

## **Serious Games. Serious Learning.**

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How the intrinsically motivating nature of video games can be used to  
revitalize textbook learning

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## Introduction

### *Statement of the Problem, Theoretical Framework and Purpose of the Study*

Education in the United States is muddled in growing pains. Few people question the need for fundamental reform, but there's little consensus on what that reform should look like. Popular films like *Waiting for 'Superman'* lambast public school systems as the locus of academic degradation. White House leaders cry for repair of broken methods of instruction. Experimental schools herald restructured student-teacher relationships as visions of innovation. Although exploring these options is necessary to uncover effective methods of transformation, such an unfocused campaign against an ingrained system is destined for failure.

One thread that has linked reform approaches thus far is the creation and implementation of new instructional technologies. Some schools have augmented online learning programs to reach more distance-learning students, while others have integrated social media and mobile technologies into the classroom to design more highly interactive learning environments. Similar to reform attempts in general, however, these technological advances lack direction and have focused primarily on extrinsic motivators to increase student achievement.

Interestingly, research has neglected to analyze ways to revitalize textbook learning, which, in higher education, is one of the primary instructional methods encountered by students. Studies have shown that many students entering college today lack the appropriate reading skills to benefit from textbook learning, and those who utilize their textbooks often find them incomprehensible and unhelpful (Berry, Cook, Hill, & Stevens, 2010). Understanding that effective textbook usage leads to greater success in college (Bauer, Bradley, & Clump, 2004), the need to design textbooks that promote greater engagement with scholarly material is clear.

One source of innovation rests in gamification, a term applied to approaches in education that implement characteristics of playful games (Klopfer, Osterweil, & Salen, 2009). Given the intrinsically motivating aspects of most games (Shelton & Scoresby, 2011), it stands to reason that a modernized, “gamified” textbook would promote greater student engagement and motivation to learn from textual material.

Consider the following scenario for its image of blending game characteristics with an electronic sociology textbook:

*Carmela can't wait to complete her Introductory Sociology reading assignment. The electronic book that she downloaded on her iPad at the beginning of the semester sends her reminders each week to finish her readings before class. But this week, they've piqued her interest more than usual. "Log in and help me," the messages read. "I don't know who I am anymore, please help me." When Carmela finally sits down to complete her assignment, she's greeted by a video about a woman who says she has been "un-socialized" and needs help regaining her identity.*

*Carmela immediately takes the role of a creature that scours her textbook for information that might help the woman. Chapter 4 revolves around socialization, so the assignment has purpose for her. As she delves into the text, she highlights and annotates information she deems important, taking special note of anything relating to the lost woman's concerns. She receives points for how well her annotations summarize the chapter, and after she finishes the material she enters a video game. Controlling the creature, she must lead the woman through a series of rooms in search of her lost identity — solving puzzles and answering quiz questions about socialization along the way.*

*Upon completing her mission, Carmela sees both her results and the results of her classmates. The points she achieved throughout the chapter are tallied, and she's pleased to see she ranked first among her peers. Her e-book automatically reformats her annotations and portions of her highlighted text into an outline that she can download and study. Carmela feels satisfied with the assignment and has a foundation on which to apply the information she learned. She's excited to attend class tomorrow to find out about her classmates' experiences.*

Of course, this type of interactive text does not yet exist, but the depth of literature supporting this gamified style of learning increases every year. These studies are underscored by Deci's (2006) Self-Determination Theory, which posits that there exists a disparity in effectiveness between activities deemed extrinsically motivating (done for an outcome separable from the activity) and intrinsically motivating (done for the inherent enjoyment of the activity.) Intrinsic motivators are characterized by autonomous action, while extrinsic motivators are characterized by controlled action. In education, intrinsic motivators are those that reveal the underlying benefit to the learning process, while extrinsic motivators are those that emphasize grades and student performance (Deci, Vansteenkiste, & Lens, 2006). Many studies have suggested the advantages of autonomous over controlled motivation for learning, including decreased drop-out rates, greater creativity and curiosity, less superficial information processing and higher levels of achievement (Deci, Vansteenkiste, & Lens, 2006).

As far back as 1981, the educational application of the intrinsically motivating nature of video games has been hypothesized. Malone (1981) suggested three primary characteristics of games that could be carried over into the academic realm: challenge (the exercise of recently acquired skills), fantasy (the appealing nature of surrounding environments), and curiosity (the

novelty and surprise of arousing environments). Since then, researchers have refined his theory and designed educational games with generally positive results (Grimley, Green, Nilsen, Thompson, & Tomes, 2011; Nikkila, Linn, Sundaram, & Kelliher, 2011).

The purpose of this study is twofold. First, it is to theoretically define and construct a gamified introductory sociology electronic textbook. Second, it is to test the feasibility of using such a textbook in the classroom, specifically measuring levels of student intrinsic motivation and academic achievement. The study will focus only on first-year college sociology course material with students in an introductory sociology class at Flagler College.

Sources used to inform this review were primarily located through online searches with WilsonWeb databases, including those in the social sciences, humanities and education. Sources were selected based on their relevance to two main topics: (1) operational definitions of gamification; and (2) usefulness of textbooks in college courses. The sources were deconstructed for information that would form a clearer picture of problems with contemporary textbook learning and for the characteristics of games that might work to remedy those problems.

### **Literature Review and Research Questions**

This review includes four main areas of concern: (1) issues with current efforts for course redesign; (2) the intrinsically motivating factors of video games; (3) problems with contemporary textbook learning; and (4) game characteristics that could be applied to textbooks to promote greater student engagement.

#### *The Problems with Extrinsic Motivation*

Statistics support the necessity for innovation in education. In K-12 education, students are outperformed in math and science by their peers in other nations, and high school graduation rates in some states hover just above 50 percent (“Statistics,” 2009). In higher education, the

nation lags behind developed countries in number of degrees conferred, while students achieving these degrees are graduating with increasing debt (“Statistics,” 2009). Reacting to these trends, President Barack Obama has called for an increase in degree holders from 41 percent of the population to 60 percent by 2020, along with a close in the achievement gap so that all students graduate from high school prepared for a career in either work or academia (“Transforming,” 2010).

Already, organizations have pioneered campaigns to restructure education. One of the most prominent efforts in higher education has been led by The National Center for Academic Transformation, which maintains five principles of redesign meant to improve course quality and reduce costs: (1) redesign the entire course; (2) encourage active learning; (3) provide students with individualized assistance; (4) incorporate automated feedback; and (5) ensure sufficient “time on task” for student progress (Twigg, 2005). Analyzing the redesign efforts of 30 institutions, Twigg (2005) noted that, on average, costs for students were reduced by 37 percent and those in redesigned courses generally outperformed their peers in lecture-based courses.

Despite NCAT’s success, the program relies heavily on extrinsically motivating factors, which Deci (2006) argues fail to foster long-term success. Generally, NCAT implements web-based learning resources that encourage out-of-class peer-to-peer interaction and utilize online programs to monitor student progress on homework and other assignments. Software administers low-stakes quizzes to track student achievement and encourage active learning. This structures student out-of-class time working with material and frees class time for professors to address specific concerns (Twigg, 2005). However, since such extrinsic factors don’t support long-term retention of information, the benefit of these redesigned courses is arguably short-lived (Deci,

Vansteenkiste, & Lens, 2006). Students might find themselves motivated to pass their first-year courses, only to fail as they move on to classes following a different format.

### *Games and Intrinsic Motivation*

Many other campaigns for educational reform in some way mention the importance of incorporating educational tools that foster intrinsic motivation (Ainsworth, et al., 2005; Klopfer, Osterweil, & Salen, 2009). The National Science Foundation (2005) suggests the need for more research on the educational possibilities of video games, which motivate people “to continue learning outside of the game in order to improve their game play” (Ainsworth, et al., 2005). Klopfer (2009) echoed this belief, finding that game players often exhibited levels of persistence, risk-taking, attention to detail and problem solving skills rarely demonstrated in the classroom. Furthermore, he noted five “freedoms” inherent to gameplay that are limited in most classroom environments: (1) freedom to fail; (2) freedom to experiment; (3) freedom to fashion identities; (4) freedom of effort; and (5) freedom of interpretation (Klopfer, Osterweil, & Salen, 2009).

The application of game characteristics to real-life activities is not a revolutionary idea. Some researchers have long predicted a future “gamepocalypse,” in which everything in daily life becomes gamified (Lee & Hammer, 2011). Researchers like Reeves (2009) have created entire companies focused on gamifying some aspect of daily life. Though previous efforts to invent “edutainment” games like the drill-and-practice “Jump Start” and “Math Blaster” have often proved ineffective (Klopfer, Osterweil, & Salen, 2009), current pulls toward incorporating virtual worlds and virtual reality into education have made great strides toward making games a cornerstone of academic innovation (Dickey, 2006).

### *Defining Gamification*

Some studies have attempted to apply a definition to gamification, yet there is little consensus on how the process should work. Properly understanding the intrinsically motivating aspects of games is vital to the design of any new instructional technology, and is thus necessary to define before moving forward.

Lee (2011) noted that games are best utilized in education when addressing three primary areas of concern: (1) cognitive; (2) emotional; and (3) social. Cognitive tasks give students clearly defined, actionable tasks with immediate reward. They also tend to provide greater motivation than vague, long-term benefits. Emotional tasks promote repeated experimentation and repeated failure due to a lack of consequence for curiosity. This rapid feedback cycle motivates players to try until they succeed, unlike high-stakes examinations that are characterized by high risks for failing and long feedback cycles. Social tasks permit players to become someone else, allowing them to get lost in exploration of new sides of themselves while eliminating the need to internalize the failures of their game characters (Lee & Hammer, 2011). This definition identifies two important aspects of games: (1) freedom to fail; and (2) rapid feedback cycles.

However, Lee's (2011) analysis lacks insight on how to design environments that reflect those characteristics. Because popular games range from the two-dimensional *Pong* to the vast, detailed environments present in massively multiplayer online games (MMOs) like *World of Warcraft* and *Second Life*, it is necessary to identify the motivating aspects of games in general.

Shelton and Scoresby (2011) identified three general categories of instructional games and virtual worlds. The first includes those games originally made for entertainment purposes and were later repurposed into instructional games, which often result in unintentional learning experiences. The second includes games that offer rewards to motivate students, where players



are exposed to educational material in their attempts to obtain those rewards. The third category includes those games that are designed for learning but lack typical game attributes, or which contain so many game attributes that players are distracted from learning objectives (Shelton & Scoresby, 2011). Understanding the weaknesses inherent to each category helps to reveal the characteristics of an effectively motivating game.

Related to the first category, Berger (2008) repurposed *Second Life* for use in her classroom. She noted that the quality of student interaction diminished during online instruction and that the virtual world, for the most part, was “pretty seamy,” particularly because the game’s design did not reflect instructional intentions.

In the second category, Nikkila (2011) suggested that extrinsically motivating games may promote frustration in some players. Her social media game *Taskville* attempted to motivate workers in an unspecified workplace to expand a virtual city by completing tasks identified throughout the work day. Completing tasks resulted in the construction of a virtual building, the size of which depended on the quality of the task. Workers competed against others in their city to become mayor of their city and also against other cities to construct the largest city. Productivity increased while using *Taskville*, but workers felt cheated and unmotivated by loose definitions of what constituted a task in the game (Nikkila, Linn, Sundaram, & Kelliher, 2011).

In the third category, Castronova (2008) noted the failure of games that promoted little interest beyond an educational storyline. His MMO *Arden*, which was set in Elizabethan England to teach about the works of William Shakespeare, garnered attention from popular video game media outlets for its attention to detail and realistic graphics. However, beta tests revealed its instructional weaknesses. Shakespeare scholars who tested the game praised the narrative structured around the Bard’s famous plays, while average players found the narrative

unappealing and criticized the lack of appropriate game mechanics to hold their waning interest (Baker, 2008).

Despite these flaws, some game designers have managed to discover an appealing middle-ground in gameplay. Since 2008, IBM has offered “PowerUp,” a program for middle school students that thrusts users into the role of an engineer who must contribute to improving a virtual community. Students interact with the game environment and learn about environmental disasters while follow pre-designed lessons focused on teaching both science and engineering. The game emphasizes exploration and collaborative play and has been met with positive reviews from critics (“PowerUp,” 2008).

Shelton and Scoresby (2011) note the strength of this type of game because it balances entertainment elements with instructional goals. They emphasize that well-balanced games enhance intrinsic motivation because players feel connected to their game characters and the goals they seek. To test that idea, they designed a game around the classic text *Spoon River Anthology*, where students were encouraged to uncover the story’s narrative by interacting with characters and completing quests. Though designing a game that aligned game activity with instructional goals was difficult, they found that students understood the text and implemented a range of problem-solving skills that they would not have used when just passively reading *Spoon River* (Shelton & Scoresby, 2011).

Pruett (2011) and Dickey (2006) echo this game-alignment theory while emphasizing two other important factors of game design: (1) game mechanics and narrative; and (2) character design. Pruettt suggests games are fun to play either because the activity of playing is innately fun, like that of the simplistic *Super Mario Bros.*, or because the game narrative forces players to become part of the story and to solve problems logically. Balancing game mechanics with

narrative should theoretically attract a wide spectrum of people. In-game goals that align with this narrative should be similarly rewarding (Dickey, 2006).

Dickey (2006) adds to this analysis the importance of character design, where players are able to customize their character to some level, resulting in a greater emotional connection with the character. Lim and Reeves (2009) confirmed this hypothesis, finding that players exhibited physical responses, like increased heart rate, when they selected their own character before playing video games. Golub (2010) found that narrative, graphics and avatar appearance need not be realistic in order to elicit emotional connection and physical response from players, which is important from a design standpoint.

Considering this analysis of gamification efforts, a proper instructional game is here defined as that which: (1) offers constant feedback on in-game activity with little concern for failure; (2) is specifically designed for instruction by aligning game mechanics with instructional goals; (3) aligns game narrative with instructional goals; (4) allows players to choose and customize their characters.

#### *Textbooks as a Candidate for Gamification*

Klopfer (2009) enumerated a list of barriers to the adoption of games in education. Among these were: (1) a reluctance to give up traditional tools like textbooks, which follow a standardized curriculum; (2) difficulty integrating game structure into the typical structure of a school day; and (3) the focus of games on teaching higher order skills, which limits their use in classes centered on standardized tests.

Applying gamification to textbooks theoretically dodges the first two barriers. First, designing a textbook that incorporates game characteristics necessarily avoids creating a game

with no instructional purpose and, by nature, appropriately aligns instructional goals with gameplay (Shelton & Scoresby, 2011).

Second, designing a textbook game that intrinsically motivates students to complete readings outside of class follows the NCAT's fundamental principle of course redesign, freeing class time for more discussion and higher-order learning (Twigg, 2005). This integrates games into education while maintaining traditional classroom structure.

The third barrier only limits the gamification of certain material. Since this study is concerned with introductory sociology, gamification is supported. Persell (2010) surveyed 124 sociology professors and found that critical thinking skills (i.e. the sociological imagination, the ability to identify structural explanations for social life, etc.) ranked among their highest priorities for introductory sociology classes, while rote memorization of topical material ranked among the lowest priorities. Since texts in general are developed to approach sociology from a substantive angle, fundamental redesign of sociology textbooks is supported (Persell, 2010). Furthermore, Simpson and Elias (2011) found that structuring their sociology courses like a narrative role-playing game, where students select identities at the beginning of the semester and develop their characters in relation to course material, effectively challenged student stereotypes and made more effective progress in teaching sociology than did classes structured around rote memorization.

A wealth of research exists that suggests textbooks in general are ineffective instructional tools and that even when students attempt to utilize them, most lack the necessary skills to properly deconstruct the material (Simpson & Nist, 1990). There is no question that those reading textbooks receive better grades in school (Wandersee, 1988), and that students spend the majority of lesson time working with textbooks (Knecht & Najvarová, 2010). However, most

students read their textbooks less than 3 hours per week, which falls short of the traditional suggestion of 2 hours of study time for each class credit (Sikorski, Rich, Saville, Buskist, Drogan, & Davis, 2002).

The qualities of good reading are well understood. Beatie (2011) emphasized the importance of pre-reading material and completing post-reading assessments. Simpson (1990) underscored the benefit of proper annotation, or having students write brief summaries in text margins, note the difference between core material and examples in text, write down possible test questions and selectively underline key words and phrases. In comparing an experimental group that was taught how to effectively annotate text with a control group left to study using other methods, Simpson (1990) found that students utilizing annotation strategies performed 73 percent better on tests while spending 77 percent less time studying.

Despite these statistics, most students lack adequate active reading skills. Bauer (2004) found that the majority of students — 69.98% — read textbook material before exams, while only 27.46% read material before class. Students who were unprepared for class usually remained silent and uninvolved, thus limiting both the time instructors could spend reviewing material and the effectiveness of their lessons in general. Bauer (2004) suggests that students tend to read more often and actively if they feel they will be responsible for displaying their understanding of the text. Though he promotes the idea of offering extra credit or some other extrinsic reward for reading, he concedes that it is not the “cure-all for the epidemic,” and proposes more research on how to make textbooks more engaging.

Knecht and Najvarová (2010) revealed that students identify the readability of textbooks as one of the most pressing issues with comprehending the material. Students frequently report textbooks containing more material than is necessary and suggest books should avoid confusing

terminology, refrain from overestimating the reader's prior knowledge of the subject and illustrate all points with examples. Oftentimes, textbooks fail to motivate them to think about and to apply in practice the knowledge it offers, thus lacking demonstration of the inherent worth of the information. Students most often praise the inclusion of photographs, graphs, figures, indexes, contrived lists, questions, examples and highlighted words.

An array of textbook alternatives has been explored with mostly positive results (Berry, Cook, Hill, & Stevens, 2010; Stelzer, Mestre, Gladding, & Brookes, 2008; Sadaghiani, 2011). Berry (2010) surveyed 264 students and found that most favored online learning systems like Blackboard, which allow teachers to upload readings and supplemental materials for students to access instead of a textbook. However, many students felt that the vast amount of material provided by such systems oftentimes missed key concepts — a problem also inherent to textbooks. Stelzer (2008) found that students who utilized online multimedia lesson presentations in introductory physics to prepare for class outperformed students who used text-based tools. Sadaghiani (2011) replicated these results by replacing one-third of weekly class time with the viewing of multimedia models. Like Stelzer (2008), Sadaghiani found that students outperformed peers in traditional classes. The reduced class time in the hybrid courses also cut costs and increased the ease of disseminating instruction.

Grimley (2011) found that even computer games were an adequate substitute for textbooks. Even with half of a semester spent interacting in online game lectures, students in an experimental group outperformed their peers in a Computer Games and Education class while demonstrating more engagement with course material.

Though this research seems to promote the use of electronic books or some other readily available textbook substitute, studies have shown that, despite their flaws, students still prefer

textbooks over electronic resources. In a survey of 91 students, Woody (2010) found that students were no more likely to engage with textbook material when it was digitally presented than when it was presented in a book, and even when purchasing e-books, students still preferred to also have access to a print version.

This caveat is important to note, since merely presenting the same material using a different instructional tool does not inherently make the information more engaging. Considering student textbook preferences suggested by Berry (2010), along with the increased performance of students utilizing multimedia tools in the studies on Sadaghiani (2011) and Grimley (2011), it is clear that e-books need to do more than just re-hash textbook material. Instead, they must fundamentally transform the way students approach and interact with the information while making the process of learning more active and intrinsically motivating.

Considering this analysis of textbook adequacy, an effective instructional tool is here defined as that which: (1) encourages annotation and interaction with text; (2) provides access to multimedia examples that encourage application of textual knowledge; (3) enhances intrinsic motivation to learn material; and (4) provides the option to download and print study materials.

## **Experimental Methodologies and the Gamified Textbook**

### *Methods, Data Collection, Data Analysis and Limitations*

Exploring the usefulness of a gamified textbook will make important strides in transforming both how classroom redesign is approached and how games are integrated with education. Bauer (2004), Berry (2010) and Grimley (2011) all stress the importance of researching how textbooks can be redesigned to be more intrinsically motivating. Because games offer one of the most widely researched resources of intrinsic motivation, their application to this gap in textbook research is fitting.

Considering the aforementioned definitions of both gamification and effective instructional tools, the textbook *Sociology In Our Times* by Kendall (2007) is here re-imagined as a gamified electronic textbook.

In its textual form, Kendall's book is organized into five sections with 16 chapters. Chapters average about 30 pages in length. There are numerous pictures and key words are highlighted and defined in boxes on the corner of each page. Each chapter begins with a short story with some relevance to the chapter topic and ends with a summary of key topics and review questions. In general, the book follows guidelines set by Beatie (2011) and Knecht (2010) by incorporating pre- and post-reading sections along with pictures and graphs.

A gamified version of the book would place the material in a new context. From the start, readers would select and customize a creature called a "Colligo" (latin for "knowledge harvester") and would be thrust into the narrative of the Colligo tribe. These creatures act as consultants for people in need of help, with individual Colligos "mining" textbooks for information that will help solve the problems of the people. Each chapter would be structured around a different person with a different problem, with short multimedia movies preceding each chapter and introducing the issue. The mission for every chapter would be to mine the text for relevant information. This ongoing narrative would give relevance to each reading assignment and encourage greater interaction with the material, incorporating the narrative research of Pruet (2011) and Shelton and Scoresby (2011), along with the character design research of Dickey (2006).

While interacting with the text, students would use a stylus as a highlighter and pen to digitally mark relevant material. They would be able to choose from a set of annotation options (e.g. possible test questions, good summaries, key words, etc.) After every chapter, the student's



annotations would be compared to an answer key and graded, promoting the active reading skills suggested by Simpson (1990). The student would receive points for the quality of their annotations, beginning a tally that would become important at the end of the chapter.

Following the reading, the student's Colligo would enter into an interactive game setting. They would lead that chapter's character through a short sequence of rooms requiring the student to solve puzzles. The puzzles would be structured around relevant course material, with progress contingent on answering questions right, matching key terms present in the game environment and applying textual material to that chapter's proposed issue. The student would continue to receive points for the quality of his or her work, with the final tally resulting in their chapter score. This score could be used as a grade, or merely as a method of comparison between students of how well they understood the material. However, failure would never be punished beyond the student receiving new questions or having to start the puzzle again. This structure would follow the game-alignment research of Shelton and Scoresby (2011) and also the freedom to fail research of Lee (2011).

Following the chapter, the student would receive feedback on both their chapter annotations and on their in-game performance. They could receive extra points for correcting their work. When finished with the chapter, the student would have the option to download their annotations and other study material so they could print them and study hard-copies of the information. This structure would follow the ongoing feedback research of Lee (2011) and would avoid the problems commonly associated with e-books, as enumerated by Woody (2011).

Overall, the textbook's narrative structure, along with its incorporation of game mechanics that directly follow that narrative, should promote greater intrinsic motivation. The game's focus on applying sociological material to the chapter's issue and the contingency of that

application to completing the assignment directly reflects the goals of sociology professors discussed by Persell (2010). As Shelton and Scoresby (2011) discovered, the balance of instructional goals with gameplay would be the biggest issue with game design, and each chapter would need to be approached individually to create an innovative experience.

Whereas the design of the tool will be difficult, testing its effectiveness will be more straightforward. Following the basic structure of Grimley's (2011) study, two introductory sociology classes at Flagler College taught by the same professor during the same semester will be selected. One class, selected at random, will become the experimental group where students will be required to use the electronic textbook for the course. The other class will become the control group where students will be required to use the textbook version of the same book.

Efforts to control for intervening variables will focus on ensuring that the primary difference between the two courses is the type of textbook used. As a result, class time, location and instructional methods will need to remain fairly identical. The courses will necessarily need to be structured the same way and move at similar paces, while tests, quizzes and other assignments will need to be identical to ensure grades can be compared. Of course, some freedom would need to be granted to the professor to handle day-to-day classes differently, especially since students will likely respond to and discuss the textbook material differently in each group. However, the teacher will need to be trained in advance so as to not influence student decisions to use or not use text material more or less than usual.

Both quantitative and qualitative data will be gathered. For a qualitative analysis of student academic engagement and motivation to learn, both pre- and post-tests will be administered to the classes to gather data on study habits, typical textbook use and general motivation to complete school work. Because Flagler College has administered IDEA surveys at

the end of their courses for almost 10 years, utilizing these forms as a post-test tool would be ideal. The forms utilize a five-point Likert scale to solicit students' feedback on their own learning progress, effort, and motivation, as well as their perceptions of the instructor's use of 20 instructional strategies and teaching methods. Not only could the forms from the experimental and control groups be compared, but data from previous years' surveys could be analyzed. The IDEA forms also provide a section for extra questions, so questions from the pre-test could be replicated in the post-test to document effects of the experimental treatment.

Quantitative data will be collected on student attendance and performance in the class. Because this data is best understood in conjunction with the student's subjective feelings on the course, release forms will be required for access to the students' grades. Controlling for outside variables, attendance to the class should be a good indicator of motivation to learn, while performance in the class should reflect the quality of that learning. Analyzing this in the context of the instructional tool incorporated in the class, this data should provide equally relevant insight on how the differing tools affected student learning.

Of course, the scope of this experiment will be limited. Because it will be conducted in one class in a specific subject at a small college, its external validity is low. However, because it is grounded in gamification and motivational theory, it should provide important insight on how future applications of game attributes should be incorporated into the classroom.

It is important to note that because the experimental textbook will be designed specifically for this study, information on its internal validity will also be collected through post-test surveys. Neither the quantitative and qualitative results will carry much significance without an adequate understanding of how the experimental textbook was used and understood. If the design of the textbook is flawed, then the results of the experimental treatment will be skewed.

This information will need to be carefully considered in analyzing the results of the experiment to determine if modifications of the tool for future research or necessary, or if the tool is inadequate for instruction altogether.

## **Conclusions**

### *Significance of the Study*

The importance of exploring the effectiveness of a gamified textbook cannot be understated. Textbooks have long been a cornerstone of academic learning, and a weakness in a tool so vital to education necessarily reflects a weakness in academia. Although the overall decline in American education is in no way directly related to decreased use of and engagement with course material, it appears that uncovering a way to revitalize the use of textbooks in the classroom could inject new life in textbook learning.

Self-determination theory has long supported the idea that video games are, by their very nature, intrinsically motivating. Recent research exposing the characteristics comprising that motivation has revolutionized the way people look at gaming. Meanwhile, studies have continued to criticize textbooks and document their fall from grace, while teachers and researchers have frantically scrambled to find ways to eliminate their use.

Little has been done, however, to resuscitate this dying tool. Exploring the ways that the intrinsically motivating nature of games can be imbued with textbooks is a necessary step in the wider search for academic innovation. The results of this study — either for or against the effectiveness of such a tool — would become an asset in informing future research on textbook quality and also in advising current publishers of text and e-books. If such a tool is found to be effective, then further research can be explored to hone and cultivate it for use in a wider array of subjects and grade levels.

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## **Appendices**

1. Example IDEA Diagnostic Form
2. Pre-Test Questions
3. Post-Test IDEA Form Extra Questions (Experimental Group)
4. Post-Test IDEA Form Extra Questions (Control Group)

**Pre-Test Questions**

*\*Note – All Questions will be answered on a 5-point Likert Scale as seen on the IDEA*

*Diagnostic Form (See Appendix 2)*

1. I enjoy reading textbooks.
2. I enjoy learning from textbooks.
3. I read my textbook as often as my professors suggest.
4. I always read my textbook before coming to class.
5. When I read my textbook, I use active reading strategies.
6. I find that textbooks are a useful learning tool.
7. Textbooks help me apply course material to real-life situations.
8. I would rather use learning tools other than textbooks.
9. If I didn't read my textbook, I would perform equally as well in class.
10. I would learn more effectively if my professor did not use textbooks.

**Post-Test IDEA Form Extra Questions (Experimental Group)**

*\*Note – All Questions will be answered on a 5-point Likert Scale as seen on the IDEA*

*Diagnostic Form (See Appendix 2)*

1. I enjoyed reading the electronic textbook.
2. I enjoyed learning from the electronic textbook.
3. The electronic textbook encouraged me to stay up to date with my assignments.
4. I learned more effectively using the electronic textbook than I would have with a regular textbook.
5. The electronic textbook taught me active learning strategies.
6. I feel that the electronic textbook was an effective learning tool.
7. I was more interested in using my electronic textbook than other textbooks I have read.
8. I would rather use the electronic textbook than regular textbooks.
9. If I hadn't read my electronic textbook, I would have performed equally as well in class.
10. I would have learned more effectively if my professor had used a regular textbook.

**Post-Test IDEA Form Extra Questions (Control Group)**

*\*Note – All Questions will be answered on a 5-point Likert Scale as seen on the IDEA*

*Diagnostic Form (See Appendix 2)*

1. I enjoyed reading my textbook.
2. I enjoyed learning from my textbook.
3. I read my textbook as often as my professors suggested.
4. I always read my textbook before coming to class.
5. When I read my textbook, I used active reading strategies.
6. I found that this textbook was an effective learning tool.
7. This textbook helped me apply course material to real-life situations.
8. I would rather use a learning tool other than this textbook.
9. If I hadn't read my textbook, I would have performed equally as well in class.
10. I would learn more effectively if my professor did not use this textbook.