

Gamification Using a Choose-Your-Own-Adventure Type Platform to Augment Learning and Facilitate Student Engagement in Marketing Education

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Purpose of the Study: Gamification is the instructor's use of a game (e.g., role playing, word, adventure, trivia, puzzle, simulation, race, etc.) in the classroom to facilitate learning. Prior gamification research has yet to investigate the efficacy of using a choose-your-own-adventure style platform in the classroom. The purpose of this research is to explore the pedagogical value of that particular gamification method.

Method/Design and Sample: Two independent studies using quantitative and qualitative data taken from three samples of marketing students at a large California university investigate the academic effectiveness, perceived helpfulness, and perceived enjoyment of a choose-your-own-adventure type game in the classroom via the open-source program Twine.

Results: Results from Study 1 indicate marketing students take 23.8% less time while simultaneously scoring 10.2% higher on the module assessment when their lessons are gamified using Twine (vs. not gamified). Results from Study 2 suggest this particular gamification method also increases student engagement.

Value to Marketing Educators: Given the findings of these two studies, the previously unstudied choose-your-own-adventure gamification platform is a recommended teaching method to augment marketing education as it not only increases student performance, but also student engagement.

Keywords: Gamification; educational technology; instructional strategy; self-efficacy, student engagement.

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According to DeLotell, Millam, and Reinhardt (2010), deep learning in an online environment boils down to student engagement. They believe there is no better place than the online classroom to drive student learning and create conditions to foster deeper, more fulfilling learning. Gamifying learning activities is a growing trend to keep students engaged with the core curriculum.

The college-aged Millennial generation, born 1980-1995, is currently 21-36 years old (Pricewaterhousecoopers, 2013). These students have grown up with digital technologies and the Internet (Jones & Hosein, 2010). According to Montenery et al. (2013, p. 405), "[Millennials'] learning is nonlinear and irregular, characterized by rapid shifts between Internet sites and various devices. These students multitask, are accustomed to immediate, automatic feedback, and desire positive reinforcement." Gamification provides a context to meet those requirements and increase student engagement (Brigham, 2015).

Currently, instructors gamifying curriculum in higher education are early adopters, but the pedagogical method is spreading (Toyama, 2015). As the trend toward gamification grows, instructors need examples and options of empirically tested, successful

gamification methods. Some gamification methods may suit one's teaching style or subject matter better than others, some methods may be easier to incorporate into the curriculum than others, and some instructors may be more adept at coding and using programming languages than others. The correct gamification method to use is a successful one that best fits the instructor, curriculum, and desired outcomes. Unfortunately, creating a highly-engaging instructional game can be difficult, time consuming, and costly (Dicheva, Dichev, Agre, & Angelova, 2015; Kapp, 2012).

The present research identifies a gamification method absent from current gamification literature. It identifies and employs a user-friendly, cost-free program as context to deliver that method to better engage the current university student demographic. Through a series of two studies performed across three online Consumer Behavior courses, the new gamification method is shown to increase marketing students' assessment scores and decrease their assessment times. In addition, marketing students perceive it to be helpful, fun, and engaging.

GAMIFICATION

The term gamification was first coined by British computer programmer and video game designer Nick Pelling in 2002. He defined it as, “applying game-like accelerated user interface design to make electronic transactions both enjoyable and fast” (Pelling, 2011). Although gamification has arguably been around for decades, the term has only fairly recently been coined, but the concept is advancing rapidly as a way to teach and motivate students in higher education.

Gaming (tablet platform, smartphone/watch platform, PCs, webgames, and game consoles) is a massive industry. Global Games Market Report projects worldwide gaming revenues to reach \$107 billion by 2017; in 2015, \$22 billion was from the United States alone (Sinclair, 2015). Gamification rewards our behavior (Kim, 2015); this makes it an excellent learning tool via operant conditioning. Many extant pedagogical studies on the topic found that undergraduate students perceive gamification positively and are interested in its use for learning (Cheong, Filippou, & Cheong, 2014; Kuo & Chuang, 2016; Nevin et al., 2014). Banfield & Wilkerson (2014) found gamification increases both the intrinsic motivation and self-efficacy of undergraduate students in the classroom. Educational games allow for trial and error, eliminating the negative pressures that can interfere with students’ ability to learn (Cohen, 2011). It is not meant to replace other types of learning experiences, but rather augment them (Cain & Piascik, 2015).

Gamifying an entire course, however, has been shown to lead to decreased student motivation, satisfaction, and empowerment as compared with a non-gamified course (Hanus & Fox, 2015). Frost, Matta, and MacIvor (2015) recommend gamifying individual assignments in lieu of gamifying an entire course. A longitudinal study by Hanus and Fox (2015) compared a gamified course to a non-gamified course at four various points in time, and discovered decreasing motivation over time. Cognitive evaluation theory is cited as the underlying reason for the result, positing students felt controlled and constrained by the reward aspect of the game (which in this case was earning a badge). Game rewards in the classroom should not be authoritarian or controlling (Deci, Koestner, & Ryan, 1999; Stipek, 1996). Tangible rewards (e.g., money, special privileges, or extra credit points) affect free-choice behavior and are thus considered controlling, whereas verbal rewards (e.g., praise or performance feedback) enhance free choice. It is also noted unexpected rewards used on occasion are beneficial, but should not be so frequent as students come to expect them (Deci et al., 1999).

Gamification in the classroom has been extensively studied using video games (Fisher, Beedle, & Rouse, 2014), proprietary gaming software (Nevin et al., 2014), competitions (Leaning, 2015), point-based systems (Attali & Arieli-Attali, 2015), word games (Schamroth & Walsh, 2014), etc., but never using a choose-your-own-adventure story-type platform. The purpose of this research is to see whether gamification using the

platform Twine is successful as a curricular enhancement, both academically and motivationally. This research was performed in a virtual classroom to see whether students would not only enjoy it, but also benefit from it.

CHOOSE-YOUR-OWN-ADVENTURE STYLE

Choose Your Own Adventure was a wildly popular book series published by Bantam Books in the 1980s. Over 250 million copies were published in 38 languages (Lodge, 2007). The choose-your-own-adventure style of nonlinear storytelling is based on that book series. While contemplating novel ways to gamify a marketing course, the author recalled the Choose Your Own Adventure series and sought to investigate this method.

Academic literature on the nonlinear storytelling method for use in pedagogy is scant at best, though there is at least one example of the method being gamified in practice. RMIT University Library in Melbourne, Australia developed a browser-based, choose-your-own-adventure style game designed to orient students with their University library. It is described by Rowan Mangan, the Library Quest creator, as “the spoonful of sugar that helps the medicine go down” when it comes to learning how to navigate the school library. She also credits the game with confidence building (i.e., self-efficacy) in the students. Dr. Craig Anderson, the university librarian believes the program engages students at a deeper level. Although there is no empirical literature on Library Quest’s actual effectiveness, the game’s website contained a video with students commenting they found it “fun” and “easy to understand”. One student said it was engaging because it kept her wanting to continue the game to find out “the town’s outcome,” part of the game’s storyline (Library Quest, 2016).

The choose-your-own-adventure method gives its user autonomy and promotes active involvement. Since Millennials are active learners (Conklin, 2012) and they are the current academic demographic in higher education, this platform for gamification in the classroom warrants further investigation.

THEORETICAL DRIVERS

There are many underlying theories as to why gamification is useful as a method of instruction in the classroom. Operant conditioning, motivation theory, self-efficacy theory, the novelty effect, and student engagement are a few of them. Each driver will be discussed, then its relationship to gameplay will be addressed. Four hypotheses theoretically supported by the literature are given.

Operant Conditioning

Operant conditioning is a method of learning whereby reinforcement (or punishment) is used to increase or decrease a behavior. An association is then formed between the behavior elicited and the consequences for that behavior. B. F. Skinner demonstrated this concept when he introduced a starved rat into a box that

contained a lever which would release food when pressed; the rat soon associated pressing the lever with the reward of food. Operant conditioning can explain how games work, regardless of whether success in the game is tied to chance (e.g., slot machines) or skill (e.g., educational games). For example, slot machine gamblers are operantly conditioned to continuously add money to their slot machines due to intermittent financial rewards for reinforcement. Similarly, educational game participants are operantly conditioned to continue on with the educational Q & A due to intermittent rewards (such as a clue that leads to solving a perplexing riddle) given when a question is answered correctly.

Motivation

Gamification increases student motivation and engagement (Cheong, Filippou, & Cheong, 2014). Motivation is personal investment as determined by the initiation, direction, intensity, persistence, and quality of action taken and effect exhibited (Maehr & Meyer, 1997).

It is an essential condition for learning (Maehr & Meyer, 1997) and it explains the level of effort students give to particular learning activities (Brophy, 2013; Buckley & Doyle, 2016). Thus, a good educator works to increase the motivation levels of students.

There are two categories of motivation, intrinsic and extrinsic. Intrinsic motivation involves engaging in an activity where there are no apparent rewards except enjoyment of the activity itself; conversely, extrinsic motivation involves engaging in an activity for an external reward (Deci, 1971). Intrinsic motivation results in better learning outcomes than extrinsic motivation (Deci et al., 1999). An early study on motivation by Deci (1971) found that using money for extrinsic rewards lowers intrinsic motivation, but that other extrinsic rewards such as verbal reinforcement and positive feedback increase intrinsic motivation levels. However, research has shown that if students find the learning activity boring, giving extrinsic rewards has absolutely no effect on student motivation (Deci et al., 1999).

A gamer's motivation to play should be the center of game design (Siemens, Smith, Fisher, Thyroff, Killian, 2015). As previous research shows, performance feedback or praise as a reward system for achievement is more effective than class points or an achievement badge (Cheong, Filippou, & Cheong, 2014; Werbach & Hunter, 2012). Hence, the reward system for the present research was performance feedback for both correct and incorrect answers chosen (for intrinsic motivation) and an intermittent clue to solve a riddle (for external motivation).

Self-Efficacy

Self-efficacy is one's belief in his or her own capacity to succeed in specific situations in order to accomplish a task (Bandura, 1977, 1986, 1997; Schunk, 1995). It reflects a person's interpretation, and thus confidence, in his or her abilities. This interpretation changes over time, either increasing or decreasing, and is an important aspect of gameplay experiences. A person high in self-efficacy is more likely to engage in

competitive play due to a perceived higher chance of success, whereas a person low in self-efficacy is more likely to avoid game play for fear of failure (von Gillern, 2016). Self-efficacy is better predicted by active learning (participating in the game) versus observational learning (watching someone else play the game) (Bandura, 1997). It influences how one approaches a task, how much effort is devoted to a task, and how failure is interpreted (Lee, 2015).

Self-efficacy is used as a tool to predict performance (Bandura, 1997; Hackett & Lent, 1992; Multon, Brown, & Lent, 1991) and motivation (Schunk, 1995). Research on self-efficacy revealed its relation to both gameplay motivation (Klimmt, Hartmann, & Frey, 2007) and game enjoyment (Klimmt & Hartmann, 2006; Trepte & Reinecke, 2011).

Digital games have been shown to promote self-efficacy (Peng, 2008), and higher levels of self-efficacy lead to better academic performance (Hackett & Lent, 1992; Multon, et al., 1991). Therefore, it is hypothesized that,

H₁: Students in a gamified (vs. nongamified) course will have higher assessment scores on the assessment quiz for the gamified content.

Novelty

A novelty effect occurs when there is an initial boost in interest unrelated to how interesting the thing actually is; this interest wanes as the newness of it fades. Novelty is an important factor in learning (Tulving & Kroll, 1995). It enhances salience and attention (Foley, Jangraw, Peck, & Gottlieb, 2014), and novel occurrences are better remembered (Green, 1956; von Restorff, 1933). An object found in an unexpected (i.e., incongruent) place produces a novelty effect and any information associated with that object is remembered more easily; if that same object were found in an expected (i.e., congruent) place, recall is poorer (van Kesteren, Ruiters, Fernandez, & Henson, 2012). Outcomes from gamifying educational elements may be due to a novelty effect, as prior research shows student engagement can decrease over time (Koivisto & Hamari, 2014).

Increasing recall ability will inherently decrease student assessment duration. Faster test taking times offers students the benefits of less time pressure stress, more confidence in answer selection, and more time to go back and double-check answers prior to assessment submission.

There is also extensive neuroscientific research confirming novelty activates dopamine-recipient structures (the reward circuitry) in our brains (Bunzeck, Dayan, Dolan, & Düzel (2010); Bunzeck, Guitart-Masip, Dolan, & Düzel (2011); Düzel, Bunzeck, Guitart-Masip, & Düzel, 2010; Wittmann, Bunzeck, Dolan, & Düzel, 2007) which regulate motivation (Salamone & Correa, 2012). There exists a positive association between dopamine and motivation. Novel occurrences activate the reward center of the brain resulting in increased levels of motivation.

Taken together from the aforementioned novelty research, it is reasoned that including a choose-your-

own-adventure type game in an upper division core business course should have a novelty effect thereby enhancing student attention, motivation, and ultimately, their recall ability of the topics covered in the game. This increase in ability to recall should be reflected in assessment duration. Hence, it is hypothesized that *H₂*: Students in a gamified (vs. nongamified) course will take less time to complete the course assessment.

Early novelty research shows people have better recall for things that are novel or atypical (Brewer & Treyens, 1981; Friedman, 1979). Later research reveals memory recall relies on the hippocampus and novelty signals from the hippocampus promote subsequent memory encoding (Lisman & Grace, 2005; Schomaker, van Bronkhorst, & Meeter, 2014). The present research uses a content-related novel game as a learning tool. Students play the game prior to taking the assessment. Due to the novelty of the gamified module, students should recall the information they learned in the game while taking the related assessment. Therefore, it is hypothesized that

H₃: Students will find the Twine game helpful for recalling course content to perform well on the assessment.

Student Engagement

Student engagement is a metaconstruct that encompasses multiple dimensions of involvement in learning. It has behavioral and emotional dimensions (Finn, 1989; Finn & Voelkl, 1993; Ryan, Stiller, & Lynch 1994) as well as a cognitive dimension (Fredricks, Blumenfeld, & Paris, 2004; Jimerson, Campos, & Greif, 2003; Wang, Willet, & Eccles, 2011). Student engagement has been linked to both student retention (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008) and academic performance (Pascarella, Seifert, & Blaich, 2010; Thomas, 2012).

Hagel, Carr, and Devlin (2011) argue students must have control and autonomy in their learning to be genuinely engaged. Providing a gamified learning experience where students travel through the game at their own pace, making their own choices along the way, allows for this autonomy. Thus, the very nature of a choose-your-own-adventure type gamification platform increases student engagement levels (Brigham, 2015).

A study examining the construct fun and its relationship with student engagement in higher education found that fun content delivery methods by the professor (e.g., storytelling) have a positive impact on student engagement (Tews, Jackson, Ramsay, & Michel, 2015). It can be argued the choose-your-own-adventure gamification method used in the present research is a fun delivery method. Therefore, it is hypothesized that

H₄: Students will find the gamified learning activity fun.

Methods of Delivery

The choose-your-own-adventure method was chosen because it was absent from gamification literature and seemed like an excellent way to have students review the course material. Twine, specifically,

was the chosen software because it does not have a steep learning curve and the program is open-source. After having surveyed other software possibilities (e.g., Quest, TADS, ADRIFT, etc.), Twine was found to be the easiest program to learn for a very busy professor; the coding system is fairly intuitive. Initially, more of a story line was going to be used, such as “You are walking through the woods when you encounter...” and then consumer behavior concepts would be woven in. The student could progress on the adventure as he or she chose the correct response to a character’s dilemma that directly related to the material. Unfortunately, this proved to be quite difficult to create effectively in a way that made sense. Hence, a question/answer format was adopted. Though not a true choose-your-own-adventure story, the format was choose-your-own-adventure-like, offering a systematic weaving through the game that led to explanations for both correct and incorrect responses which subsequently either led the gamer back to the question or forward to a mystery clue.

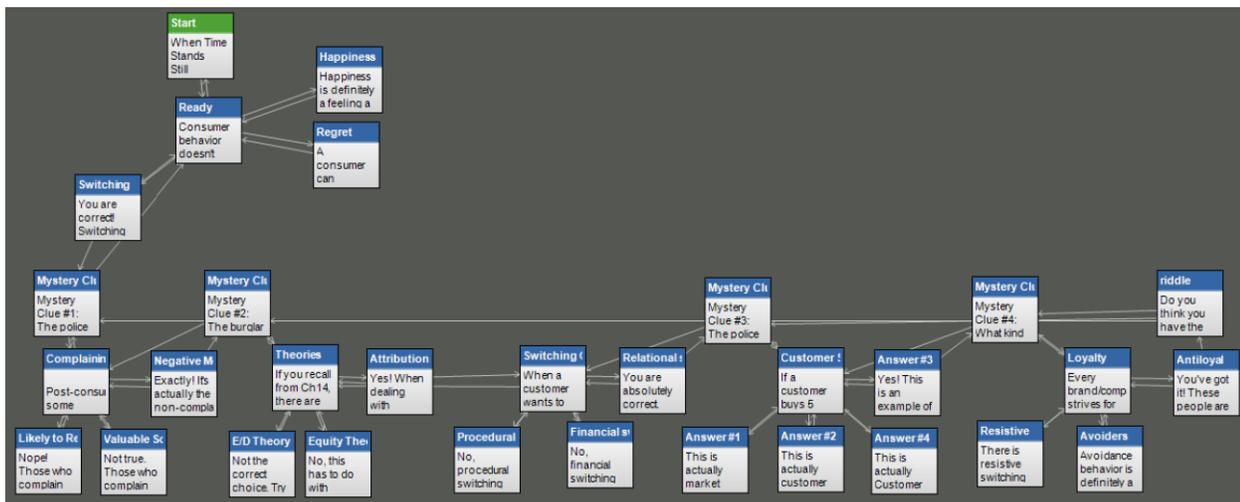
A mystery riddle was chosen as the reward to operantly condition students to want to continue on with the game. An existing mystery riddle (vs. a newly created one) was chosen since it contained several ready-made clues that could be easily used as positive reinforcement. Mystery clues were given only randomly for both a theoretical reason and a practical reason: 1) Prior gamification research argues rewards should be used occasionally (vs. continuously) so students do not come to expect them (Deci et al., 1999), and 2) The Twine game contained more questions than there were mystery clues.

Twine

The platform used to create the choose-your-own-adventure paths was Twine, a free, open-source program for creating interactive, non-linear stories, akin to Choose Your Own Adventure gamebooks. Gamebooks are fictional adventure stories whereby readers participate by making choices that affect the narrative. For example, “You walk along a passageway where you see a fork in the road. You can take the sunlit path on the left (p. 276) or follow the shady, tree-lined path on the right (p. 28).” Twine was selected as the platform for this gamification method due to its relative ease of use with story construction, its ability to work seamlessly with any learning management system (requiring only a mere upload of an html file), as well as its free cost.

Twine allows the author to easily create these stories digitally. One passage is written (e.g., “You walk along a passageway...”) and hyperlinks to two other passages (“Left path” and “Right path”) are embedded into the first passage. Then, hyperlinks to subsequent paths are written into those passages, and so on, until there is a mapped web of linked passages resembling a hierarchical chart. Twine makes it easy to identify broken links along the way to ensure the story stays functional. Figure 1 contains a screenshot of the Twine story map used for this study. It is a view of the map during the creation stage; students do not see this.

Figure 1. Twine story map



The program (found here: <http://twinery.org/>) can be used both as a browser-based program and as a standalone desktop app. It does not require knowledge of a specific programming language, but instead utilizes the visual structure of hypertext and supports CSS. The present research utilized Twine Version 1, but the program has since been updated to a more user-

friendly Version 2. It was used to create content-related multiple choice quiz-like questions for students. Figure 2 contains a screenshot of one of the questions in the Twine game as seen from the student's view, and Figure 3 shows the coding that was required to create that screen.

Figure 2. Student's view of a Twine question

Beyond Consumer Relationships

Restart

Bookmark

This story was created with Twine and is powered by TiddlyWiki

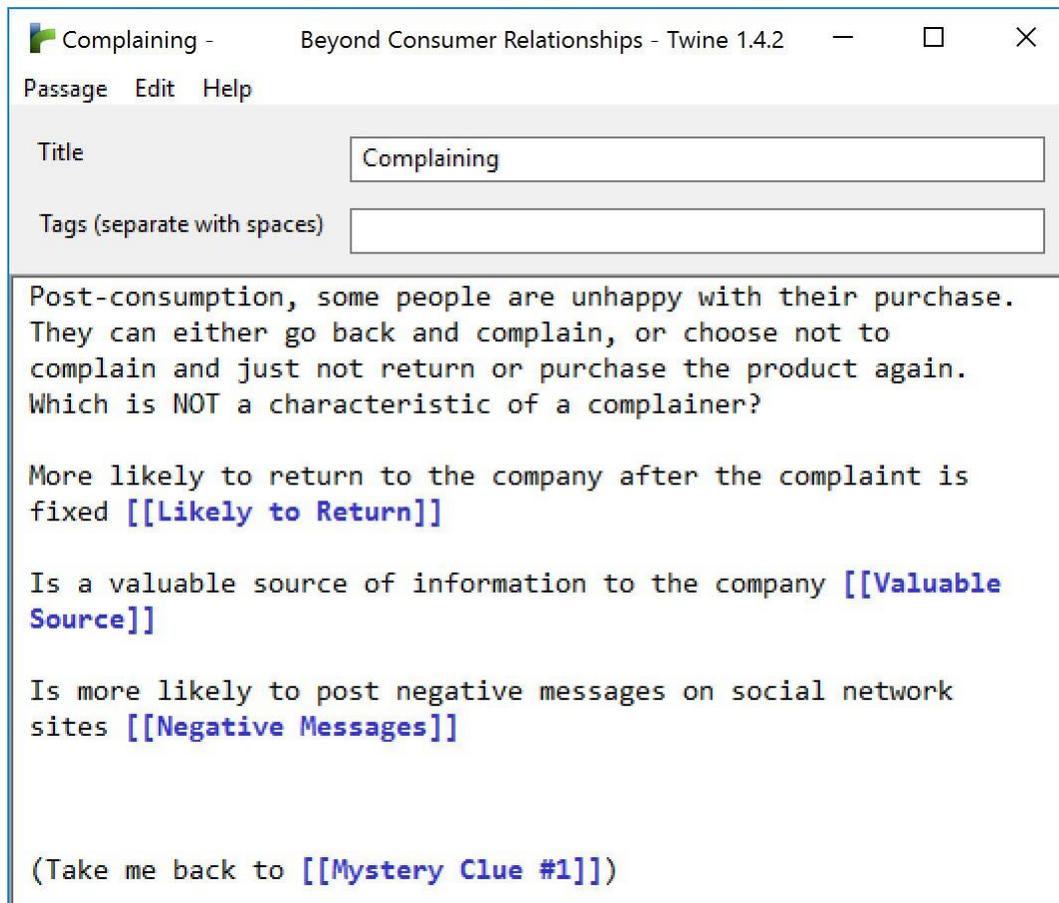
Post-consumption, some people are unhappy with their purchase. They can either go back and complain, or choose not to complain and just not return or purchase the product again. Which is NOT a characteristic of a complainer?

More likely to return to the company after the complaint is fixed **Likely to Return**

Is a valuable source of information to the company **Valuable Source**

Is more likely to post negative messages on social network sites **Negative Messages**

Figure 3. Coding for the Twine question in Figure 2



Since Twine uses html, it is viewable on any browser; hence, mobile play is possible via smartphone.

Canvas

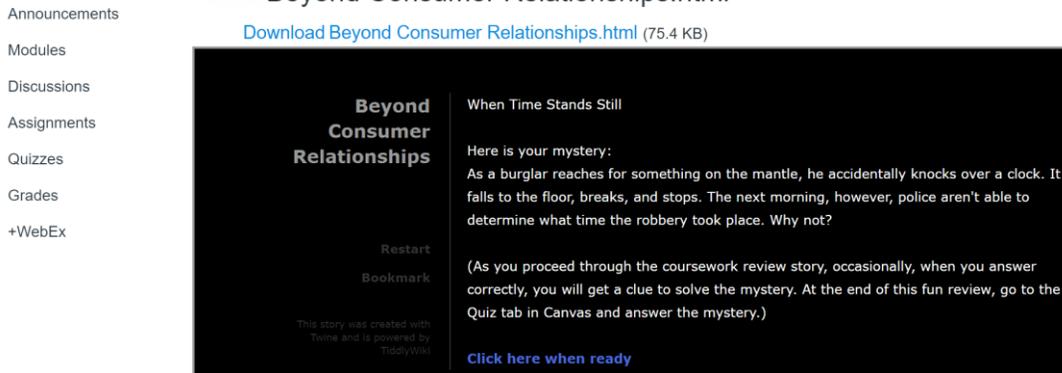
The game for this research is delivered via Canvas, a cloud-native learning management system (LMS), in which the online class for this study was held. All assigned textbook readings and additional content-related course material (videos, notes pages, URLs, PowerPoint slides, podcasts, images, etc.) are uploaded into weekly modules created within Canvas; students must read/watch/listen to all course content in the weekly module prior to accessing the game.

Once the Twine story is created, it needs to be connected to the course LMS so students can access

it. Any LMS will work, but the present research was conducted at a university that utilized Canvas. Information on Canvas for use in higher education is available from this link: <https://www.canvaslms.com/higher-education/>.

Once a story is created, there is an option to “Publish to File” which turns the entire game into a single downloadable html file. The instructor then uploads this file into the course files on Canvas and, subsequently, adds it to the corresponding course module. When a student clicks on the game link, he or she is taken directly to the story. Figure 4 is a screenshot of the very first screen of the Twine game as seen from a student’s view within Canvas. The menu on the left is the Canvas navigation menu.

Figure 4. Student's view of the first Twine screen as seen from within Canvas
Beyond Consumer Relationships.html



STUDY 1

The purpose of Study 1 is to test to see whether gamification affects students' performance on assessments and whether it affects students' time to complete the assessment. It is predicted using a choose-your-own-adventure method of gamification will increase student assessment performance (H_1) and it will decrease student assessment duration (H_2).

METHOD

Participants included a total of 84 undergraduate marketing students (3 juniors and 81 seniors) enrolled in Consumer Behavior, an online upper division core marketing course, at a large California university. Previous research suggests students in an upper-division business course would yield better results than students in a lower-division course (Frost et al., 2015). Two classes took part in this study during the same semester. One week-long course module was randomly selected from the semester-long course and gamified, as recommended by prior research (Frost et al., 2015; Hanus & Fox, 2015). One Consumer Behavior class was randomly assigned the Twine game (treatment), and one was not (control). Professor, syllabus, assessment, and course materials remained constant between classes; the only change between the control group and treatment group was the single gamified module.

Students who played the Twine game were given a link that took them to choose-your-own-adventure type questions comprised of topics related to the course material. Prior to starting the game, students were given a riddle. As they progressed through the game, if they chose the correct answers to the questions, they were sometimes awarded a mystery clue to the riddle. The game started with a content-related question and a selection of possible responses.

If the student answered incorrectly, the link took him/her to a mini-explanation of what specifically makes

that particular answer choice wrong (thus refreshing students on the course material). Then he/she was directed back, via the only link provided, to the original question where another answer choice could be made. There were no penalties for selecting an incorrect answer, but a student could not advance forward through the game until the correct answer was chosen.

When the correct answer was chosen, students were given a supporting explanation for their answer (again reaffirming the course material). This adds extra reinforcement to the material, and it informs the student exactly why the answer is correct (for those who may have chosen the correct answer by happenstance). In both cases, multiple exposures to the course material occurred. After the answer was correctly chosen, students sometimes received a mystery clue reward. Then they were given the option to go back to the last question they had or move forward to the next question. A correct answer was required before being allowed to proceed to the next level. Appendix A contains screenshots of actual Twine game play. It shows what it looks like when a student chooses an incorrect answer, a correct answer, and when he/she is awarded a mystery clue. Appendix B contains an example of one level of the game and Appendix C shows the mystery riddle and reveals the mystery clues; the riddle was unrelated to the course material.

After students in the gamified condition completed the Twine game, they were given access to the online, multiple choice quiz, located in Canvas; students in the control treatment were given access to the quiz after they finished the regular course module. One 10-question, 15-minute quiz was used as the assessment; the graded course quiz was identical in both conditions. It contained content-related questions about the same subject matter offered in the Twine game, but the graded quiz questions were not the same as those found in the game. For a comparison between a Twine question and a related quiz question, see Table 1 below.

Table 1. The comparison between a Twine question shown in the game and a related course quiz question given for a grade.

Twine Question in Game	Related Quiz Question in Canvas
<p>“Post-consumption, some of the people are unhappy with their purchase, They can either go back and complain, or choose not to complain and just not return or purchase the product again. Which is NOT a characteristic of a complainer?</p> <p>A. More likely to return to the company after the complaint is fixed</p> <p>B. Is a valuable source of information to the company</p> <p>C. Is more likely to post negative messages on social network sites*</p>	<p>“How is a complainer different from a noncomplainer?”</p> <p>A. A complainer is unlikely to return.</p> <p>B. A complainer is not as valuable as a noncomplainer to a firm.</p> <p>C. A complainer is more likely to become a satisfied customer.*</p> <p>D. A complainer is less likely to tell others when the company responds poorly.</p> <p>E. All of the above.</p>

RESULTS

An independent samples t-test was conducted to compare the effects of choose-your-own-adventure gamification (i.e., game vs. no game) on assessment time and assessment score for a 10-point, 15-minute quiz. Both sets of data pass assumptions of normality and homogeneity of variance.

As predicted, results indicate a significant difference in assessment score, $t(82) = -2.90, p < 0.01$. The effect size for the analysis of quiz score ($d = 0.64$) is found to be exceed Cohen’s (1988) convention for a medium effect size ($d = 0.50$). Students in the gamified treatment ($M = 8.89, SD = 1.35$) performed better on the course assessment than did students in the control group ($M = 7.87, SD = 1.85$); H_1 was supported. Students who played the game had a 10.2% increase in assessment score.

Also predicted, results reveal a significant difference in assessment time, $t(82) = 4.71, p < 0.001$. The effect

size for the analysis of time ($d = 1.04$) is found to exceed Cohen’s (1988) convention for a large effect ($d = 0.80$). Students in the gamified treatment ($M = 8.69, SD = 3.68$) took less time to complete the course assessment than did students in the control group ($M = 12.26, SD = 3.18$); H_2 was supported. Students who played the game had a 23.8% decrease in assessment time. The means and independent samples t-test results are presented in Table 2.

To rule out academic achievement as a potential confounding variable, an independent samples t-test was performed on overall student grade at the end of the course. Results showed no statistical difference between student course grades for each condition at semester’s end, $t(82) = 0.415, p = n.s.$. Perhaps if more weekly modules had been gamified, there would’ve been a significant difference between overall course grades; however, since only one of the fourteen course modules was gamified, this result rules out academic achievement as a confounding variable.

Table 2. Quiz time and quiz score independent samples t-tests

	Not Gamified			Gamified			<i>t</i>	df	% Change
	μ	δ	<i>n</i>	μ	δ	<i>n</i>			
Quiz Time (in minutes)	12.26	3.18	39	8.69	3.68	45	4.71**	82	23.8% Decrease
Quiz Score (in points)	7.87	1.85	39	8.89	1.35	45	-2.90*	82	10.2% Increase

Note. Higher means indicate longer assessment time and higher quiz score.

* $p < 0.01$, ** $p < 0.001$

STUDY 1 DISCUSSION

Gamification using a choose-your-own-adventure format (via Twine) increases learning (as indicated by performance assessment scores) and memory recall (as indicated by performance assessment times) in marketing students. Improving learning outcomes is the ultimate goal of gamification (Cheong, Filippou, & Cheong, 2014). Although not tested specifically, current literatures suggests the novelty of the game may have

aided in the recall speed of the students, and an increase in student self-efficacy from the gameplay may have contributed to the increase in students’ assessment scores. This study demonstrates the effectiveness of this gamification method on student outcomes, but it offers no insight into students’ minds as to how they felt about the game. Were they more engaged? Did they enjoy the game? Did they find the game helpful? Study 2 was designed to provide this insight.

STUDY 2

The purpose of Study 2 is to test to see whether students find the choose-your-own-adventure type gamification method helpful on the quiz (H_3) and fun (H_4). It is predicted students will find the Twine game both helpful and enjoyable.

METHOD

The following semester, 45 undergraduate marketing students (8 juniors, 37 seniors) from another Consumer Behavior class played the same game, but this time data were collected to find out how students felt about the game. The university, professor, syllabus, and module modified were held constant with Study 1 for greater internal validity. Three students failed to complete the survey and thus were discarded from the analysis ($n = 42$).

After completing the game and taking the quiz, students were asked to complete a mixed-method questionnaire. They were asked to rate on a Likert-type scale of 1-5 (1 = Not at all fun, 5 = Very fun) how fun they found the choose-your-own-adventure game to be and how much they felt the game helped them on the quiz (1 = Didn't help at all, 5 = Helped a lot). The marketing students were also asked the open-ended question "How do you feel about this choose-your-own-adventure game and its relation to the course material and quiz?"

QUANTITATIVE RESULTS

Helpfulness of the Game

Overall, 78.57% of the students found the game to be helpful (35.71% said it helped a lot and 42.86% said it was somewhat helpful). Only 16.67% responded neutral and 4.76% found it not helpful. It is noteworthy that nobody indicated the game "Didn't help at all". $\mu = 4.10$. As predicted, students found the Twine game helpful on the assessment; H_3 was supported.

Enjoyment of the game

Coincidentally, 78.57% also found the game to be fun (47.62% said it was very fun and 30.95% said it was somewhat fun), while 16.67% responded neutral and 4.76% found it not fun. It is noteworthy that nobody found the game to be "Not at all fun". $\mu = 4.21$. As expected, students found the gamified learning activity enjoyable; H_4 was supported.

Overall grade comparison

In order to maximize the generalizability of Study 2 on Study 1, a between-subjects ANOVA was performed on students' overall grade at the end of the course among all three classes (two from Study 1, and one from Study 2). Results revealed no statistical difference among student course grades at semester's end, $f(2, 126) = 2.613$, $p = n.s.$ A table itemizing the similarities among all three classes is located in Appendix D.

QUALITATIVE RESULTS

Of the 42 participants involved in the study, only 37 answered the open-ended question. All responses to that question, "How do you feel about this choose-your-own-adventure game and its relation to the course material and quiz?" were positive, except for one student who noted he/she was too focused on solving the riddle to pay attention to the material.

Two methods of grounded theory were performed to conceptualize the data. The first (open coding) was performed to breakdown the data into its conceptual components, and the second (selective coding) was performed to theorize the conceptual components into more inclusive concepts. Open coding is an interpretive process whereby data are broken down analytically and compared for similarities and differences, then given conceptual labels to group the categories that emerge (Corbin & Strauss, 1990). Selective coding leads to a clearer perception of which conceptual labels integrate the entire analysis; it is a process performed at the end of the study when the open categories are unified around the central phenomenon of the research (Corbin & Strauss, 1990). Hence, selective coding was subsequently performed on the open codes to capture the theoretical drivers of interest here.

Open Coding

During the initial coding phase of the responses, three major categories emerged: novelty, fun, and enhanced learning. Approximately 1/3 of the comments described the game as novel, 1/3 described the game as fun, and 2/3 said the game enhanced their learning. (Note: Some comments were longer or compounded and fell into more than one category.) The comments describing the game as novel centered on it being a refreshingly different way of learning, either for the course or for higher education in general. The comments describing the game as fun generally discussed how enjoyable they found the activity to be. The majority of the comments described how the game enhanced learning. Students found the game either inspired deeper thought, related directly to the course material, or was helpful in learning/retaining course content. Appendix E contains a table of the major results of the open coding analysis, along with their corresponding properties, and examples of participants' words that fall into each major category.

Selective Coding

Selective coding involved ascribing the open codes (Novelty, Fun, and Enhanced Learning) into three main categories, each representing one of the theoretical drivers of gamification success: Novelty, motivation, and student engagement were the resulting categories, respectively.

Novelty. The novelty category stayed the same as 1/3 of the responses naturally fell into a novelty category during open coding. This novelty effect was likely the driver for the next two categories, motivation and student engagement.

Motivation. Many of the comments indicated how fun and enjoyable it was to play the choose-your-own-adventure type game and solve a riddle. They felt a sense of entertainment while learning. The fun aspect of the game was the reward students received when they answered a question properly. They received a single clue, which was a small piece of the puzzle to help solve a mystery riddle. Anticipating the next clue (i.e., reward) motivated students to continue through with the game.

Student Engagement. Consumer Behavior at the university where the study took place is an upper-division core course requirement (vs. a chosen elective) in which many faculty find it difficult to hold student interest. These qualitative responses from participants in the gamification treatment contained passion, interest, and optimism in the marketing course material when using the game despite its challenging nature to some. This is evidence that the method increases student engagement.

STUDY 2 DISCUSSION

Study 2 was necessary to find out how students felt about the Twine game. Of those who participated in the game, 78.57% of the students found it to be both fun and helpful on the quiz. Content analysis of the open-ended question revealed students found the game novel, a break from the norm. Although it was an educational game, they were motivated to play due to the enjoyment of the method. Some students found it enhanced their learning by inspiring deep thought while others said it helped them to understand the material better. It is evident the Twine game increased students' levels of engagement with the course material.

Although most open-ended responses fell into one of the three categories, novelty, motivation, or student engagement, some individual comments seemed to reveal other underlying theoretical mechanisms that fueled their experiences. The student who stated, "I felt great because it helped me review the material covered for this week's quiz" appeared to be driven by an increased self-efficacy. He or she "felt great" due to having been exposed to the course material one additional time during the game; it seems his or her confidence level had risen when it came time to take the

quiz. Operant conditioning seemed to drive the student who said "The Q & A in this 'game' were very relevant to the chapter's material and the quiz. But now I'm very curious about the riddle answer!" and also for the student who said, "The game motivated me to get the correct answer on each of the questions since I really wanted the clues." The clue reward was positive reinforcement for getting correct answers in the game, thus conditioning the students to continue on in anticipation of another clue in order to solve the answer to the mystery riddle.

GENERAL DISCUSSION

Creating an online adventure story with multiple paths is quite time consuming. It is not so much the hypertext coding that is an issue, but being creative enough to come up with a course-related story line. It requires the instructor to extract important concepts from class, come up with creative ways to offer correct and incorrect answers, and make sure the material is not the same as what is on the assessments. It must coincide with the assessments, but not mimic them.

With that said, results indicate gamification using a choose-your-own-adventure format, both increases assessment results as well as decreases assessment times. In addition, students revealed they really enjoy it and found themselves more engaged with the course material. Playing an in-class game is a divergence from traditional learning; the novelty alone increases student motivation and engagement. Some students found it helps them to focus on what is truly important in the readings/lectures when studying, as the game was created to focus on course material that was deemed most important.

End of the semester student evaluations (provided by the university) for all three classes were interesting. It appears at semester end that students who had the gamified lessons (for both Study 1 and Study 2) rated the professor higher than those in the control group on "used assignments that enhanced learning" as well as "overall teaching effectiveness." Even though a very small portion of the semester-long class was gamified, it seemed to have a lasting effect on student perceptions of the professor overall. Table 3 of the means for these student evaluations is located below.

Table 3. Means for End of Semester Student Evaluations of the Professor

	n	Gamified the Class	Overall Teaching Effectiveness		Used Assignments that Enhanced Learning	
			μ	δ	μ	δ
Study 1 Control Group	30	No	3.9	1.0	4.1	0.9
Study 1 Experimental Group	35	Yes	4.3	0.8	4.5	0.9
Study 2	35	Yes	4.5	0.6	4.6	0.6

Extrinsic rewards were offered throughout the game. Feedback was constant and the mystery clue rewards were intermittent (they were not given for every correct

answer). In line with research from Desi et al., (1999), this form of reward system was successful. And since the vast majority of student participants found the game

to be fun (Study 2), prior research cautioning educators that extrinsic rewards do not increase student motivation for boring tasks was a non-issue. This research lends support to the value of using an extrinsic reward system that offers continuous feedback and intermittent tangible rewards.

Goffman's (1967) research on student engagement discusses the Cartesian split between being and doing. Although students may appear to be engaged when they are physically present during instruction, taking notes, or participating in a class activity, some may be just going through the motions and instead thinking about themselves, other school activities, and/or external issues. Learning can only take place when students are actively engaged with learning activities (Yair, 2000). With respect to the underlying drivers of gamification, operant conditioning keeps the student engaged, motivation fueled by enjoyment increases effort, self-efficacy increases assessment performance, and novelty enhances attention and recall.

Although the game play questions in this study pertain mainly to recall, this choose-your-own-adventure-like format could feasibly be used to include other types of questions that require a demonstration of the understanding, application, analysis, and/or evaluation levels of Bloom's Taxonomy. It is important to note, however, that the actual quiz questions in the assessment contained scenarios and other questions which required students to use the encoded facts they learned, not just recall them. When a student chose an incorrect answer in the game, he/she was offered an explanation as to why that answer was incorrect. It can be argued that, for those who did not know the correct answers initially, this led to a deeper understanding of the concepts beyond rote memory.

The game question type, game type, and gamification method should all fit the instructor, the curriculum, and the desired outcomes for the course. If the game isn't suitable for the learning situation, it can end up being a confusing, frustrating, and/or intimidating mess for both the students as well as the instructor which could backfire with unintended results. In the case of this research, the instructor opted for a choose-your-own-adventure *type* game (rather than a full storyline) because it matched the instructor's amount of available course prep time, concept knowledge, and coding experience. The gamification method/type also met the current [lack of] funds available for new software, had the ability to deliver the game to online classes, and was an appropriate way to deliver the multitude of new concepts/terminology inherent in the learning outcomes of the undergraduate marketing course.

Interestingly, all of the theoretical drivers for academic gamification are related to motivation. Gamification increases student motivation and engagement (Cheong, Filippou, & Cheong, 2014; Frost et al., 2015); operant conditioning is a behavioral view of motivation (Snowman & Biehler, 1997); motivation drives student engagement in academic activities (Appleton, Christenson, Kim, & Reschly, 2006; Lau & Roeser, 2002; Miller, Greene, Montalvo, Ravindran, &

Nichols, 1996; Reeve, 2012); and self-efficacy is a construct of motivation (Lee, Hayes, Seitz, DiStefano, & O'Connor, 2016). Motivation is what leads to an increase in student engagement, a goal of any good instructor. The present research serves to support extant literature on the benefits of using gamification as a curricular enhancement in the virtual classroom, and it is the first to study the effects of a choose-your-own-adventure platform on assessment duration and student grades.

In summary, this research identified a gamification method absent from current gamification literature that theoretically meets the needs of the current university student demographic (i.e., Millennials). A user-friendly, open-source program was identified and employed as a tool to explore that method. Through a series of two studies performed across three online Consumer Behavior courses, the new gamification method was shown to increase marketing students' assessment scores and decrease their assessment times in a way that students found to be engaging. Twine was used successfully to deliver a choose-your-own-adventure gamification method that now has empirical support for increasing positive student outcomes.

LIMITATIONS AND FUTURE RESEARCH

Although this research gives insight into the benefits of using gamification to augment learning and facilitate student engagement in marketing education, it is only cross-sectional. This study was performed on one randomly selected, week-long course module from a consumer behavior course, not on the entire semester-long course. Prior research (Frost et al., 2015; Hanus & Fox, 2015) recommends gamifying individual assignments instead of the whole class since the novelty of gamification wears off as the semester progresses; however, due to the success of this gamification method, it would be prudent to use it in more class modules. Future research should test how many week-long modules get positive results until reaching the point of diminishing returns. Also, age and gender demographics were not collected; only data for class standing was collected; future research might test to see whether those demographics moderate the results.

It is recommended future users of this method consider the relevancy of the riddle. The riddle used in this research is unrelated to Consumer Behavior; a riddle more relevant to the course topic would be more appropriate and was actually offered as a suggestion in a few of the open-ended student responses from Study 2.

Due to the asynchronous nature of the online course, the professor had no control over how long the students played the game, whether they abandoned the game and returned to it at a later time, nor how soon after having played the game they took the quiz. A future study would have more internal validity if these variables were controlled for. Since this study was performed in the context of an online class, utilizing the innovation in a traditional, face-to-face classroom might

yield similar benefits, but with the added ability of controlling for the above-mentioned variables.

Previous research has shown increasing students' time on task is one of the many reasons educators use games in the classroom (Annetta, Minogue, Holmes, & Cheng, 2009; Landers & Landers, 2014). The present research offered additional explanations of the course content (thus reinforcing the material) regardless of whether or not students chose correct or incorrect answers during the game. Further research is needed to determine whether assessment scores increased and assessment time decreased because students

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Appendix A Screenshots of Twine Game Play

Screenshot of an incorrectly chosen answer

Beyond Consumer Relationships

Restart

Bookmark

This story was created with Twine and is powered by TiddlyWiki

Not true. Those who complain are GREAT sources of information for the company. They are able to get first hand accounts of what issues their product/service might have and how they can remedy those issues.

Try again. **Complaining**

Screenshot of a correctly chosen answer

Beyond Consumer Relationships

Restart

Bookmark

This story was created with Twine and is powered by TiddlyWiki

Exactly! It's actually the non-complainers who tend to post negative messages on social networks. Once squeaky wheels (i.e., the complainers) get greased, those folks are unlikely to spread negative feelings W.O.M.

You are rewarded with **Mystery Clue #2**

(I'd like to go back to **Complaining** just for fun.)

Screenshot of a mystery clue reward

Beyond Consumer Relationships

Restart

Bookmark

This story was created with Twine and is powered by TiddlyWiki

Mystery Clue #2: The burglar did not alter the clock in any way after it fell.

Move on to **Theories**

(I'd like to go back to **Complaining** just for fun.)

Appendix B An Example of One Level of the Game

Post-consumption, some people are unhappy with their purchase. They can either go back and complain, or choose not to complain and just not return or purchase the product again.

Which is NOT a characteristic of a complainer?

- More likely to return to the company after the complaint is fixed
Nope! Those who complain are actually more likely to return after their issues have been addressed by the company. Try again.
- Is a valuable source of information to the company
Not true. Those who complain are GREAT sources of information for the company. They are able to get first-hand accounts of what issues their product/service might have and how they can remedy those issues.
- Is more likely to post negative messages on social network sites
Exactly! It's actually the non-complainers who tend to post negative messages on social networks. Once squeaky wheels (i.e., the complainers) get greased, those folks are unlikely to spread negative feelings W.O.M.
You are rewarded with Mystery Clue #2

Appendix C Mystery Riddle and Accompanying Clues

As a burglar reaches for something on the mantle, he accidentally knocks over a clock. It falls to the floor, breaks, and stops. The next morning, however, police aren't able to determine what time the robbery took place. Why not?

- Mystery Clue #1: The police could see the clock.
- Mystery Clue #2: The burglar did not alter the clock in any way after it fell.
- Mystery Clue #3: The police didn't expect to be able to read the clock.
- Mystery Clue #4: What kind of clock is it?

Appendix D Similarities among All Three Classes That Participated in the Studies

	Study 1		Study 2
	Gamified	Not Gamified	Gamified
Student Course Grade	✓		✓
Course Materials	✓	✓	✓
Professor	✓	✓	✓
Semester	✓	✓	
Syllabus	✓	✓	✓
Quiz	✓	✓	✓

Note. A checkmark indicates the variable is the same across rows.

Appendix E
Major Categories That Emerged from Open Coding of How Students Felt About the Game

Major Categories	Properties	Examples of Participants' Words
Novelty	Different from the class norm Different from educational norms	Nice switch-up Nice break from the usual A neat way to represent what we learned I have not taken anything like this in any of my other courses Clever Refreshing break from the standard Change of pace Mixes things up a little Definitely a step away from the regular format Different New
Fun	Enjoyable way to learn	Fantastic tool to incorporate fun It was a fun exercise Really enjoyed it Liked it a lot Since it is a game, it makes it more fun I love puzzles and riddles Entertaining way to learn
Enhanced Learning	Inspired deeper thought Related to course material Helpful	Made me think deeper and read in between the lines Incorporates out-of-the-box thinking Prepared me way better Very intuitive review Reviewed some of the important topics Enhances course material and stimulates thought process Good summary Prepared me on what subjects I have to focus on more Adds a new dimension to learning Helped me to retain the information for longer Very relevant to the chapter's material and the quiz Motivated me to get the correct answer on each of the questions since I really wanted the clues Helped me learn Helped with my understanding of some of the concepts

Appendix F

Sample Responses to the Question “How Do You Feel About this Choose-Your-Own-Adventure Game and its Relation to the Course Material and Quiz?”

- I like it a lot, and it added some fun into very informational based material.
- I find it an entertaining way to learn. A refreshing break from the standard material.
- It is a great way to apply the concepts that we are learning. I really enjoyed it.
- It was interesting! I have not taken anything like this in any of my other courses.
- It forces you to study particular parts of the book in a not so terrible way.
- I think this game is a fantastic tool to incorporate fun and outside-the-box thinking to learn the course material!
- It provided great examples that made it easier to learn the course material.
- I am a riddle person and like that aspect of it where you can do this to gain clues about the riddle, at the same time you are subconsciously studying.
- It was fun and I liked the explanations for all of the wrong and right answers.
- This was really fun! I love puzzles and riddles, it adds a new dimension to learning which I feel helped me to retain the information for longer.
- I like how it mixes things up a little.
- I thought it helped with my understanding of some of the concepts.
- I thought it was a neat way to represent what we learned.
- I thought this game prepared me way better than myself trying to read and learn about what is going on.
- It prepared me on what subjects I have to focus on more. Since it is a game, it makes it more fun for me to learn and challenge myself.
- I felt that the game helped me learn in the sense that I had to recall information from the course.