

THE GAMIFICATION OF EDUCATION

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ABSTRACT

The concept of gamification was first introduced in the literature in 2008 has increasingly been a topic for published books, blogs, and numerous articles in journals and other media outlets. Drawing on the author's personal experience and published research this paper is intended to establish a definition of gamification that can be generally accepted, explain the popularity of the concept in terms of those elements that support effective learning, and make a case that those of us that have been involved with simulation are long time gamifiers.

INTRODUCTION

This is a playful paper. While it is intended to meet the standards of academic research by grounding my thoughts in theory and properly citing the work of others, it is written in my voice and is a synthesis of a lifetime of teaching and learning. My hope is the reader will be engaged, stimulated, and maybe even inspired to join the movement to “gamify” their courses, their personal learning, their careers, and maybe even their lives!

First, I will define “Gamification” and visualize it with a model. It should be noted that while all games are played, not all play is gaming. Next, drawing on the work of other scholars, I will identify the known benefits of play and games. Then I will explore the association simulation as a teaching and learning tool has to Gamification. The paper concludes with an invitation to professors, employers, and students to gamify your courses, work places, education, and careers.

Earlier in my career I had the good fortune of working with a Fortune 100 firm as a developer and facilitator of training and development activities. The centerpiece of my offerings was the use of simulations that I customized for various work groups and business units. I referred to these Sims as games. One day a senior executive took me to the side and informed me that we were doing important work and “simulation” was a more appropriate term than “game”. Thus, my “games” became “simulations”. Due to the research I encountered preparing this piece; my “simulations” will once again become “games”.

WHAT IS A GAME?

Jesper Juul (2001) includes five essentials present in a game: (1) rules, (2) variable quantifiable outcomes, (3) valued outcomes, (4) player attachment to outcomes and (5) effort. Other features that are frequently found in games include challenge, player control or influence, fantasy (no

real life consequences), role playing, competition, mystery, adaptation to changing skill levels, assessment, progress, sensory stimuli, and immediate feedback. Scott Eberle, Vice President for Interpretation and Play at the Strong Museum, and a nationally recognized expert, describes play as a six-step process consisting of anticipation, surprise, understanding, strength, and poise. Game researcher Jane McGonigal argues that a game consists of goals, rules, feedback, challenge, valued outcomes, and is played voluntarily. In synthesizing these definitions, I have constructed the diagram (figure 1) below to illustrate my definition.

First, a game is played by choice because it is fun! A game has well defined goals (capture your opponents King). The game is governed by rules and instructions that players abide by. Player take actions – again, think of a chess move, or buying Boardwalk. The game ends definitively with winning or losing. I have added two other essential elements to strategy games such as chess, monopoly, and business simulation games. Your actions are affected by other player actions, and sometimes by random events such as the roll of a dice or acquiring a chance card (Monopoly™). In anticipating your opponent's actions and the games random events, we develop strategies that increase our chances of winning.

Humans of all ages and cultures like playing games. We have always played games and likely always will. The historian Herodotus wrote about game playing in the ancient world. (McGonigal, 2011)

WHAT IS GAMIFICATION?

The first documented use of the term “gamification” was in 2008 (Deterding, Dixon, Khaled, & Nacke 2011) and was defined simply as using game design elements in non-game contexts. Since 2008, gamification as a concept has been broadened and defined by others as follows.

- The process of using game thinking and game mechanics to solve problems. ((Deterding, et. el, 2011)
- The use of game mechanics, dynamics, and frameworks to promote desired behaviors. (Lee, & Hammer 2011)
- The trend of employing game mechanics to non-game environments such as innovation, marketing, training, employee performance, health, and social change. (The Gartner Group)
- Gamification is using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning and solve problems. (Kapp, 2012).

The Gartner Group is a national organization that tracks technology trends. Since the term gamification first appeared as an internet search in 2008 the number of searches on the term has grown exponentially and now is the object of more than 1,000,000 searches per month.

BENEFITS OF GAMIFICATION

Psychologist Mihaly Csikszentmihalyi wrote about a state he described as “flow” in his 1990 book *Flow: The Psychology of Optimal Experience*. (Csikszentmihalyi, 1990). During flow, people typically experience gratification, immersion in the experience, are at peak creativity and performance. Games induce a state of flow which is an ideal learning state. Game researcher and scholar Jane McGonigal in her 2011 book *Reality is broken: why games make us better and how they can change the world* captures game players sentiments that they are “fully alive,” “engaged”, “have a sense of purpose”, “perform at maximum potential”, and “feel most creative” when playing – experiences they do not get at their jobs. (McGonigal, 2011)

Stuart Brown, M.D. wrote a bestselling book he entitled *Play, How it Shapes the Brain, Opens the Imagination, and Invigorates the Soul* in 2009 that has vaulted him to “guru status” in the world of corporate training and development where training activities seem to be held to greater accountability than the university. (Brown & Vaughan, 2009) Through a lifetime of studying, formal education, and experiences he makes a compelling

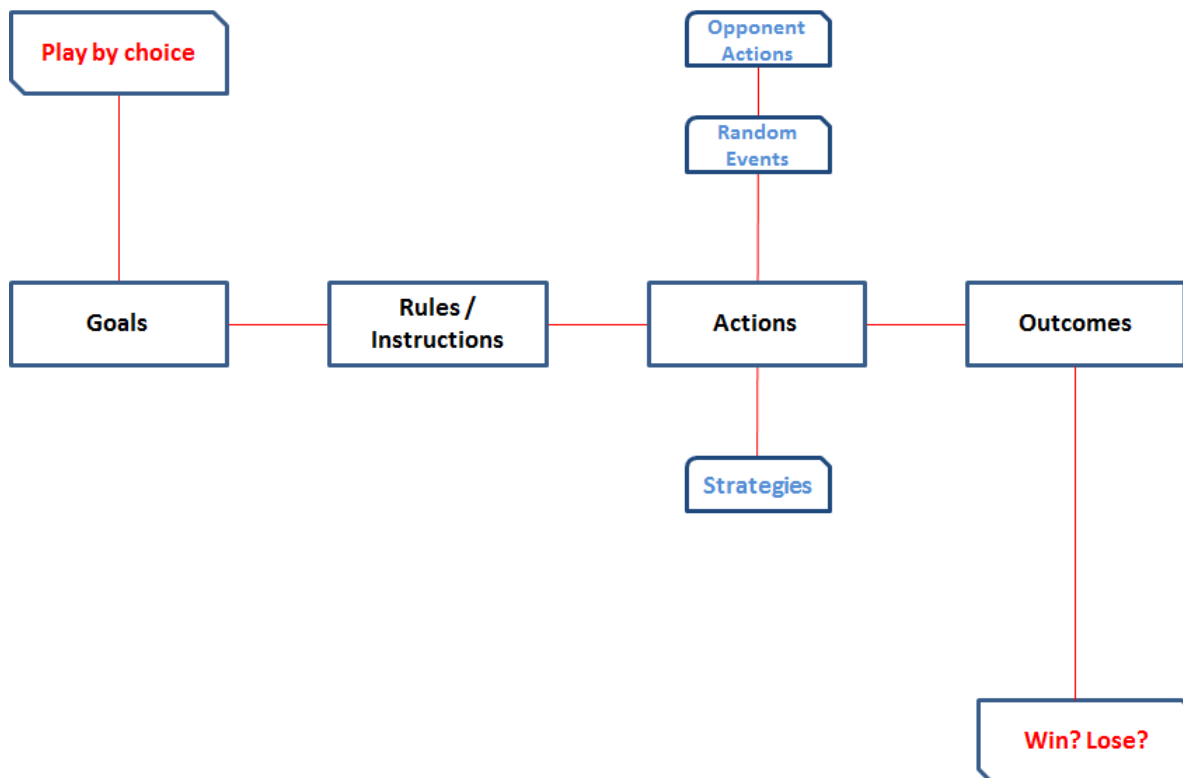
case for play in all aspects of life, including learning. According to Brown, it is play that lies at the center of creativity and innovation.

Benefits of Gamification are known to be physiological (McGonigal, 2011). Scientists have measured the increased release of the chemicals norepinephrine, epinephrine, and dopamine in the brain that not only bring on “good feelings” make us more receptive to learning (Gutierrez, 2012). Neuroscientist Gregory Burns sees dopamine not as a reward necessarily, but a chemical that allows us to learn properly (Rackwitz, 2012). Brain researchers have proved that learning requires neural connections to be made in the brain to store information in memory and frequently learning comes from response to an actual event. The brain does not distinguish between actual and simulated events. Therefore, if we “learn” by simulating such conditions and demonstrating the skill, we form the neural connection in our brain. The proper response is then stored and when we do experience an actual event, our learned response will come into play. In a learning game, the outcomes are built around knowledge and skill sets and attitudes (Gutierrez, 2012).

Many researchers comment about the association of gaming and problem solving skills such as the powers of deduction, spatial thinking (in addition to linear thinking), and evidence based decision making. (Kapp, 2012) Gaming allows one to exercise his/her imagination, to fantasize about aspirational roles (a roller coaster tycoon!)

Below is my enhanced gamification model (figure 2). The benefits derived from gaming, as noted in the literature, are those attributes we champion as business teaches. It is also

Figure 1



important to note the importance of the feedback loop as simulation and games are frequently played in an iterative manner. Later, I will make a case that business simulation as a teaching pedagogy can produce those same effects.

GAMIFICATION AND SIMULATION

Is a business simulation a game? Are business teachers using simulation gamifiers? Should simulation be considered a gamification tool? I believe the answer is yes for several reasons.

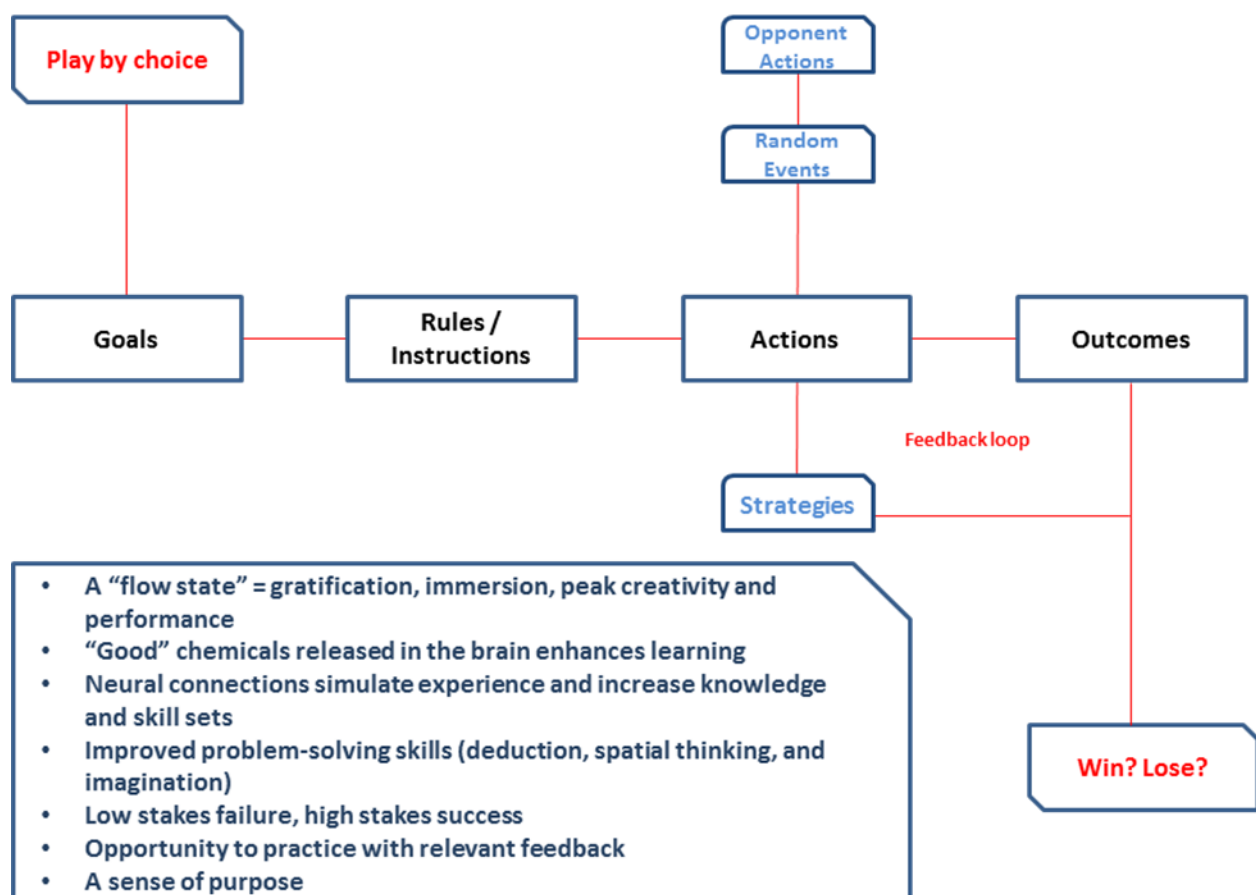
Stuart Brown identifies purposelessness, a voluntary activity, an inherent attraction, freedom from time, diminished consciousness of self, improvising, and a continuous desire to stay with an activity as the properties of play. Simulation does consist of many gaming elements and produces many of the beneficial outcomes of play.

In a lengthy article in *Simulation and Gaming*, Wilson, Bedwell, Lazzara, Salas, Burk, & Estock, (2009) define a game as an artificially constructed competitive activity with specific goals, a set of rules, and constraints. A simulation game attempts to represent real phenomena including complex processes through algorithms. A similar definition is offered by Teach (1990) where players face a business related scenario, assume a decision maker's role, make decisions that are acted upon by the game algorithms,

and receive feedback in the form of an accounting report. Many benefits are associated with business simulation games. In keeping with current teaching trends, simulations are an intense active learning experience tapping into a basic human motivator – we like to win! (Wilson, et.al, 2009) Students are not describing knowledge but experiencing it. The goal orientation of business simulation games allow players to understand and set business goals (Seijts, 2004. Students will appreciate the clarity of specific and measureable goals as compared to ambiguity. When students know what needs to be done, they may not know how to do it – this is where the experimental nature of gaming and learning is beneficial. A sim game will allow a student to safely fail, affiliate with other students, and affirms hard work and performance in a more visceral manner than test scores. Students will need to practice and hopefully improve their powers of deduction, establish a credible hypothesis, conceptualize complex and abstract ideas, and improve their ability to process visual and spatial information.

Business games are usually competitive. Most general enterprise simulations are competitive and designed to teach decision making and strategy. A competitive game is frequently referred to as a zero sum game. For every gain captured by one player there is a corresponding loss to be absorbed by the remaining players. The author of the book

Figure 2



Game Theory, Johnny Von Neumann (1944), classifies games as being competitive *or* cooperative and business simulations can fall into both categories. The Prisoner's Dilemma is an iconic example of a cooperative game. Only when the two suspects collaborate and deny guilt will total returns be optimized (they both get off). An individual maximizes their personal expected value by confessing to a less serious crime and pointing the finger at the other prisoner. "Role play" exercises are used frequently in soft skills training such as team building and fall into the collaborative or cooperative category. In the current business environment of partnerships and integrated supply chains there is an opportunity for more cooperative simulation games.

Finally, cases and simulations are frequently compared. The many elements of gaming discussed above sharply distinguish them. Most importantly, in a simulation game there is no ambiguity regarding the outcome. Feedback is delivered immediately in an authentic format – dollars earned, ROI's achieved, and stock values derived. In summary, the learner is inside the simulation and playing whereas he or she is an observer when analyzing a case study.

A CALL TO ACTION

To Professors: Gamify your courses! Like it or not, traditional methods of teaching are out of favor. People are bored by lectures, textbooks, and the things called eLearning are passive electronic versions of more of the same. Those of us that teach must provide goal oriented and engaging tools. (Rahn, 2009) suggests that the importance of engagement in education is a function of the simulation and educational environment. He suggests engagement is evident when there is a competitive team spirit, discussion and debate within the team. Moreover, engagement is strengthened when students are presented with focused goals, challenging tasks, an authentic and compelling story, a degree of novelty, and a variety of interesting characters and roles. Students in simulation enhanced courses have identified goal setting, information processing, organization and interpersonal skills, sales forecasting, entrepreneurial skills, financial analysis, economic conceptualization, inventory management, mathematical modeling, hiring, training, motivation, enhanced creativity, communication skills, data analysis, strategic planning plus others as part of the learning experience (Wellington & Faria, 2006). A teacher can gamify his or her course – can a curriculum be gamified? That would be exciting! That would produce a distinctive competence and competitive advantage.

To Employers: Gamify your work! In a recent survey, 55% of people would like to work for an organization that uses gaming as a productivity tool. (Kapp, 2012) Our primary economic issue is not unemployment. Consider the minor effects resulting from a very expansionary fiscal and monetary policy the past few years. Our problem is underemployment. Many of your workers are not being challenged and engaged to produce the level of work they want to, and you want them to. Notice the clever use of the term "level". Is it possible in your company for your

employees to "level up"? Gamification is also strongly linked to creativity and innovation. You say this is what you want in survey after survey. (Brown, 2009)

To Students: Gamify your education! Have fun! Play hard! Learn much! Win!

REFERENCES

- Brown, S. L., & Vaughan, C. C. (2009). *Play: how it shapes the brain, opens the imagination, and invigorates the soul*. New York: Avery.
- Boller, S. (2012) Game Based Learning - Why Does it Work? *A Learning Brief*. Retrieved November 12, 2012, from <http://www.bottomlineperformance.com/gamebasedlearning/>
- Csikszentmihalyi, M. (1990). *Flow: the psychology of optimal experience*. New York: Harper & Row.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From Game Design Elements to Gamefulness: Defining Gamification. *MindTrek, Sept 28-30*, 8.
- Gutierrez, K. (2012). The 5 Decisive Components of Outstanding Learning Games. *SHIFT eLearning Blog*. Retrieved November 12, 2012, from <http://info.shiftelearning.com/blog/bid/234495/The-5-Decisive-Components-of-Outstanding-Learning-Games>
- Juul, J. (2001). Games Telling stories. *The International Journal of Computer Game Research* 1 (1), 1-12.
- Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. San Francisco, CA: Pfeiffer.
- Kearney, P., & Pivec, M. (2012.). Recursive Loops of Game-Based Learning: a Conceptual model. *WWW.MajaPivec.com*. Retrieved February 18, 2012, from www.majapivec.com/files/recursive%20loops%20of%20gbl.pdf
- Lee, J., & Hammer, J. (2011). Gamification in Education: What, How, Why Bother? *Academic Exchange Quarterly*, 12(2), 1-5.
- McGonigal, J. (2011). *Reality is broken: why games make us better and how they can change the world*. New York: Penguin Press.
- Mosca, I. (2012). +10! Gamification and deGamification *GA|ME. GA|ME*. Retrieved November 12, 2012, from http://www.gamejournal.it/plus10_gamification-and-degamification/
- Rackwitz, R. (2012). Why Gamification is more than just a trend | Engaginglab. *Engaginglab/Gamification*. Retrieved November 12, 2012, from <http://engaginglab.wordpress.com/2012/10/08/why-gamification-is-more-than-just-a-trend/>
- Rahn, D. (2009). Enhancing Web-Based Simulations With Game Elements For Increased Engagement. *Developments in Business Simulation and Experiential Learning*, 36, 303-311.
- Seijts, G., Latham, G., Tasa, K., & Latham, B. (2004). Goal Setting and Goal Orientation: An Integration of Two Different Yet Related Literatures. *Academy of Management Journal*, 47(2), 227-239.
- Teach, R. (1990). Designing Business Simulations. *Guide to business gaming and experiential learning* (pp. 93-

- 116). East Brunswick: Nichols/GP Pub.
- Vonn Neumann, J., & Morgenstern, O. (1944). *Theory of games and economic behavior*, 3rd ed. Princeton: Princeton University Press.
- Wellington, W., & Faria, A. J. (2006). Validating Business Simulations: Do Simulations Exhibit Natural Market Structures?. *Developments in Business Simulation and Experiential Learning, Volume, 33*, 118-123.
- Wilson, k., Bedwell, W., Lazzara, E., Salas, E., Burke, C., Estock, J., et al. (2009). Relationships between Game Attributes and Learning Outcomes. *Simulation and Gaming, 40*(2), 217-265.