

## **Gamification as a Teaching Strategy: Is It Effective?**

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### **Abstract**

Gamification has become a trending concept in online courses for the past 10 or more years. Based on the analysis of psychological and social factors that make electronic games highly used in today's population, gamification suggests ways to improve education course innovation, student engagement, student motivation, student critical thinking, and student decision-making. The question is, "Is it effective?" This paper evaluates an online graduate course in business administration at a state university with a majority Hispanic student population to determine if the concept is effective as a teaching strategy option.

### **Introduction**

Among the great challenges in higher education is developing methods and techniques to foster innovation, creativity, motivation, engagement, and learning into effective design and delivery of courses in all platforms, but in online courses in particular. Online course design and implementation have recognized the perceived and proven results of gaming and simulations as teaching strategies during the past sixty years.

Although the charge to incorporate the concepts of gaming and simulation into educational and learning experiences has been experienced for decades and even centuries

(Chou, 2015), the concepts that comprise gaming theory and strategies have only become codified into consistent definitions and techniques with the needs derived from the challenge of creating better, more effective learning processes in online courses.

Through the evolution of course development, the assumption seems to have been made by course designers that the increasing population of game players in the online world naturally extends skill development to the learning environment. According to the Entertainment Software Association, the average age of current game players in the population is 30. Of those, 68 percent of the gamers are above the age of 18, primary college age (NMC Report, 2014, p. 42). So the base assumption is that higher education students have higher skill sets because of exposure to sophisticated games in their operational environment.

The latest growth of gamification in learning seems to result from commercial efforts to provide training for employees and to increase numbers, loyalty, orientation and instructions for customers (NMC Report, 2014, p. 42). According to a Pew Research Center report, gamification is "...interactive online design that plays on people's competitive instincts and often incorporates the use of rewards to drive action -- these include virtual rewards such as points, payments, badges, discounts and free gifts; and status indicators such as friend counts, re-tweets, leaderboards, achievement data, progress bars and the ability to level up" (Anderson, J. and Rainie, L. 2012, p. 1; Farber, 2013, p. 1). For the purposes of this paper we will define gamification as using gaming design, game elements and mechanics and applying them to a non-game based environment.

In the NMC Horizon Report for 2014, critics suggest gaming in the commercial applications in business will be a short-lived trend that results in short-term bursts of productivity. But, according to the report, educational applications of gamification are showing

“...that game-like environments transform assignments into exciting challenges, reward students for dedication and efficiency, and offer a space for leaders to naturally emerge” (NMC Report, 2014, p. 42).

Games have spent decades (or even centuries depending on how you define a game) mastering motivation and engagement. Games are now teaching us how to motivate and engage players. Thus, the concept is called “Gamification”. (Chou, 2015). The effects of gamification applied to learning are generally described as increasing student engagement in learning activities, increased application of critical thinking, more creative problem-solving, and more effective teamwork. (Reeves and Read, 2009).

As gamification has accelerated in its academic scrutiny, several frameworks defining the characteristics of educational game application have arisen. Several are introduced here.

### **Theoretical Framework**

Among the frameworks for gaming in educational course development, several have made significant contributions to detailing and measuring course design elements to ensure the greatest likelihood of accomplishing the intended goals of creation of innovation, critical thinking, motivation, and engagement. Almost, if not all, of the theoretical frameworks offered in current literature are true models in that they are the conclusions drawn by observers to illustrate the identified characteristics of well-designed online courses that have the greatest probability of achieving optimum student learning.

This paper will look at several of these framework definitions in a layered approach. It will begin with the simplest categorization: Micro vs. Macro Gameplay (Kim, 2010). These categories have distinct application in the development process. Kim defines Micro Gameplay

as implementation of online capacities down to small elements of control such as movement of player directions or acquisition of specific information from a game object. Kim's definition for Micro gaming is:

Micro (short for "micromanagement") refers to the level of granular and specific control a user has over game units. In the *Warcraft 3*, the user's skill and ability to control their hero and other game units to attack enemy units and avoid/dodge enemy unit attacks defines a user's micro. (Kim, 2010, p.1)."

Macro Game Playing is suggested by its name. It implements gaming at the highest, most abstract level of game interaction. As Kim defines Macro Gaming:

Macro (or "macro-management") refers to higher-level strategic game considerations that are not based on granular twitch/reflex based control of game elements. Again, using the *Warcraft 3* example above as a reference, in this case good macro skill would involve:

- Strategy: The player's game strategy to win including issues such as planned attack sequence, game style, and building development progression
- Resource Management: The management of game resource materials to build buildings faster and more effectively
- Map Awareness: Ability to predict and properly adjust to what an enemy may be doing by watching map movements (or lack of movement) (Kim, 2010, p.1)

As Kim suggests, the most effective games include elements of both Macro and Micro Gaming as a strategy to initiate the primary gaming advantages to player learning, Innovation, motivation, critical thinking and engagement.

The second layer is the concept of the application of Gaming-Process and Gaming-Informed. (Begg et al, 2005). This criterion focuses on the learning process and how it conforms

to the implementation of an activity that clearly conforms to definition as a game. It compares this view against one suggesting that game elements are used in an education environment to achieve the basic gaming goals in a more direct and accessible learning process (Begg, et al, 2005) .

Begg, et al, suggest that learning is most effective in the game-informed concept that does not require the learning content to be incorporated directly into a recognizable game format. Instead, it can be most effectively developed meeting the following criteria:

- The backstory gives an emotional "in" for context and character role.
- Intrinsic feedback enhances students' enjoyment and feeling of agency, increasing opportunities for learning by encouraging students' willingness to learn difficult material (Malone 1982).
- The ability to act in an emotionally engaging simulated situation without the serious consequences that such action might have in the real world (the "psychosocial moratorium" of Erickson) allows for repetition and improved performance as well as more committed performance from students (Gee 2003).
- Students assume identities within the application and perform accordingly.
- Students develop an emotional attachment to the character within the application that contributes to the learning experience by helping students to perceive the application as a real, situated experience (Ryan, 2001).

Begg, et al (2005) came to these conclusions studying effective learning activities in medical schools, but conclude that the characteristics are just as applicable to other discipline learning.

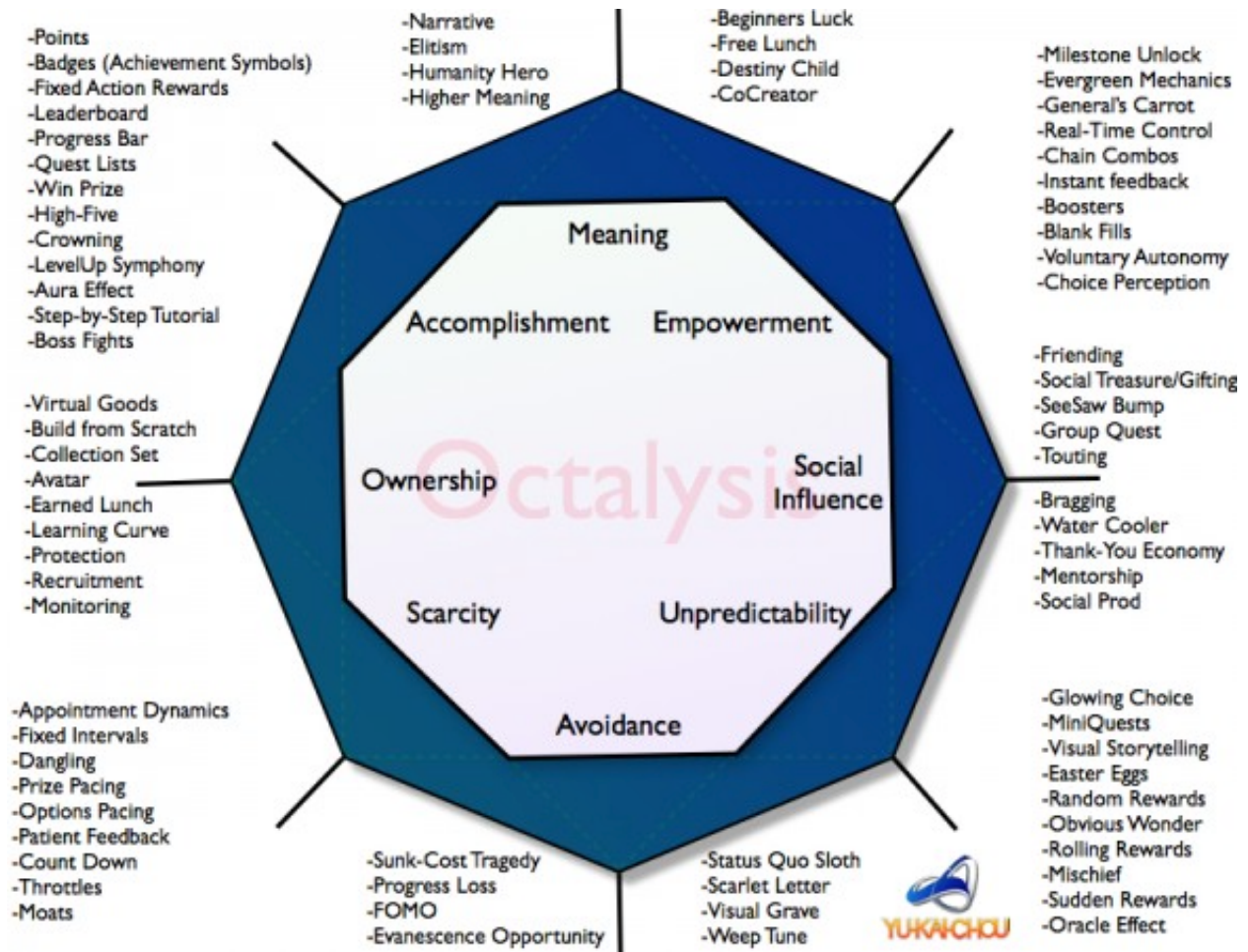
As defined earlier, Gamification is "...the craft of deriving all the fun and engaging

elements found in games and applying them to real-world or productive activities”(Chou, 2015.) The concept has been labeled “Human-Focused Design.” The alternative is called “Function-Focused Design” (Chou, 2015).

“Function-focused” design seeks to get the job done quickly. Much of what is discussed as pedagogy falls into this category. There, “effectiveness” in learning equates to “efficiency” in learning. Human-Focused Design, on the other hand, is based on the concept that people in a system have feelings, insecurities, and reasons why they want or do not want to do certain things, and therefore optimizes for their feelings, motivations, and engagement (Chou, 2015).

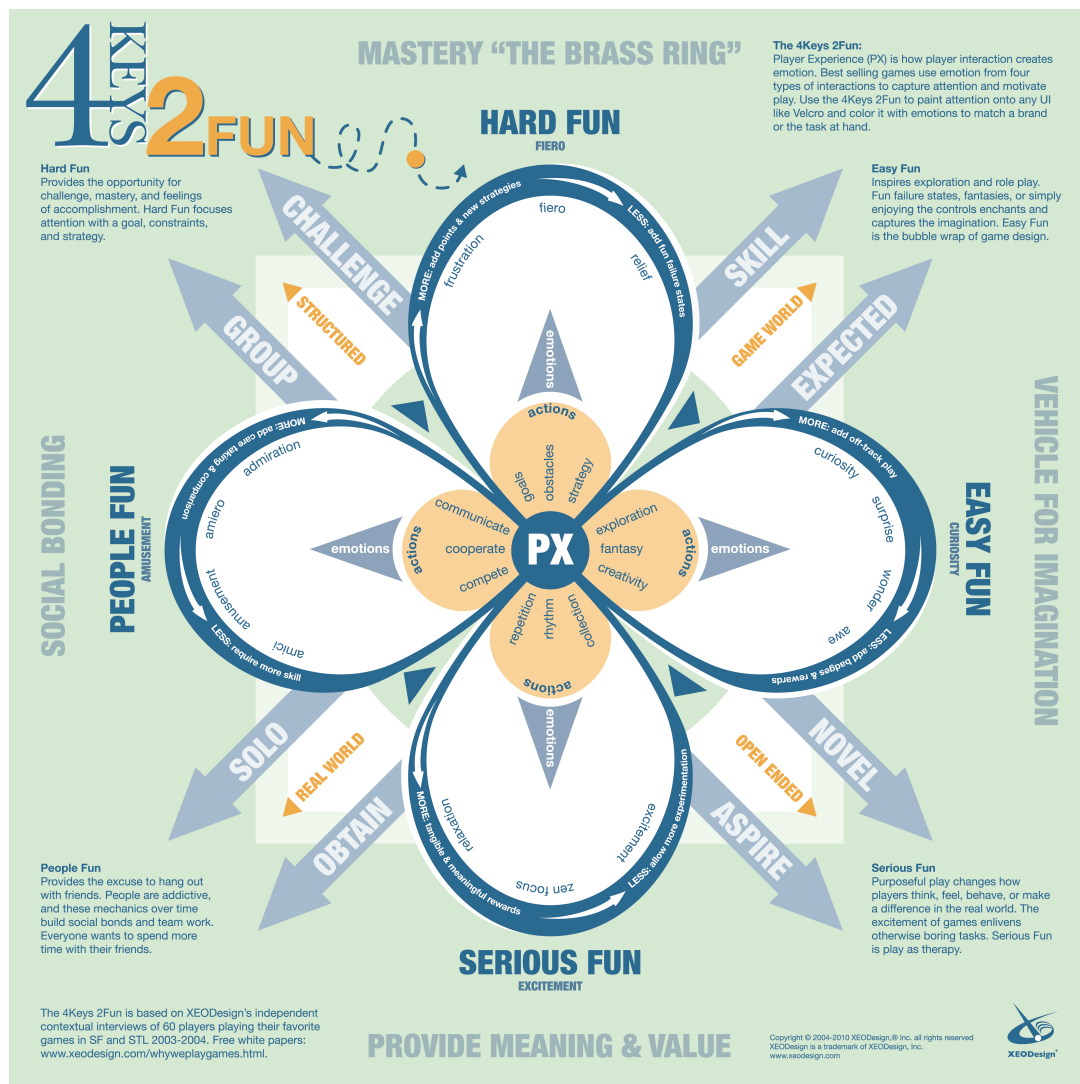
The Human-Focused design is illustrated in Figure 1, The Octalysis, and suggests categories of activities, artifacts, and outcomes that can be manipulated to produce highly effective learning processes in education. (Chou, 2015).

Chou’s conclusion in his Octalysis Model is that a key to successful gaming as a learning tool is that the activity should be “fun” (Chou, 2015). This is suggested because games have as one of their primary purposes to make the game player happy with the experience. And games are “fun” because they are related to the eight elements of the Octalysis Model (Chou, 2015).



**Figure 1. Octalysis: Complete Gamification Framework.** Copyright 2014 Octalysis. (Chou, Y. 2015)

This conclusion by Chou is among the rare places where the idea of “fun” is specifically talked about. However, considerable research has been focused on the role “fun” has in successful gaming. Lazzaro (2015) has proposed a construct of four different types of fun that are used in developing games in the commercial environment.



**Figure 2, 4 Keys 2 Fun. (Lazzaro, N., 2015) Copyright, 2015**

This model defines the four main reasons that people play games. Each key unlocks a different set of play experiences (Lazzaro, 2015). Lazzaro (2015) suggests that because players alternate between these types of fun during a single play session, best-selling games offer at least three of the 4 Keys 2 Fun. Therefore, effective educational applications will include three out of the four keys to fun to achieve a similar type of variable experience in the learning process.

These theoretical frameworks give us the tools to design and develop educational gamification to achieve the target goals of innovation, motivation, critical thinking and

engagement. However, the extent of design frameworks, begs the question, "Is Gamification in higher-educational environments effective as a design and delivery system of learning experiences?" For this pilot study, the hypotheses proposed are:

- H1: Higher education courses developed and deployed using gamification result in courses that are perceived to be more "fun" by students.
- H2. Higher education courses developed and deployed using gamification result in high student engagement in course content.
- H3. Higher education courses developed and deployed using gamification result in high use of critical thinking skills by students applied to course content.
- H4. Higher education courses developed and deployed using gamification result in high student motivation in achieving positive outcomes for course content.
- H5. Higher education courses developed and deployed using gamification result in student evaluations suggesting beliefs in course effectiveness and quality.

### **Methodology.**

The first question that must be addressed prior to attempts to find answers to the hypotheses is to identify a course that incorporates the Gamification Theoretical Frameworks described here as basic to appropriate development, in order to be considered a good example.

A graduate level course taught in an accelerated MBA program at a predominately Hispanic student-population university in South Texas was reviewed for its incorporation of gamification techniques. The course has been taught in the online, accelerated format for two years. It is offered six times per year. The program is new so student enrollment in this course varies significantly to the point that some offerings are canceled to meet small class size policy

of the university. The class offerings have ranged from as few as five to as many as nineteen students. A total of six class offerings during this time create a data pool sufficient to draw conclusions about characteristics.

Because this is a pilot study, the data collected for analysis is based on accumulated data from this class to compare results from evolving class offerings. Although the course was not originally designed using gamification frameworks, the continuing development of the course led to incorporation of many of the techniques and concepts until it reached the level of content that classifies it as a gamified course.

The course is the capstone course in the degree program. It focuses on strategic management. Students take this course at the end of their programs. Typically, students taking this course have considerable previous experience with other class members so things like team building and team decision-making are met by students with active psychological opinions related to the effectiveness of team activity in previous courses. Such psychological baggage means the course has a challenge to overcome preexisting ideas and feelings to achieve some of its objectives related to teamwork.

The evaluation that establishes this course as using gamification is complex. First, it includes both Macro and Micro gamification elements. For macro, the course incorporates narrative design for meaning and cohesion. Students are told how a business was considered a monopoly and then broken into six units. Each student is assigned to work for a company and plays a role in its outcomes. As each module progresses, different events happen, including potential labor strikes, modification of economic environment influences, and competition initiating new products. Additionally in Macro, the course modifies student behavior beyond interacting with the gamified environment where the student must determine strategy of

managing a company, determining how that strategy will be implemented, and evaluating the outcomes using analysis techniques. As for Micro gamification, the course requires students in roles as managers of their firms to make specific decisions about product design, product price, product production levels, and financial options. These decisions result in market changes when competing organizational decisions are included in industry calculations. The game is up!

The course uses a simulation as its primary learning tool. Although a student is placed in a role, such as Vice President of Research and Development, his or her manipulation of decisions and the processes used are classified as “gaming-informed.”

Looking at the Octalysis eight characteristics of gamification we find the course has:

*Meaning*-It is promoted to students as real-time decision processes directly transferable to management processes in real life and that skill development has a payoff in the student’s recognition and success in work environments.

*Empowerment*-It allows students to make many decisions in different operational functions giving the student complete control over input that results in outcomes directly resulting from the specific decisions made. The simulation unleashes competitive spirit in students that is a major part of the drive to do well in the course.

*Social Influence*-The management team allows students to create social interactions as they work to reach collaborative decisions for the firm. The design of the decision processes builds an interdependence among students that pays off in increased exchange and perceived stronger team activity.

*Unpredictability*-The results from each decision round can be estimated by students, but the outcomes based on input from competing organizations makes actual outcome unpredictable

and fosters effort by students to fine tune decision processes to come closer to predicting eventual outcomes.

*Avoidance*-The program allows students to avoid elements. The student has the power to determine strategy and implementation. They can avoid options that would have significant outcome differences, but still be highly successful for firm outcome.

*Scarcity*-As with real-life, student teams do not have unlimited resources. Instead, the course requires allocation of scarce resources to accomplish positive outcomes.

*Ownership*-The outcomes accomplished by the management teams are perceived by students to be their accomplishments. If they score well, students take considerable pride in the results. The competitive spirit drives students to excel in the outcomes to be able to say, “My team did this.”

*Accomplishment*- This characteristic is widespread in the course content. But one element is especially relevant to this gamification resource. After scores are calculated for simulation rounds, they are compared to all other graduate teams worldwide currently using the simulation. A percentile ranking is established for the entire population. This “leaderboard” allows a student to see where they are in the learning process. This semester, one team is currently in the 98<sup>th</sup> percentile, meaning, they have scored better than 98% of the teams working on the simulation (approximately 1500 word-wide).

Since the course includes all elements for gamification, only one set of characteristics remains to be reviewed. The course’s elements of “fun” are very relevant to the courses content for attracting and retaining student access to the course and tenacity to continue until course material is finished.

Evaluating the course on the basis of the four types of fun, the target course includes “Easy Fun” because the format of the course is so novel from what students expect of an online course. The course’s decision process allow students to enter decisions that result in failure, such as major loss of profit, having to take an emergency loan, and inventory management that is terribly costly. However, the simulation processes allow students to see the major deficiencies as temporary setbacks they can overcome.

Serious fun is included as students become more engaged as the rounds of the simulation pass. Students begin to interpret the outcomes as purposeful and realistic. When successful, the outcomes create a feeling of “serious fun” as students take pride in the outcomes.

As students get deeper into successful outcomes based on the effectiveness of team decision-making, they begin to relish the social interactions with other team members. Team membership becomes an important accomplishment as relationships between students blossom. This is real “People Fun.”

And lastly, the course simulation provides considerable challenge to students to create a feeling of mastery when they accomplish positive results in the round outcomes.

With this evaluation, the classification of the Strategic Management course as one that incorporates gamification is clear. Therefore, it is appropriate to use the outcomes for this course in the test of gamification effectiveness in course design.

## **Results**

Using the Accelerated MBA Strategic Management course as one that classifies as a course built on gamification, data can be collected to provide interpretation of the issues associated with this paper’s hypotheses. As a pilot study, these outcomes are relevant to this

course alone and may have no basis for generalizability to other courses in other programs, other disciplines, or in other populations.

Specific classification characteristics of this pilot study are:

Course level- Graduate

Course Platform-Fully Online

Course Discipline- Business Administration (Management)

Student population- Hispanic (80%) Caucasian (15%) Asian (3%),

Black (2%). (These are estimates based on class enrollments  
in Strategic Management)

Total students observed. - 75

Instructor Assigned-Same instructor for all course administrations

External Quality- Quality Matters Certified

Course Development- Faculty and Instructional Developers

Data was collected at each offering of the course and aggregated for application to inferences for hypotheses.

### *Hypothesis 1*

H1: Higher education courses developed and deployed using gamification result in courses that are perceived to be more “fun” by students.

To evaluate Hypothesis 1, comments posted on student evaluations by students were classified as positive toward the concept of having “fun.” Statements posted did not have to include the word “fun” to be placed in this category. Rather, the tenor of the posted statement is interpreted as related to “fun.”

For example, a student posted this:

*“Great course! The Capism™ simulation was a great way of learning about the managing of an entire company. I really feel like I learned a lot from this class in the last few weeks. Dr. Xxxxxx is a great professor and would push us to learn rather than complete assignments just for a grade.”*

A statement like this is interpreted as a surrogate for having had “fun” in the course activities and using the course materials. The accumulated results are shown in Table 1.

	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree
	Class 6	Class 5	Class 4	Class 3	Class 2	Class 1
Number of posts	5	12	5	6	7	11
Percentage of enrollment	55.56%	63.16%	71.43%	66.67%	58.33%	57.89%
					Average	62.17%
N=	9	19	7	9	12	19

**Table 1. Number of Statements Revealing the Student Had “Fun” in the course**

The result of these unsolicited postings was 62.17% of students posted a statement that was classified a statement indicating that the course and activities were “fun.” The hypothesis is confirmed.

### *Hypothesis 2*

H2. Higher education courses developed and deployed using gamification result in high student engagement in course content.

The second hypothesis focusing on engagement uses the results of peer evaluations for student team activity. The course asked for five peer reviews during the course’s duration. The peer evaluations were the responsibility of each student to rate the team activity of all other team members. The peer evaluations are shown in Table 3.

	Class 6	Class 5	Class 4	Class 3	Class 2	Class 1
Number of students with PE of 4.0 or higher	9	19	7	9	12	19
Percentage of students	100%	100%	100%	100%	100%	100%

					Average	100%
N=	9	19	7	9	12	19

**Table 3. Peer Evaluations Above 4.0 Out of 5.0 Average for All Items in Survey**

The results of this measurement are astounding! Each team member earned an average of greater than 4.0 out a 5.0 possible rating. Team activity is usually a very troublesome point for most courses as students encounter team members who do not engage in the course material. In this case, the results show that the teams comprised members who became engaged and committed the time and effort to earn very positive ratings in the peer evaluations. Hypothesis 2 is confirmed.

### *Hypothesis 3*

H3. Higher education courses developed and deployed using gamification result in high use of critical thinking skills by students applied to course content.

This hypothesis targets high levels of critical thinking applied by students in this course. The measure is the percentage of score the student accomplished out of the total score available in the simulation's individual performance. The course's final exam is individual performance in two areas of activity. First is the simulation and second are the queries from the board of directors. The exam is placed into the context of a story that names the student as the president of the company with responsibility to respond to queries from the company's board of directors. A standard for the measure of student performance of 50th percentile plus is outstanding performance and 35th percentile is the threshold for adequate performance. The results are show in Table 3.

	Class 6	Class 5	Class 4	Class 3	Class 2	Class 1
Percent score on simulation	64%	65%	63%	62%	62%	65%
					Average	64%
N=	9	19	7	9	12	19

**Table 3. Percentage of Score on Simulation Performance**

The average of 64th percentile for student performance on the individual simulation is outstanding. Keep in mind that the score on the simulation is not interpreted in the normal frequency distribution around a mean of 75 percent. Instead, it is interpreted on the student performance in comparison with everyone taking the individual simulation. The average score of students in this course at 64th percentile is well above the 50th percentile standard, meaning they have scored high on critical thinking in comparison to everyone involved in the simulation. For our purposes here, the comparison is against worldwide student population who are involved in courses using the simulation, which includes a bulk of the course gamification content described here. Hypothesis 3 is confirmed.

#### *Hypothesis 4*

H4. Higher education courses developed and deployed using gamification result in high student motivation in achieving positive outcomes for course content.

This hypothesis turned out to be the most difficult to interpret in the pilot study. To try to interpret motivation among students, the only indicator that was included is the unsolicited posts on the course evaluation. For example, a post such as:

*“Great course!!! I really enjoyed the Capsim modules and the competition it created”*

Any post that mentioned competition created or application of learning to professional environment was classified as relating to motivation. Since these are unsolicited posts in the evaluation, there is no direct request for students to respond to some construct of motivation in the course engagement. The evaluation of statements made by some of the 75 students in the pilot test population shows 46 percent of students making a positive statement about their motivations for the course. In this case, this result shows some strong motivation, but the measurement does not give an opportunity to make a definitive judgment about the hypothesis.

Because most of the statements reflected on the role of the simulation, the influence on student motivation is interpreted as strong. For our purposes, this suggests that Hypothesis 4 is probable, but requires additional, specific construct inclusion in future research to confirm.

### *Hypothesis 5*

H5. Higher education courses developed and deployed using gamification result in student evaluations suggesting beliefs in course effectiveness and quality.

To evaluate this hypothesis, the end-of-semester student evaluations are used. These are a series of questions students respond to in an online survey. The response period is a specific length of time and all students are asked to respond. All classes had 100 percent response rate from students, except class one, which was short one student response. The class numbers are in order from first class to last.

Table 5 shows the results of the student evaluations. Student responses of “Agree” and “Strongly Agree” are aggregated to determine overall positive satisfaction with the course.

	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree	Agree/Strongly Agree
	Class 6	Class 5	Class 4	Class 3	Class 2	Class 1
The instructor clearly defined and explained the course objectives and expectations.	89%	100%	100%	100%	100%	100%
The instructor was prepared to teach for each instructional activity.	100%	100%	100%	100%	100%	100%
The instructor communicated information effectively.	100%	100%	100%	100%	100%	100%
The instructor encouraged me to take an active role in my own learning.	100%	100%	100%	100%	100%	100%
The instructor was available either electronically or in person.	100%	100%	100%	100%	100%	100%
N=	9	19	7	9	12	19

**Table 5. Students’ Evaluations for Strategic Management Class**

The data show that student satisfaction with the course is astoundingly high. Therefore, Hypothesis 5 is confirmed.

## Conclusion

This paper addresses the question, “Is Gamification of Course Content Effective?”

After carefully selecting a course that exhibits a plethora of gamification concepts and techniques, this pilot study was able to review evaluation results of an operational course to make interpretations of five hypotheses. Four of the five hypotheses were confirmed. The fifth was determined to be probable until additional research is conducted.

**Based on the four confirmed hypotheses and the fifth probable, the conclusion that can be drawn is that gamification of a course is effective as a teaching strategy with a goal of improving course performance by students.**

Gamification can be used to change a behavior, increase engagement/motivation, acquire skills and more. Examples of changing a behavior in regards to face-to-face courses would be to improve class attendance and improve student punctuality. For these two examples, microgamification can be used where punctuality and attendance are extrinsically rewarded. It is important however to explain to students the intrinsic value behind this. To increase motivation, one can apply macrogamification and gamify the entire course. Begin with a story line that calls the students to action, is meaningful and related to the discipline, and change the structure of the course to look game-like:

- Instead of structuring the course by Modules/Weeks, change them to levels
- Include narratives within the module to continue the story and include them in the narrative
- Instead of Assignment, call them Fights
- Instead of Exams, identify them as Boss Fight.

- Show character growth (for example begin as an Apprentice and level up until you become a Master)
- Utilize small amounts of extrinsic motivation (ex. show badges for growth, change grading policy to experience points)

Although this pilot study is a snapshot in time to estimate the effectiveness of the course, there are no comparisons to other teaching strategies to determine if there is difference in level of student learning and application. However, the evidence here suggests that the concept of gamification is significant enough to warrant inclusion as a teaching strategy in more courses.

To begin the process of building a course into one that incorporates the concepts of gamification, a framework for organizing development of elements is required. One of the most direct is the Game Design Framework by Werbach and Hunter (2012). Although this framework was developed for companies to use to create training for employees and customers, it is directly applicable to education. The framework includes the following steps:

#### **GAME DESIGN FRAMEWORK**

1. Define business objectives
2. Delineate target behaviors
3. Describe your players
4. Devise activity loops
5. Don't forget the fun!
6. Deploy the appropriate tools

(Werbach & Hunter, 2012)

Our institution is developing an educational gamification framework that incorporates Werbach's & Hunter's framework, along with Quality Matters and best practices found in

literature. The goal will be to develop a process for effective gamification design to achieve effectiveness outcomes.

### **Future Existing-Course Revisions**

In addition to the program that guides development of gamification in new courses, a program designed to improve gamification feel and operation of a course is also in development. The goal is to enrich courses to take advantage of the gamification concepts to improve online course effectiveness in achieving improved Assessments of Learning measures. The update program includes:

1. Explain in Start Here how this course is gamified.
2. Introduce their characters in the Start Here and create a storyline to introduce them to the gamified setting.
3. For each module, incorporate badges for areas of growth. Show growth from Apprentice to Master Businessman. This would incorporate extrinsic motivation and allow students to see growth in character.
4. Incorporate the Storyline in the Simulation to the Blackboard Environment and tailor it to share the challenges/mission to accomplish.
5. As mentioned previously, build a survey instrument to evaluate specific constructs of our hypotheses with questions included in course evaluations to ensure response density for future course modification.

### **Future Research**

This paper lays the groundwork for considerable lines of future research. The ideas that are derived from the paper include:

1. A study comparing gamification course with non-gamification (in this case, a course such as this study's course compared to a course with traditional case-study approach).
2. A study comparing discipline students (this study focused on business students, which should be compared to other disciplines to determine possible differences).
3. A study comparing ethnic populations to determine any socio-economic differences in course effectiveness using gamification (this study is based on results from predominately Hispanic student population in a very low income area of the country).

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