement d. Write off all bad loans from the previous period.
Q9. When cash on hand exceeds the Federal Reserve requirement for a bank, no revenue is earned on this excess cash. ***a. True*** b. False
Q10. Which of the following ratios is used by the banking industry as a measure of liquidity? ***a. Loan to deposit ratio*** b. Operating profit margin ratio c. Times interest earned ratio d. Capital to asset ratio

*Correct answers are in bold and italics

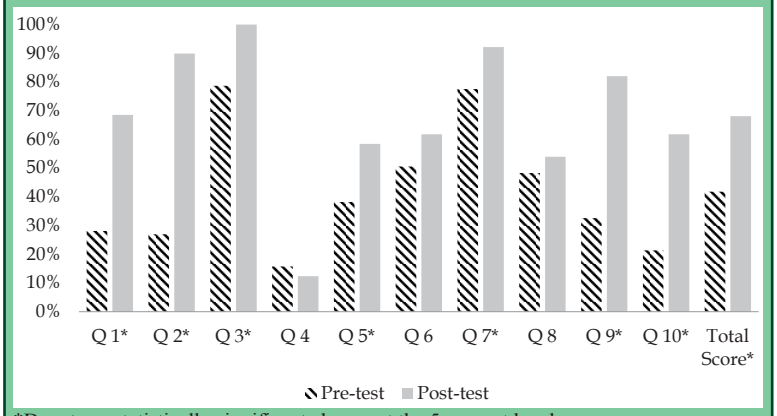
are compared with their pre-test scores to reach conclusions about the effectiveness of the game at improving understanding of bank management. In addition, results from the pre- and post-tests from both universities were used to inform the research on what areas of bank management students/participants needed more instruction and thus to improve the student/participant manual. To test if the post-test scores showed significant improvement for the students, a nonparametric pairwise t-test, the Wilcoxon Rank-sum Test, was used to examine statistical differences in the means for each question as well as overall scores (Siegel and Castellan Jr., 1988). For further information on how to obtain access to the game and how to best to play the game, please contact the authors as they have a prepared teaching note or go to the game's website at www.agbanksim.org.

Figure 1. OSU Agricultural Finance Course: Percent of Correct Reponses For The Pre- and Post-Test



*Denotes a statistically significant change at the 5 percent level

Figure 2. LSU Capstone Agribusiness Strategic Management Course: Percent of Correct Reponses For The Pre- and Post-Test



*Denotes a statistically significant change at the 5 percent level

Results

Statistical tests confirmed that students learned key banking and financial concepts by playing Ag Bank Sim. Regardless of the institution or class being taught, students exhibited a significant improvement at the five percent level in their overall test scores. Moreover, written student comments showed that they thoroughly enjoyed the Internet based game.

After playing Ag Bank Sim, OSU agricultural finance students demonstrated an increase in learning of key concepts. They demonstrated a statistically significant increase at the five percent level in their post-test total score compared to the pre-test total score (Figure 1.). Four individual questions showed a statistically significant increase at the five percent level from pre- to post-test score: questions 4, 7, 8, and 10.

Louisiana State University students also demonstrated an increase in test scores, despite the class not being focused on finance. These students were enrolled in a senior-level, agribusiness strategy capstone course. Even though finance was not the focus, these students' pre-test scores increased from an average failing score of 40 percent to an average passing score on the test of 70 percent (Figure 2). Moreover, seven of the possible ten questions showed a statistically significant improvement in test scores at the 5 percent level: questions 1, 2, 3, 5, 7, 9 and 10. It would appear that Ag Bank Sim did enhance OSU and LSU students understanding of key economic and financial concepts.

All students as well as banking executives commented on the virtues of playing the game on the Internet. One student's comment was especially noteworthy, *"I like being able to know where my bank stands after each round, because I want to win the game.* [Author's note: This feature was not available in the previous version]. *Getting the results quickly and having access to all previous decisions and results was helpful when my group decided on our strategies."* Also, a credit union president and CEO commented, *"The game does a good job of replicating the types of decisions banking executives make. The web base format of the game makes it much easier to play and understand when compared to other bank management games I have played."*

Conclusions

Through playing the agricultural bank simulation game, participants learn key financial, economic and banking lessons. In the previous version of the game, these lessons were limited to a series of in-person meetings. Moving the game to the Internet has reduced the need for in-person meetings, enhanced the student

and instructor experience and was shown to enhance learning of key objectives.

One implication of this paper is that the Internet can serve as a learning platform. Moving the agricultural bank simulation game from a classroom-grounded game to the Internet alleviated many time constraints. Also, it enhanced the participants view and opinion of the game. The transition to the Internet did not sacrifice learning objectives of the game. In fact, students from different backgrounds demonstrated an increase in their understanding of key game concepts.

Another implication of this Internet game is that the borders of the classroom have been expanded. The game was recently introduced to instructors via a webinar with virtual game-playing during the day, followed by a wrap-up webinar. This instruction method could also be adapted for students at other campuses or even employees of banks in rural areas to receive the classroom based instruction, while making decisions and playing the Internet based game. In fact, this idea was a key discussion point at the 2010 Agricultural and Applied Economics Association's Teaching Academy: The Use of Simulation to Stimulate Student Learning and Engagement. Many participants felt creating inter-university competition through the Internet Agricultural Bank Simulation Game would enhance student participation and interests. This contention is supported by the increase in the pre- and post-test scores from the OSU and LSU students. Similar results would be expected in a webinar or inter-university competition setting as observed with the pre- and post-test scores from OSU and LSU.

Future research should seek to examine how other classroom-based games, function in a virtual environment. Careful attention should be placed on factors that make those games different from the agricultural bank simulation game, especially if they fail to be successful as a virtual game. Noting those differences will help ensure that when the Internet is used as a platform for experiential learning, it will be used appropriately to strengthen classroom-learning objectives.

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