

Gamification of Learning in Accounting Education

Susan M. Moncada
Indiana State University

Thomas P. Moncada
Eastern Illinois University

*Understanding accounting can be challenging for students whether they are enrolled in the introductory accounting courses or the classes taken as majors. The lifetime exposure of today's students to technology and gaming provides a tremendous opportunity from which faculty might capitalize. Although developing video game quality activities exceeds the skill set of most accounting faculty, using PowerPoint as the delivery tool is quite manageable. Dynamic gamification adaptations of the popular television game show *Hollywood Squares*® and the Milton Bradley game, *Connect Four*® designed with PowerPoint create a collaborative and active learning alternative to the traditional accounting lecture.*

INTRODUCTION

Gamification, serious games, and stealth learning are popular terms in use today to describe the pedagogical technique associated with gamed-based learning. Gamification can be defined as applying the mechanics of games in order to make learning more appealing (Apostol, et al., 2013). The adjective, “serious” describes board and card games designed to educate players rather than being played for amusement (Abt, 2007). Serious games are based on sound education theory such as active or problem-based learning. They are designed to teach participants by being played as many times as necessary in a nonthreatening environment (Caufield, et al., 2012). Winning is the positive reward for the effort expended. Stealth learning is, therefore, achieved when students experience gains in knowledge from playing a gamification activity rather than through overt teaching (Annetta, 2008).

Today's college students report that they prefer visual contexts and active learning environments over passive lectures (Prosperio & Giora, 2007; Prensky, 2001). On average, their learning styles often resemble the trial and error approach applied to playing video games which includes immediate feedback (Frاند, 2000). While accounting faculty typically do not have the programming skills, nor time to dedicate to the development of instructional video games, they do know how to use PowerPoint for preparing instructional materials (Ahadiat, 2008). Yet, few instructional accounting gamification activities (Seda, 2003; Moncada & Seda, 2010) seem to have been developed that capitalize on combining the custom animation, hyperlinking, and timing trigger features of this powerful software.

PURPOSE

The purpose of this paper is threefold: 1) to historically summarize the development of games as a teaching tool for university level business and accounting education, 2) to provide guidelines for developing well-designed educational games, and 3) to introduce new gamification activities that can be used to supplement accounting and business teaching and learning. Utilizing PowerPoint as the primary delivery mechanism, the governmental *Fund Identification Challenge* and *Computer Fraud Challenge* are based on the popular television game show *Hollywood Squares*[®], a hybrid adaptation of *Tic Tac Toe*. The *AIS Transactions Cycles Game*, *Principles of Financial Accounting Review* and *Business Law Review* activities are adaptations of *Connect Four*[®], a game for ages seven and greater first sold by Milton Bradley in 1974.

Understanding accounting can be challenging for students whether they are enrolled in the introductory courses or the classes taken as majors. Students need to grasp the terminology and fundamentals of the discipline quickly in order to understand and apply concepts successfully. Games like *Connect Four*[®] and *Hollywood Squares*[®], when adapted resourcefully for accounting education can become excellent vehicles for making learning more appealing. The two games and five adaptations described in this paper were designed mindful of qualities deemed important to the effective gamification of learning.

LITERATURE REVIEW

Albert Einstein has been quoted as saying “Play is the highest form of research” (Camm, 2012, p.1). People understand the nature of play regardless of their age, economic, ethnic or social background (Azriel, et al., 2005). Similarly, the process of playing games to learn is not a new concept. According to Annetta (2008), the notion of learning through play dates back to Groos’ 1898 theory of pre-exercise in which individuals used play to practice life skills. Morality games like the *Checkered Game of Life*, often taught players that success was achieved through integrity and righteous living (Whitehill, 1999). Other typical family oriented games of the period taught children history and geography.

Around the turn of the century, the first board game that made its way into higher education was actually accounting related. A forerunner of *Monopoly*[®], *The Landlord’s Game*, patented by Elizabeth Magie in 1904 was initially designed to promote the Single Tax theory championed by economist Henry George. An adaptation of the game was used to teach economics at a variety of schools including Columbia University. By 1936, three high finance business related games, *Finance* by the Finance Game Co., *Finance and Fortune* by Parker Brothers, and *Easy Money* by Milton Bradley, derived from Maggie’s game, became popular home games (Whitehill, 1999). During this time period, however, game-based teaching was commonly viewed as inappropriate and unbecoming the stature of a college degree.

Using games as an educational tool in university business schools did not experience a resurgence until the mid-20th century. Influenced by World War II military war games and the capabilities of a mainframe computer, the American Management Association introduced the *Top Management Decision Simulation* in 1956 (Cohen & Rhenman, 1961). Inspired by the pioneering work of John Von Neuman and Oscar Morgenstern, as well as the AMA’s endeavor, Albert Schreiber (1958) describes the “business game” he created to supplement instruction in his business policy course as “another new teaching technique” offering “attractive possibilities for improved learning experiences.” Within four years, a variety of management decision making games were being used as educational tools in the business schools of Michigan State University, the University of California at Los Angeles, the University of Pennsylvania and Indiana University (Cohen & Rhineman, 1961). Adaptations focused on decision-making within specific functional areas of business, such as operations research, general management, marketing strategy, and management accounting. Typical management accounting concepts included cash management, inventory management, and cash budgeting.

Advancements in technology and expansive changes in accounting regulation during the late 1980’s spawned a demand for change in accounting education. Both the Accounting Education Change

Commission (AECC) and the American Institute of Certified Public Accountants (AICPA) encouraged university accounting educators to adopt active learning teaching strategies that integrated the creative use of technology in the accounting curriculum (Fratto, 2011). As a result, accounting educators began to explore game activities as a viable teaching strategy. Paper and pencil adaptations of *Monopoly*TM (Knetchel, 1989; Albrecht, 1995; Tanner & Lindquist, 1998) are initially reported, followed by implementations employing Microsoft Office Word and/or Excel (Layman, 2003; Ulstad, 2005). These game-based activities focused on enhancing learning in financial accounting courses at either the sophomore or junior levels. Adaptations of *Jeopardy* also have been popular. The earliest implementation used overhead transparencies and post-it notes (Cook, 1997), while later versions utilized PowerPoint (Seda, 2003; Murphy, 2005; Moncada & Seda, 2010) or Excel (Bee & Hayes, 2005). These and additional game-based activities previously used in a variety of accounting courses are described in Table 1. Few of them, however, have capitalized on combining the relatively easy-to-implement, custom animation, hyperlinking, and timing trigger features of PowerPoint (Seda, 2003; Moncada & Seda, 2010). The simplicity of *Connect Four*[®] and *Hollywood Squares*[®], make these games ideal for drill and practice or review of accounting concepts.

TABLE 1
GAMES USED IN ACCOUNTING EDUCATION

<i>Monopoly</i> TM	<ul style="list-style-type: none"> • Knechel (1989) – financial accounting practice set • Albrecht (1995) – financial accounting and investments. • Tanner & Lindquist (1998) – principles of financial accounting. • Layman (2003) – principles of financial accounting. • Ulstad (2005) – principles of financial accounting.
Jeopardy [®]	<ul style="list-style-type: none"> • Cook (1997) – Revenue Reconciliation Act of 1993 for tax. • Seda (2003) – financial accounting and tax. • Bee & Hayes, (2005) – accounting information systems. • Murphy (2005) – governmental accounting. • Moncada & Seda (2010) – principles of accounting and accounting systems.
Bingo	<ul style="list-style-type: none"> • Haywood, McMullin & Wygal (2004) – professional and ethical reporting.
Puzzles	<ul style="list-style-type: none"> • Gupta, Elson, & Ostapski (2006) – principles of accounting crossword puzzles. • Moncada (2010) – computer fraud word search in accounting information systems. • Elson, Ostapski, O’Callaghan, & Walker (2011) – governmental/nonprofit accounting cross word puzzles.
Twenty-Questions	<ul style="list-style-type: none"> • Fratto (2011) – managerial accounting.
Other	<ul style="list-style-type: none"> • Pillsbury (1993) – auditing softball game for internal controls. • Busta and Kimmel (1993) – impact of information on the stock market in intermediate accounting. • Hoffjan (2005) – <i>Calvados</i> cost accounting simulation. • Nitkin (2011) – principles of financial accounting “Game of Business” based on the Hasbro’s <i>Game of LIFE</i>TM.

GUIDELINES FOR EFFECTIVE GAMIFICATION ACTIVITIES

Gamification can be defined as applying the mechanics of games in order to make learning more appealing (Apostol, et al., 2013). A well-designed game engages players in some type of figurative challenge. In addition, it is defined by rules, includes interactivity, and provides feedback in order to quantify outcomes (Kapp, 2012). Some of the most important characteristics associated with game play include: 1) providing motivation and structure through rules and goals, 2) engaging the learner through interactivity, 3) promoting creativity by imposing competitions, and challenging problem solving, 4) eliciting pleasure during the play process and 5) enhancing self-esteem by encouraging winning (Prensky, 2006). Eight important elements of gaming and gamification that recur in the literature include the following: 1) rules, 2) goals and clear outcomes, 3) feedback and rewards, 4) problem solving, 5) story, 6) players, 7) safe environment, and 8) the challenge and sense of mastery (Apostol, et al., 2013). Furthermore, the essential features required to consider an activity a game are: challenges, goals, feedback, and story (Ibrahim, et. al., 2011). The gamification of learning, therefore, involves an educational activity that incorporates a number of game features but not necessarily these four features (Apostol, et al., 2013).

Table 2 suggests a list of qualities that lead to the creation of a well-designed gamification of learning activity. From an instructional design perspective, to be considered pedagogically sound, gamification activities should identify educational objectives and any required prerequisite knowledge necessary to answer questions successfully. Content should be accurate, relevant, and informed by the scholarship

TABLE 2
CHARACTERISTICS OF WELL-DESIGNED GAMIFICATION ACTIVITIES

1. Include educational objectives and clear learning outcomes.
2. Identify prerequisite skills required for the activity.
3. Offer a challenge and a sense of mastery through winning.
4. Provide a safe environment for failing.
5. Use pleasing color schemes.
6. Employ a clutter-free layout.
7. Include clear and concise instructions.
8. Have simple, easy-to-understand rules of the game play.
9. Provide relevant feedback or rewards to participants.
10. Include accurate and relevant content.
11. Foster engagement through interactivity.

of the discipline. Feedback should be both positive as well as corrective that includes a reward for incremental achievements. In terms of visual appeal, the color schemes chosen should be pleasing to the eye. A clutter-free, clean, and balanced graphical layout should also be employed. Instructions for playing the game should be included and clearly worded. The game should be easy to use and avoid complexity. While some might argue that complex games offer richer learning experiences, evidence suggests students appear to prefer simpler games (Caufield, et. al., 2012).

According to Clegg (1991), the most important predictor of learning is the instructional context associated with an activity. The collaborative, active, learning experiences that occur during the gamification activity create an engaging environment that allows for information assimilation. For example, when compared to passive learning approaches, active learning strategies, including game play, have been found to have a positive effect on student performance (Kapp, 2012) by promoting better recall of simple as well as complex accounting material (Hermanson, 1994). The lifetime exposure of today's students to technology provides a tremendous opportunity for faculty to use PowerPoint driven gamification activities as a vehicle for active learning in the classroom.

GAMIFICATION WITH POWERPOINT DELIVERY

The governmental *Fund Identification* and *Computer Fraud Challenges* are based on the popular TV game show *Hollywood Squares*[®], while the *AIS Transactions Cycles*, *Principles of Financial Accounting Review*, and *Business Law Review* gamification activities are adaptations of *Connect Four*[®]. Since its debut in April of 1961, *Hollywood Squares*[®] has aired slightly more than 30 years, with its most recent run occurring from 1998-2004 on CBS. Celebrities seated in each cell of the *Tic Tac Toe* grid are posed questions to which contestants agree or disagree. The first contestant to achieve three consecutive X's or O's wins the game. *Connect Four*[®] has gained renewed popularity due to the rise in use of mobile devices and competitive gaming over the Internet. Also, a derivation of *Tic Tac Toe*, *Connect Four*[®] is a vertical checkers game that requires players to drop markers into a 7 by 7 gridded receptacle. The first player to place five markers in a row, horizontally, vertically, or diagonally wins the game.

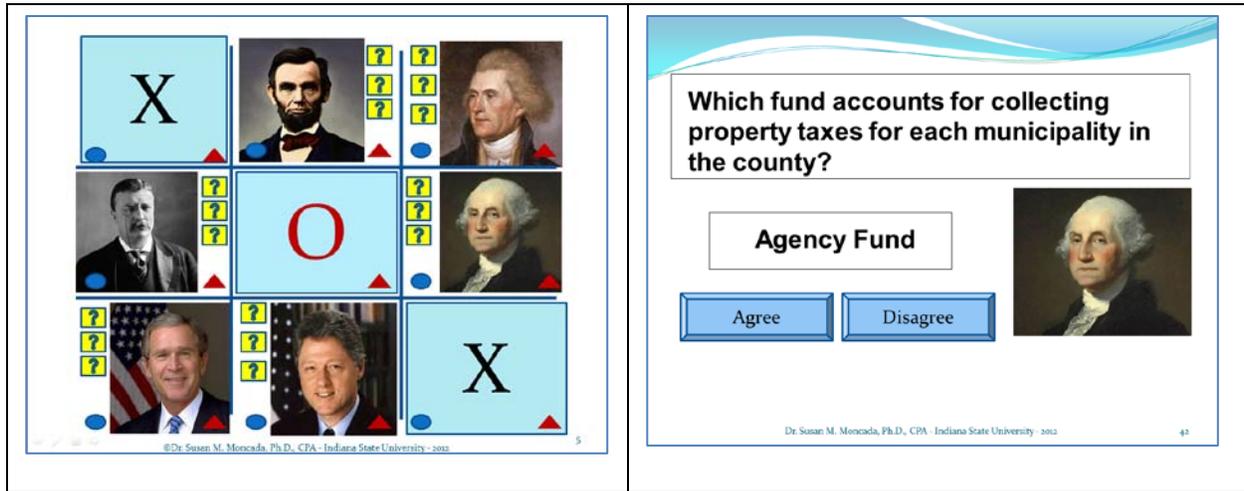
Each accounting PowerPoint game described along with its context for use, teaching tips and solutions guide can be downloaded from the Science Education Resource Center's Pedagogy in Action website. Links to the materials can also be found through the MERLOT (Multimedia Educational Resources for Learning and Online Teaching) repository. The games themselves include built-in playing instructions and relevant educational objectives.

Adaptations of *Hollywood Squares*[®]

The governmental *Fund Identification Challenge* has been used in the Not-for-Profit accounting class to help students realize whether they have truly grasped the complex fund accounting structure used by governments. The governmental *Fund Identification Challenge* game was played early in the semester, which also served as an ice breaker that helped students' become acquainted. The safe environment fostered by playing the game also seemed to make students feel at ease and more apt to ask questions in future classes.

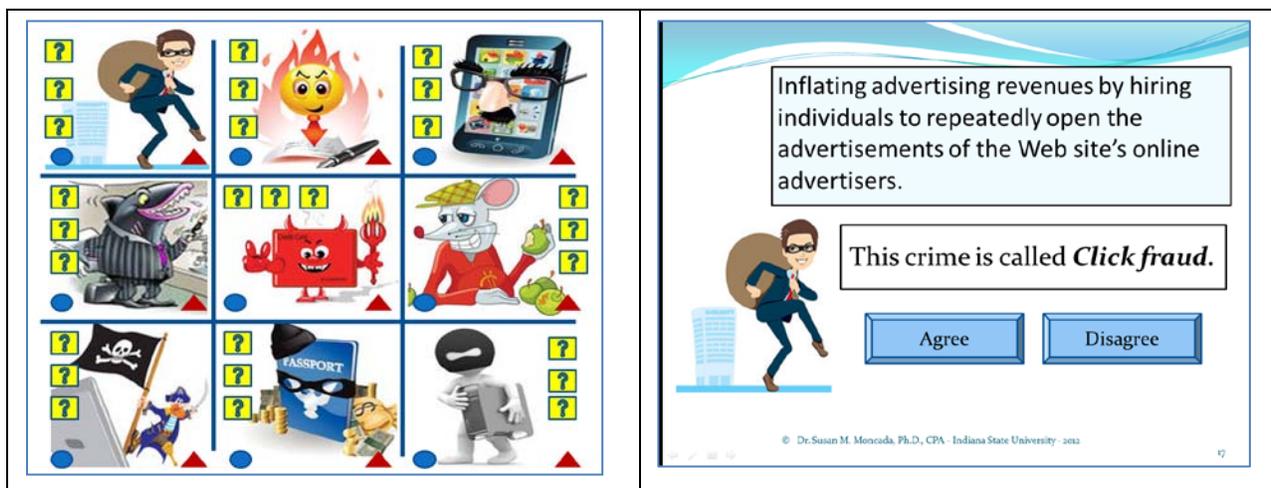
Figure 1 illustrates the governmental *Fund Identification Challenge* in play along with a sample question. With the class divided into two teams, alternating turns required students to "agree" or "disagree" with the answer provided by past presidents of the United States. The first team to earn three squares in a row was declared the winner. This PowerPoint game accommodates 27 question possibilities. As a result, each president can be selected three times allowing for repeated use with different outcomes occurring each time the game is played. The governmental *Fund Identification Challenge* has four response possibilities: 1) team agrees the president's response was correct and earns the square; 2) team disagrees with the president's response and earns the square because the president's response was incorrect; 3) team agrees with the president's response and does not earn the square because the president's response was incorrect; and 4) team disagrees with the president's response and does not earn the square because president's response was correct. Appropriate constructive feedback is provided for each response possibility. However, once selected a question cannot be repeated unless the game is closed and reopened. The *Fund Identification Challenge* game and teaching materials can be found at <http://serc.carleton.edu/sp/library/games/examples/64518.html>.

**FIGURE 1
FUND IDENTIFICATION CHALLENGE:
IN-PLAY GAME BOARD AND SAMPLE QUESTION**



For the accounting information systems class, the game template was modified to create a *Computer Fraud Challenge* that corresponds to the content covered in Chapter 6: Computer Fraud and Abuse Techniques of the Romney and Steinbart (2012), *Accounting Information Systems* textbook. Content continues to be relevant to the newest 13th edition of the text. This time, instead of presidents, the celebrities are devious-looking, clip art characters. Team game play was used instead of lecturing on the topic. Game questions presented real world scenarios with the fictitious celebrities identifying the type of computer fraud being perpetrated. Figure 2 illustrates the game board and one of the questions posed to celebrity, W.C. Crimes.

**FIGURE 2
COMPUTER FRAUD CHALLENGE: GAME BOARD AND SAMPLE QUESTION**



Unlike the *Fund Identification Challenge* implementation, students were allowed to use reference materials, because the specific scenarios used in the game were not verbatim examples found in the

textbook. As a result, students often used their laptops and cell phones to search for helpful online information. The engagement through team collaboration and discussion witnessed was refreshing. When team members were uncertain as to the correct answer, they often debated multiple possibilities, making persuasive arguments, until they reached consensus. Resources for the *Computer Fraud Challenge* are located at <http://serc.carleton.edu/sp/library/games/examples/65875.html>.

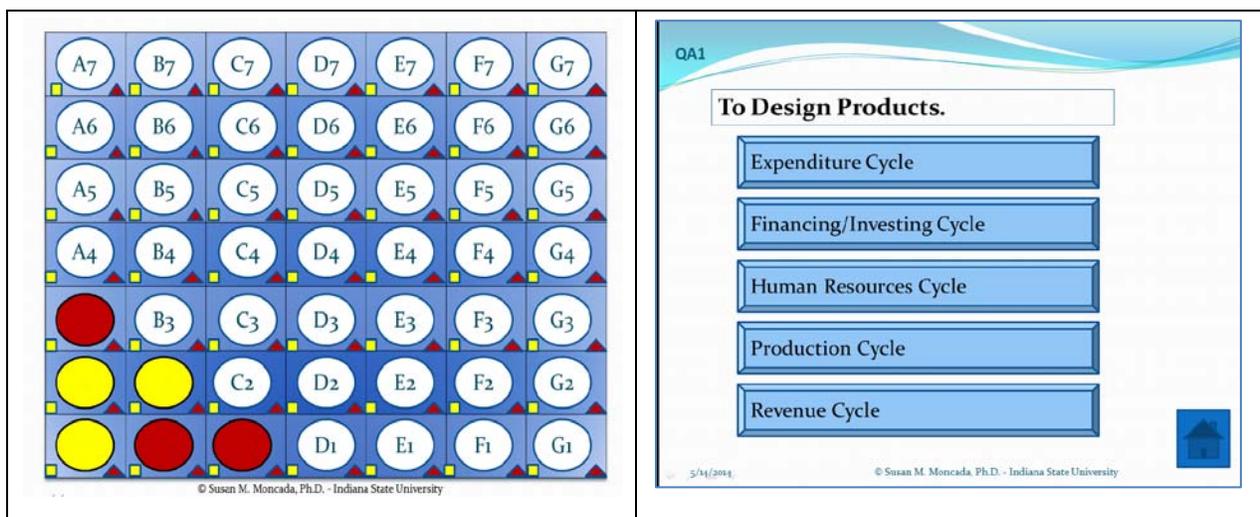
Adaptations of *Connect 4*[®]

The *AIS Transaction Cycles Game* is an adaptation of *Connect Four*[®]. Comprised of a 7 by 7 grid, the game accommodates 49 multiple choice questions with five possible responses per question. The game was used to reinforce class lecture in the form of drill practice and review. Homework prior to class required students to study the typical business processes that comprise the following five accounting transaction cycles: revenue, expenditure, production, human resources, and financing/investing.

To play, the class was split into two groups of 13 students, identified as the red or yellow team. Alternating between teams, different students were asked to select a cell location beginning with the bottom row of the game board. A transaction cycle activity was presented and the team member had to identify the transaction cycle to which the endeavor belonged. Each team member was allowed to consult with other members on the team. Only a correct response resulted in a team's marker being dropped into the chosen cell. When an incorrect response was provided, the opposing team could elect to select the missed item and attempt to earn the cell. This aspect of the game provided motivation for students to utilize logical reasoning instead of simply guessing.

To truly simulate *Connect Four*[®], the selection of questions must occur from the bottom of the game board working upwards. To give the appearance that the team marker is being dropped from the top of the game, the custom animation, entrance feature that flies in from the top was tied to each cell marker. Figure 3 illustrates an in-play game board and the question that displays as a result of selecting cell A1. The yellow rectangle and red triangle in the lower left and right of each cell serves as a timing trigger for the entrance of the marker. The first team to situate five markers in a row (vertically, horizontally, or diagonally) technically wins the game. Alternatively, the game can be played until all of the cells have been selected with the team earning the most cells deemed the winner. Students preferred the latter rendition.

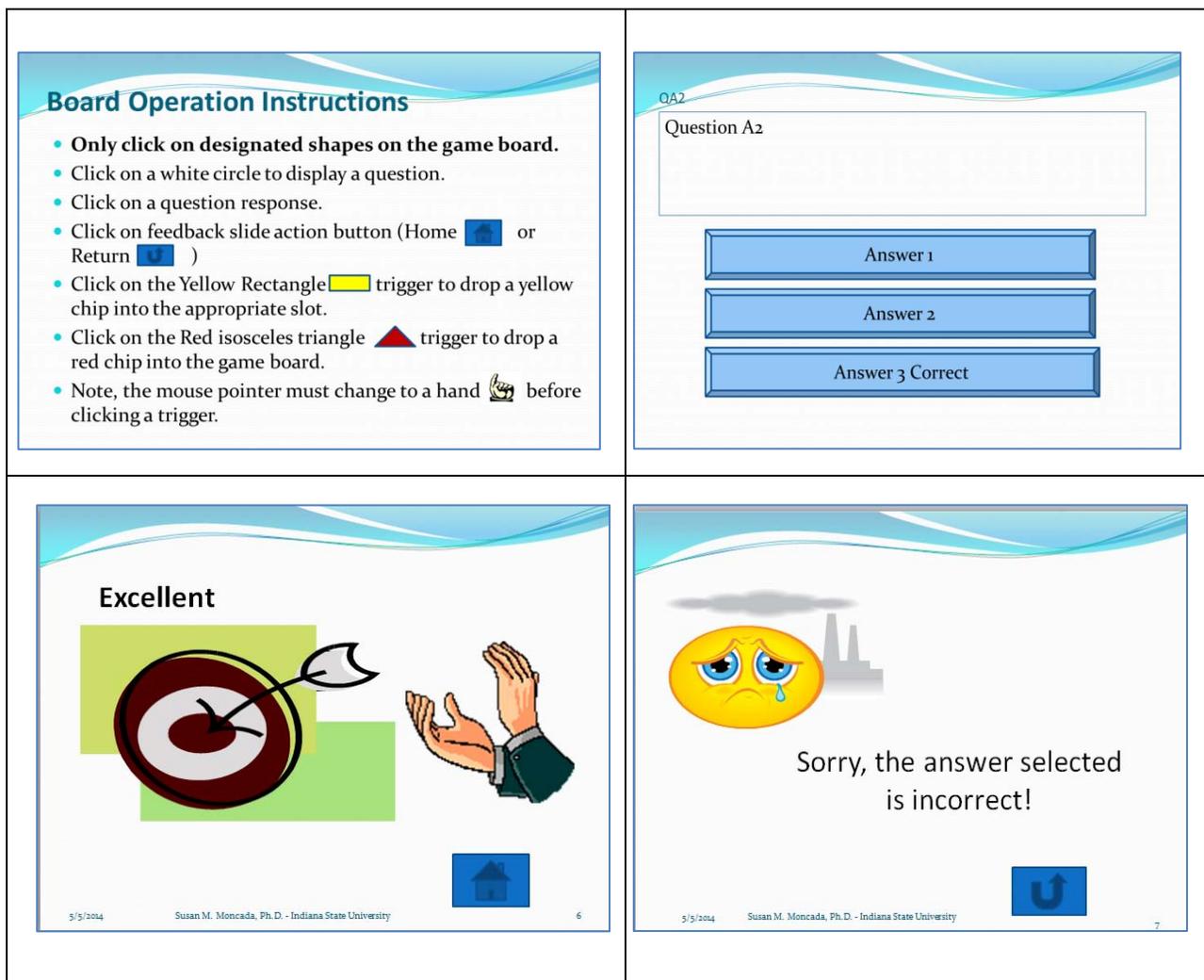
FIGURE 3
TRANSACTIONS CYCLES CHALLENGE: GAME BOARD AND SAMPLE QUESTION



For large class sizes the game can be played in pairs by having students download the PowerPoint file to their laptops at the beginning of the class period. A screen shot of each pair's ending game board or boards could be generated and submitted to the instructor as proof of participation.

The *AIS Transaction Cycles* game and related instruction materials along with a blank question template can be found at <http://serc.carleton.edu/sp/library/games/examples/61908.html>. The blank template provided online, however, accommodates three responses instead of five. Instructors need only add their own content to adapt this gamification activity to their instructional needs. The location of the correct response can be changed by merely repositioning the option's text box. Hyperlinks remain fixed as long as the slide titles are not deleted. To add more response options, text boxes with a hyperlink to the incorrect feedback slide will need to be inserted. Introductory slides that precede the game board can also be added as necessary. As long as the original slide titles remain in place, the required hyperlinking inherent to the game's function remains intact. Figure 4 illustrates a summary of the board operation instructions, a blank question template as well as the standard positive and negative feedback slides.

**FIGURE 4
GAME TEMPLATE SLIDES**



The *Business Law Review* version of *Connect Four*[®] was designed for reviewing concepts prior to the final exam in an MBA business law class, while the *Principles of Financial Accounting Review* game board was used to review for the comprehensive final exam. Both versions do not require the bottom upwards selection of cells. Instead of markers dropping into position, they merely appear. As a result, players can select questions from any position on the game board. These two games are not available online. However, copies may be obtained by contacting the authors.

The *Business Law Review* version utilizes the four-response multiple-choice type of item and consists of 36 questions. The *Principles of Financial Accounting Review* incorporates feedback that can be displayed once the correct answer is given, but prior to returning to the game board slide. In either situation, the instructor can interject additional information as necessary to clarify and review concepts. Figure 5 illustrates how exam questions from test banks can be adapted to the question templates. The solution explanation is timed to appear after the correct response is chosen.

FIGURE 5
SAMPLE GAME QUESTIONS: BUSINESS LAW & PRINCIPLES OF FINANCIAL ACCOUNTING REVIEWS

Which takes priority among conflicting warranties?

- A. Technical specifications.
- B. General language of description.
- C. A sample from a bulk of goods.
- D. Implied warranty of fitness.

QD4

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QG4

If operating expenses are \$ 36,000; sales revenue is \$ 150,000; Cost of goods sold is \$ 105,000 then what would the gross profit rate would be?

- A. .06 (6%)
- B. .24 (24%)
- C. .30 (30%)
- D. .70 (70%)

$$(\$150,000 - \$105,000) \div \$150,000 = .30$$

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CONCLUSION

For a variety of reasons, many college accounting instructors may feel games are not appropriate for the college classroom. Simulations may be viewed as too time consuming to create or use in class. Other games may be viewed as childish and trivial. However, Haywood, et. al. (2004) report that the majority of students who played their professional and ethical reporting Bingo game described the activity as fun, enjoyable, unique, interesting, creative, entertaining, and informative. Pillsbury's (1993) students recommended continued use of her internal control softball game. The activity helped students apply concepts and at the same time made class time entertaining. Nitkin (2011) surveyed students who played his principles of financial accounting, business game for midterm review and concluded the activity was a positive value-added experience that reinforced students' learning as well as the fostered of peer-to-peer interactions. Bee and Hayes (2005) AIS Jeopardy game, pretest/post-test results indicated that students understanding of the content increased. Students reported they enjoyed playing the game and also felt it

increased their learning. Anecdotal evidence from the classes in which the *Connect 4*[®] and *Hollywood Squares*[®] games were used supports these findings.

One way to motivate students, even at the college level, seems to be exploiting the creativity and inventiveness associated with the gamification of learning. When designed and effectively structured, using gamification activities to supplement accounting instruction can provide not only a viable alternative, but also occasional relief to the classroom lecture. Games have the potential to excite students' interest in content as well as engage them in classroom discussion (Haywood, et al., 2004). Passive students as well as those who require extrinsic motivation find games particularly appealing. Properly structured games provide opportunities for the instructor to elaborate on particular topics. As a result teachable moments can be triggered through gamification activities.

Gamification of learning provides an opportunity for accounting faculty to experiment with another teaching strategy. Gamification activities that utilize the capabilities of PowerPoint, can offer instructors a viable, stealthy, teaching and learning strategy that capitalizes on collaborative play to engage students. While creating a multimedia rich, interactive instructional game can be difficult and time consuming, using Microsoft Office's PowerPoint software as the design tool provides a reasonable solution. The games introduced in this paper illustrate the potential. A challenge for accounting faculty perhaps is to discover that play, after all, is the highest form of inquiry.

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