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The Age of Gamification: Why the Recent Trend and Where Gamification is Heading

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TABLE OF CONTENTS

1. INTRODUCTION

1.1 Introduction to Play and Games

Before I jump into the recently coined term gamification, I think is necessary to first begin with a more formal introduction of the concepts of play and games. Johan Huizinga and Roger Caillois were the pioneers of the sociology of play and games. I will later introduce more updated concepts of play and games that are more applicable to our current technological positions. So although some of Huizinga and Caillois' theories now seem somewhat outdated, their works are the foundations of the study of play and are essential to considering gamification.

Huizinga's formal definition of play is "a voluntary activity or occupation executed within certain fixed limits of time and place, according to rules freely accepted but absolutely binding, having its aim in itself and accompanied by a feeling of tension, joy and the consciousness that is 'different' from 'ordinary life'" (Huizinga, 28).

To elaborate on this definition of play, consider the requirement that play be voluntary. "Child and animal play because they enjoy playing, and therein precisely lies their freedom… It is never imposed by physical necessity or moral duty. It is never a task. It is done at leisure, during 'free time'" (Huizinga, 8). The second distinction of play is that it is not "ordinary" or "real" life (Huizinga, 8). Therefore, play is a means of entering an impermanent world of new rules—distinct from real life. The third quality of play is that it is performed within constraints of specific times and places (Huizinga, 9). Together these qualities distinguish what is play, without which any action could technically be listed as play. So where does this leave games? Caillois expanded upon Huizinga's forms of play to then draw the connection between play and games.

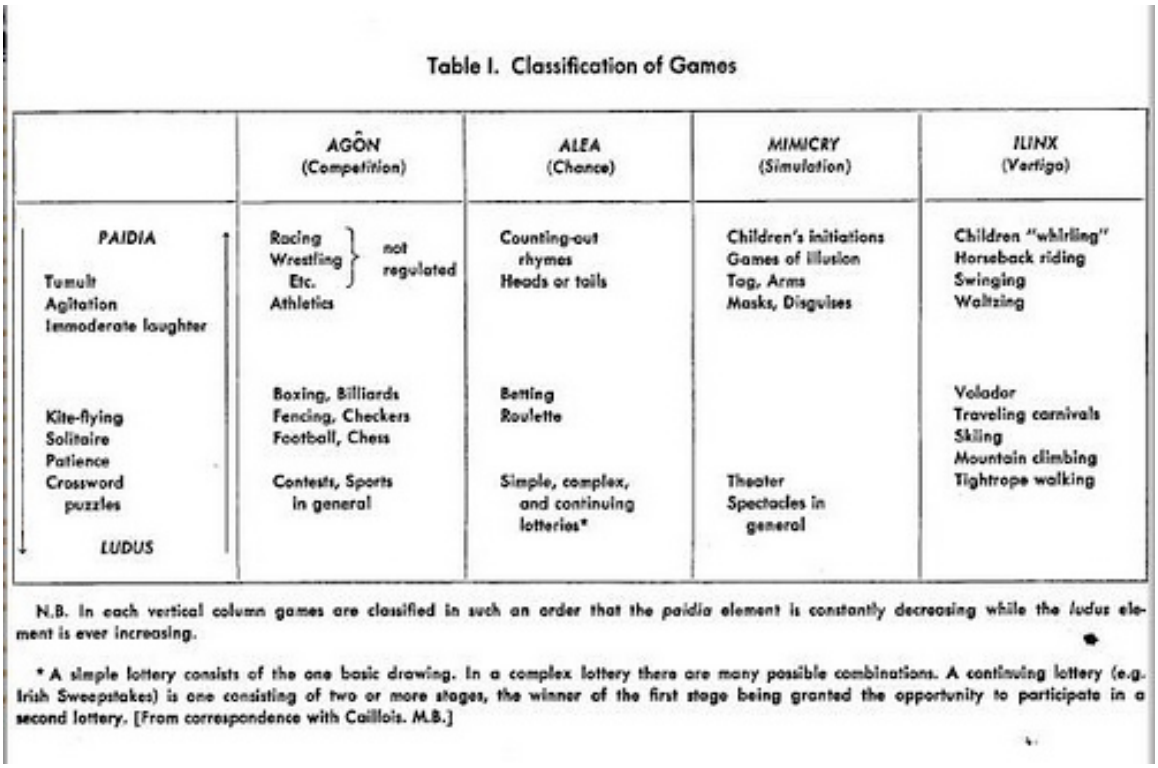


Table I. Classification of Games

	AGÔN (Competition)	ALEA (Chance)	MIMICRY (Simulation)	ILINX (Vertigo)
PAIDIA Tumult Agitation Immoderate laughter	Racing, Wrestling, Etc. } not regulated Athletics	Counting-out rhymes Heads or tails	Children's initiations Games of illusion Tag, Arms Masks, Disguises	Children "whirling" Horseback riding Swinging Waltzing
Kite-flying Solitaire Patience Crossword puzzles	Boxing, Billiards Fencing, Checkers Football, Chess	Betting Roulette		Volador Traveling carnivals Skiing Mountain climbing Tightrope walking
LUDUS	Contests, Sports in general	Simple, complex, and continuing lotteries*	Theater Spectacles in general	

N.B. In each vertical column games are classified in such an order that the *paidia* element is constantly decreasing while the *ludus* element is ever increasing.

* A simple lottery consists of the one basic drawing. In a complex lottery there are many possible combinations. A continuing lottery (e.g. Irish Sweepstakes) is one consisting of two or more stages, the winner of the first stage being granted the opportunity to participate in a second lottery. [From correspondence with Caillois. M.B.]

(Caillois, 36).

In the figure above Caillois names the play-forms including: Agon (competition), Alea (chance), Mimicry (simulation), and Ilinx (vertigo). Also in this figure is the gradation of the terms *ludus* and *paidia*. Basically ludus represents play that is based on rules and paidia the play that is spontaneous and improvised. Caillois portrayed play in a spectrum to show how play can actually be any combination of the forms above.

> If the principles of play in effect correspond to powerful instincts (competition, chance, simulation, vertigo), it is readily understood that they can be positively and creatively gratified only under ideal and circumscribed conditions, which in every case prevail in the rules of play. Left to themselves, destructive and frantic as are all instincts, these basic impulses can hardly lead to any but disastrous consequences. Games discipline instincts and institutionalize them. (Caillois, 55)

In effect games are the way to control play and keep play from escalading out of control. So it is important in game design to understand motivations of play and how to best tap into the instincts of play. These definitions will be subject to further consideration, but these thinkers of the mid

20th century set the stage for a world of gamification that was not technologically viable in their times.

Many studies of play have focused on pointing to certain biological reasoning for play, but Huizinga faced this thought-provoking notion of play in terms of sociology and culture. He approached this complex idea of play and suggested that "play is a function of the living, but is not susceptible of exact definition either logically, biologically, or aesthetically. The play-concept must always remain distinct from all the other forms of thought in which we express the structure of mental and social life" (Huizinga, 7). Play was considered to be the direct opposite of seriousness (Huizinga, 5), but with the ubiquitous nature of play, it seems difficult to sever the relations of play and seriousness. "We find play present everywhere as a well-defined quality of action which is different from 'ordinary' life" (Huizinga, 4). Yet this distinction has since been blurred, and I would argue that the differences between them are gradually disappearing. Now, more than ever, the line between *work* and *play*, *labor* and *leisure*, is dissolving right under our feet.

1.2 What has changed to call for a reconsideration of the old definition of play?

"A game is time-bound, we said; it has no contact with any reality outside itself, and its performance is its own end. Further, it is sustained by the consciousness of being a pleasurable, even mirthful, relaxation from the strains of ordinary life" (Huizinga, 203). To this Roger Caillois added a couple more conditions of play; according to Caillois, play has to be governed by rules and the players need to be aware that the play is separate from reality (Caillois, 10). One condition of play that was stated by both Huizinga and Caillois was that it was to be "unproductive: creating neither goods, nor new elements of any kind; and, except for the

exchange of property among the players, ending in a situation identical to that prevailing at the beginning of the game" (Caillois, 10). However this quality of play was built at a time without our current technological tools. Thus the foundation of play, as provided by Huizinga and Caillois, can now be used as a stepping point to describe how technology has affected the concepts and rules of play. Today we live in a digital age where we can create goods that are intangible, and we understand that labor can produce these immaterial goods.

> Immaterial labor is, according to theorists who devised the term, work that creates "immaterial products" such as "knowledge, information, communication, a relationship or an emotional response"…Immaterial labor involves the less-tangible symbolic and social dimensions of commodities. (Dyer-Witheford & de Peuterm, 4)

Therefore in light of constantly evolving technologies, definitions of games and play need to remain malleable to adapt to these technological changes. With respect to the production of immaterial goods, it would appear that games and play could be productive in generating and exchanging knowledge and information. Although some forms of these immaterial goods (knowledge and information) did exist before the current digital age, technology has since made it easier to produce and share these goods. In addition Huizinga said, "there is now [1949] a sporting side to almost every triumph of commerce or technology: the highest turnover, the biggest tonnage, the fastest crossing, the greatest altitude, etc" (Huizinga, 200). Over fifty years after Huizinga made these claims, we are seeing this same phenomenon. With our current economic issues and environmental pressures, there is competition to develop the most efficient, least damaging, longest lasting solutions. Essentially both then (1949) and now we have seen businesses and the processes of production becoming a form of play and vice versa. Our world becomes a game played with profit and maximized efficiency with minimized costs. So it is not a stretch to wonder if the rules of games can be harnessed in a way that help our world "win" at these games. In essence, "our world" can be viewed as a collection of players that can

participate in a variety of games. More recently Jesper Juul, in the field of game studies, argued that games can be defined as having some degree of rules, variables (quantifiable outcomes), value assigned to possible outcomes, player effort, player attachment to outcome, and negotiable consequences—predetermined results based on the outcomes (Dovey & Kennedy, 26). If we approach games with Juul's definition and acknowledge its fluidity, we can view games as more than just juvenile play and use aspects of games to attempt to improve lives and solve problems.

1.3 Enter the Age of Gamification

In our digital world of smart phones and the Internet, games as we know them are continuously evolving to exploit new technologies. I am not making the claim that these games are exploiting technology in a purely beneficial or detrimental way; I am merely laying the bricks for how games have changed. As Huizinga mentioned, play and culture have always been connected; and because play even precedes human societies (Huizinga, 1), it is understandable that it is an activity that should be further explored. This is what gamification does—it is a process that connects games to other aspects of human life. Gabe Zichermann and Christopher Cunningham are the authors of Gamification by Design, and they define gamification as: "the process of game-thinking and game mechanics to engage users and solve problems" (Zimmerman & Cunningham, xiv). In this paper I will use various forms of the word "gamification" with reference to this definition such as: gamify (verb form of the noun) or gamified (past tense of the verb). The power of the term "gamification" lies in its versatility because it has taken on this name in a time where mobile devices and the Internet are a big part of everyday life. In the last year over $100 million was invested in gamification-driven start-ups, and it is estimated that this number will grow to $2.8 billion by 2016 (M2 Research, 2011).

Interestingly enough, we are experiencing a globalization of gamification and games through budding technologies, despite the fact that gamification is not a brand new concept. Whether it is buying McDonald's fries to get a chance to collect Monopoly properties and win money or offering prizes to students for selling a quota of magazines, gamification has existed prior to its formal emergence in 2008 (CHI, 2011). Yet, unlike these forms of gamification, the recent boom has been in digitized forms such as websites, downloadable software, or mobile applications. It is becoming cheaper and more accessible to access the Internet and computers; for this reason, I am primarily concerned with gamification in spreading digital mediums. Moreover, it is becoming increasingly easier to circulate information through computers and other technologies. The areas of gamification that I will focus on in this paper will be the fields outside of marketing and consumerism. Instead I will explore a few of the emerging fields that are adopting gamification techniques and where this will take us.

Huizinga argued that typically higher forms of play are "a contest *for* something or a representation *of* something" (Huizinga, 13). The addition to this is that the contests for *something* can be more than just the glory of winning, and representations of *something* can extend further than just make believe in the game. Gamification can tap into these forms of play to make contests for scientific information or knowledge for a student; the representations of play can even create support systems for patients in a hospital. In any case, this explosion of gamification has the ability to affect several aspects of society and is swiftly making appearances in areas that were previously thought to be off limits to games. For instance, science is generally considered an objective study, so Huizinga thought that there would be no room for play in this field. According to Huizinga, "it is legitimate to enquire whether a science is not liable to indulge in play within the closed precincts of its own method" (Huizinga, 203). Because science

and games both have rules, it would seem plausible for science and play to coexist so long as the rules of science were held true in the rules of games. Huizinga, however, stated that rules of science are different from rules of games because the rules of science are unchallengeable. To this I would argue that both the rules of games and the rules of science could be subject to critical scrutiny and change. Caillois made the point that games are corrupted when the rules of play mingle with the rules of daily life. "They [games] will have to take quite different, and on occasion doubtlessly unexpected, forms" (Caillois, 44). This foresight of the changing forms of games turns out to be a very accurate way to compensate for the blurring of the line between games and daily life. Correspondingly, Guy Debord, of the mid twentieth century, acknowledged similar phenomenon while he was part of the *Situationist International* (a European revolutionary group). Over fifty years ago Guy Debord troubled the borders between labor and leisure:

> Situationists consider cultural activity, from the standpoint of totality, as an experimental method for constructing daily life, which can be permanently developed with the extension of leisure and the disappearance of the division of labor (beginning with the division of artistic labor) (McDonough, 61).

In essence, this is what gamification is doing to labor and leisure now; perhaps the Situationists' prophecy of artistic labor being the first division of labor to disappear can be answered with gamification. In the first chapter of Ian Bogost's How to do Things with Videogames, Bogost questions whether videogames can be art. I would argue that videogames are indeed a form of art, especially considering the dynamic nature of both games and art. So games as art can be approached as a link between Debord's theories and what is now called gamification. Gamification is this possible avenue to control the balance of labor and leisure to induce positive change from the synthesis of games and daily life. Huizinga writes,

> By way of tentative conclusion we might say that modern science, so long as it adheres to the strict demands of accuracy and veracity, is far less liable to fall into play as we have defined it, than was the case in earlier times and right up to the Renaissance, when scientific thought and method showed unmistakable play-characteristics. (204)

But once again he did not know what technology would develop in the future; I might agree that this was true for modern science in 1949, and I would debate that science today is intertwined with the new technologies and methods that push it forward.

Precisely because gamification has the ability to adopt features of games, it is able to access and utilize humans' everlasting connection to play. "Play casts a spell over us; it is 'enchanting', 'captivating'" (Huizinga, 10). What Huizinga has said about play has carried over through several other works about play, culture, and games. "What is most important—in all these doings they plainly experience tremendous fun and enjoyment" (Huizinga, 1). This can help explain the possibilities and limits of gamification. For gamification to be successful, the game always has to be fun and tie into intrinsic motivation (Sampanthar, 2011). If an activity is not something that is enjoyable for people or they do not *feel* intrinsically motivated to do it, then gamification is not a magical tool that can make activities engaging. It is important to make this distinction, because for gamification to be successful and sustainable, it needs to affect users' behaviors. "Certain play-forms may be used consciously or unconsciously to cover up some social or political design. In this case we are not dealing with the eternal play-element that has been the theme of this book, but with false play" (Huizinga, 205). Interestingly enough, this statement of Huizinga's appears to be very similar to various definitions of gamification. So if play truly cannot hold a place in science as Huizinga explained, then I would assert that gamification is this "false play" because it has the ability to use specific aspects of game design in non-game contexts. In this way Huizinga may have unknowingly made a very early definition of gamification under the term "false play".

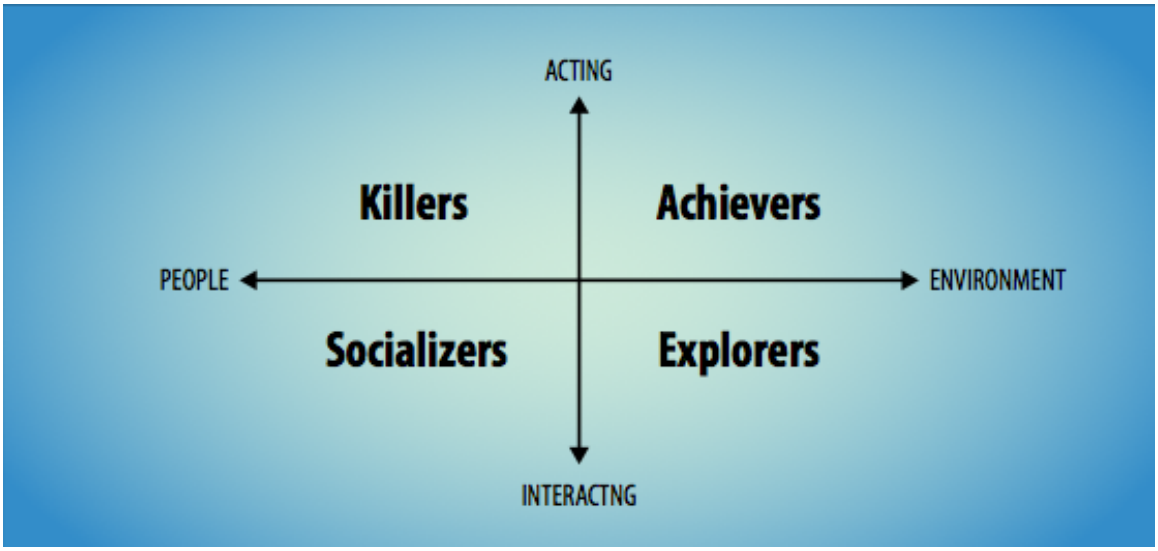
In Huizinga's time, games were limited to location, but with the advancing digital technology, games can be played across the world and opens up games as tools for reaching a vast range of people. Gamification, if used correctly, can harmonize both amusement and rewards to engage players and help solve problems.

1.4 How Gamification Works

As was mentioned earlier, it is important for games to be fun, but it is now apparent that player amusement derived from game mechanics is more important than the actual theme of the game (Zichermann & Cunningham, 3). These days there are popular games of farming, running a diner, and landing airplanes; so it is clear that themes of games are not what I would deem "fun" activities in themselves. Gamification requires that the game be fun, but this by itself is not enough to successfully gamify an activity. It is also necessary for the game carefully to provide motivations and incentives for players to keep them engaged. I think Zichermann and Cunningham do a great job of providing a hierarchy of rewards that can be incorporated in game mechanics to offer to players. This is condensed into the acronym SAPS—which stands for status, access, power, and stuff respectively (10). Of these, status is the most effective over time, and can be awarded at almost no cost to the game developers. This can come in the form of virtual or physical badges or leaderboards that everyone else in the game can see (Zichermann & Cunningham, 10-11). The same idea follows for military personnel who don badges and honors, which are deliberate displays of status. The next effective mode of rewarding players in a game is to give them exclusive access to special products or tools. Following this comes power, which gives players exclusive control over the game or other players (Zichermann & Cunningham, 12). The last type of reward is stuff, which encompasses free items that are given to the player.

Though this form of reward is not sustainable for keeping players engaged because it is just giving the player a free item (Zichermann & Cunningham, 12). Thus, the rewards that are given to players have to be carefully catered for each activity that is gamified. In the end, successful gamification will need continual engagement, whether that is done by bestowing status on players or giving them free things. Principally, finding and allocating the right reward at the right time is the key to effectual gamification and keeping players engaged (Wong, 2011). In fact, some studies suggest that monetary rewards can actually stifle productivity; rewards can often narrow focus and restrict possibility. So unless the activity is easy enough that the goal has a clear set of rules with one solution, offering monetary rewards for a task does not always result in an efficient solution. In a 2005 study at MIT challenged students with tasks to test how they would perform when offered a small, medium, and large monetary reward. Ariely et al. found that: "As long as the task involved only mechanical skill, bonuses worked as they would be expected: the higher the pay, the better the performance. But once the task called for 'even rudimentary cognitive skill,' a larger reward 'led to poorer performance.' In eight of the nine tasks we examined across the three experiments, higher incentives led to worse performance" (Pink, 2009). For the most part status can be a wonderful reward because a monetary value cannot be placed on it, and it is virtually costless for the game developer to pass on. "That truism underlies the basic lesson of games in the real world: no matter what the player thinks, the house will always win a well-designed game. Just as any honest casino manager will tell you, while the illusion of winning is vital to motivating use and play, actually winning is much harder than it seems" (Zichermann & Cunningham, 13). Understanding that games might only offer an illusion of winning, one might wonder why people would play games in the first place. We are entering a different world than the one Huizinga and Caillois experienced; technology has

developed such that cleverly designed themes of points, badges, levels, achievements, and in-game social interaction have affected how and what we play. Moreover these designs specifically target certain players by first assessing whom the players of the game might be and why they might play the game. Unlike the broad definitions of play that Huizinga and Caillois laid the foundation for, the play in Gamification by Design focuses on human play. Zichermann and Cunningham propose that the general motivators of play are: for mastery, to relieve stress, to have fun, and to socialize (20). Making these distinctions of motivators also suggests that there are various types of players, and gamification would not work if designers did not assess the players they sought to attract.



(Zichermann & Cunningham, 22)

The chart above is a generalized model of Richard Bartle's study of player types. Since Bartle's original study, several more detailed player types have been developed, but these broad categories can cover several players because a player can be any combination of each of these types. It should be mentioned, incidentally, that killers are not just people that play games to kill things; this category of player represents the people that require everyone else to lose in order for

them to win. All this information of player types is critical for the design of games and effectively gamifying an activity.

In the following chapters I will explore a few areas in which gamification is now being used. These include: science, health and fitness, and education. Each one of these will be studied with concentrated focus on particular case studies of gamification. By analyzing these new fields of gamification, I hope to explore the possibilities this recent craze has to offer and consider future possibilities for gamification.

2. GAMIFICATION OF SCIENCE

When thinking about traditional games, we might immediately think of the board games or popular videogames; the fields of science or health usually are not first to come to mind. Yet successful science games can harness the same design techniques as the popular games like Monopoly or Super Mario Bros. The focus of this chapter is to consider gamification in the field of science. More specifically I will be exploring this new area of gamification through a recently released game called Foldit. Incomplete protein structures are posted as puzzles for users to "interactively reshape," and the structures that players create in the game are tested to see whether the protein folding expressed in the game is an accurate efficiently folded structure (Cooper et al., 2010b). From this game, the results of it, and the studies performed on the game, we can learn to appropriately gamify other areas of science and health in a way that can be beneficial for individuals and societies.

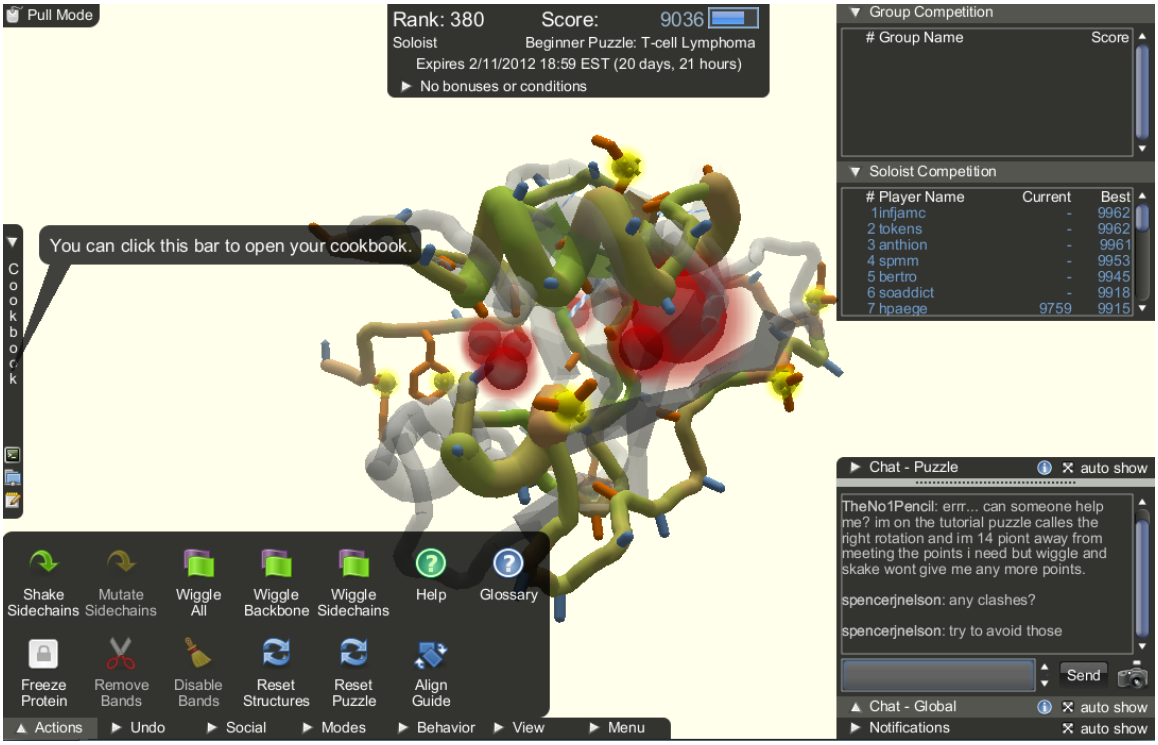
2.1 Description of Foldit and How it Works:

Fold it was developed by the Center for Game Science at the University of Washington along with the University of Washington Biochemistry department. When the biochemists at the University of Washington realized the difficulties in determining the three-dimensional structures of proteins, they teamed up with the Center for Game Science to create Foldit. "Foldit is a multiplayer online game in which players collaborate and compete to create accurate protein structure models. Foldit was created in May 2008 to allow people that are not biochemistry experts to help predict protein structures by presenting the players with forms of three-dimensional jigsaw puzzles to solve (Cooper et al., 2010a). Foldit posts new puzzles of protein structures each week, during which players compete to create the protein structures with the highest score (Cooper et al., 2011). This creates an environment that encourages continual engagement because the puzzles are routinely updated and players get a chance to compete for the high score with each new puzzle. "For specific hard problems, Foldit player solutions can in some cases out-perform state-of-the-art computational methods" (Khatib et al. PNAS, 2011).

To understand the basic nature of Foldit, the parameters of the game should be explained. When Foldit is first played, there is a tutorial through which the player learns the rules while getting a chance to use the tools that are necessary for gameplay. The first lesson the player is guided through is to avoid clashes. These occur when atoms are too close to one another, and in reality atoms can not exist too close to each other because they will be pushed apart by repulsive forces (Cooper et al., 2010a). Next, the player is introduced to the goal of filling voids. This includes closing off empty spaces to make the protein as compact as possible (Cooper et al., 2010a). The third rule is to arrange hydrophobics such that they are facing the inside of the protein structure. The reasoning for this is the fact that hydrophobics are sidechains that are

averse to facing the outside of the structure where there is water (Cooper et al., 2010a). "The fourth rule is to maintain and create hydrogen bonds, which form between particular pairs of atoms and hold the protein together" (Cooper et al., 2010a). Specific shapes represent each component of a protein and colors indicate the most information without simply presenting the protein as a labeled image, as might be found in a textbook. The game has done a wonderful job of manifesting proteins in an engaging way on a computer screen, especially considering that even small proteins "have on the order of 1,000 degrees of freedom" (Cooper et al., 2010b). Foldit has also taken aspects of games design in the graphics to make it more approachable to players. The proteins are purposefully depicted in bright colors with a cartoonish finish by default, even though there are advanced options that will allow the experienced player to customize these settings (Cooper et al., 2010a). Another important aspect of the game is the scoring system. By awarding players with points for solving puzzles and showing a live score and ranking against other players during each puzzle, it gives the player feedback on how they are doing. After all, Roger Caillois explains "the point of the game is for each player to have his superiority in a given area recognized" (Caillois, 15). Therefore the scores players receive are integral to their measures of success and accomplishment in Foldit. "For protein structure prediction, structures closer to the native structure [one with the most favorable set of chemical interactions] will have a lower energy than structures further away from it" (Cooper et al., 2010a). In a game where the solutions of the protein structures are not yet known, the scoring is also important for pointing the player in the correct direction. As was explained by one of the creators of Foldit, "to make sure that better scores will direct players toward the solution, we base scoring on the Rosetta energy function, which reports a lower energy for structures nearer

the native" (Cooper et al., 2010a). In this way, the game designers and scientists found a way to display a score that changes in real time whenever the player manipulates the protein structure.



The image above is a screenshot from a beginner puzzle of a protein structure that is already known. Interestingly enough there is also a global chat box on the bottom where players can communicate, share information, and help each other.

2.2 The Foldit Cookbook

The creators of Foldit implemented a way for users to create "recipes" of automated steps to be performed in the game. It was also taken into consideration that this could be a way for players to make patterns of their strategies and incorporate them into the social aspects of the game. "Rather than performing machine learning on gameplay traces of Foldit players, we decided that the players themselves would likely be much better at systematical abstraction of their strategies. For this reason we added the cookbook to Foldit. The cookbook allowed players

to write, share, and run recipes, which were automated versions of their strategies" (Cooper et al., 2011). In effect, this fostered a form of friendly competition in this crowdsourcing game; players are able to benefit from collaboration and positively impact science in a new way. During one study, it was found that between the 246 players of Foldit, recipes were used over 36,000 times (Cooper et al., 2011). Although that may seem like a lot of times to run a program using recipes, the previous alternative was to have a computer generate and try to compute an unlimited series of protein manipulations. Overall, the Foldit Cookbook offers a social component of the game and allows players to collaborate in a game of scientific discovery.

2.3 Successful Real-life Application of Foldit

Foldit and the community of Foldit players were put to the test in the ninth annual Critical Assurance of Techniques for Protein Structure Prediction (CASP) experiment. Each year CASP releases incomplete structures of proteins that are typically very soon to be solved (Khatib et al., 2011). The main issues that Foldit players encountered were with the already almost optimized protein structure given. In the CASP experiment, Foldit players were given protein structures with relatively low Rosetta energy functions, so the only way they could improve their scores was by making minute changes to the models (Khatib et al., 2011). It was not until after this that Foldit's claim to fame success case occurred; this prominent discovery has made a significant impact on AIDS research and development.

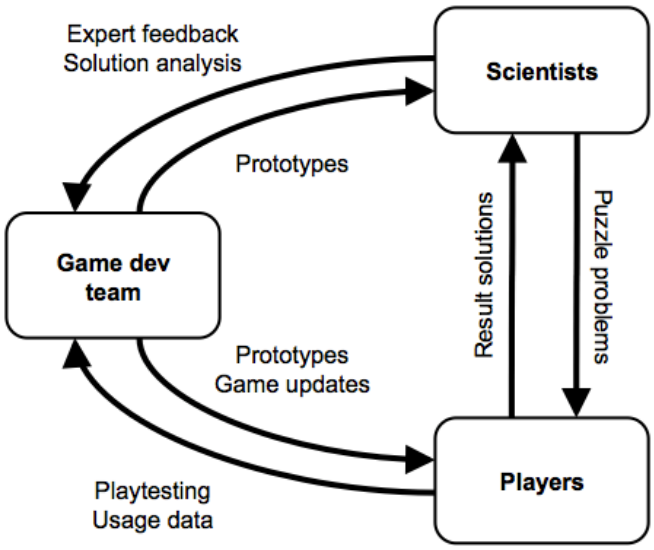
Mason-Pfizer monkey virus (M-PMV) is a retrovirus that causes simian acquired immunodeficiency syndrome (SAIDS) in rhesus monkeys (Gilski et al., 2011). Based on previous studies, it was understood that the M-PMV protease should fold into a stable shape, but the exact crystal structure of the protein was not known. When the traditional molecular

replacement techniques failed at determining the structure of the virus protein, Foldit players were essential in finding the solution (Gilski et al., 2011). The challenge of pinpointing the structure of the M-PMV protease was posed in the form of a competition for Foldit players. The players were given incomplete nuclear magnetic resonance (NMR) models, which scientists had constructed using molecular replacement (MR) techniques (Khatib et al., 2011). The goal of Foldit was to find the most efficient way to fold the protein, where efficiency was dependent upon the energy needed to do the different folding actions and how compact the protein is made. The top solutions with the lowest Rosetta energy functions (and highest scores) of the competition were confirmed using MR. This was a wonderful instance in which science has progressed through gamification. "The critical role of Foldit players in the solution of the M-PMV PR structure shows the power of online games to channel human intuition and three-dimensional pattern-matching skills to solve challenging scientific problems...this is the first instance that we are aware of in which online gamers solved a longstanding scientific problem (Khatib et al., 2011). The determination of the structure of the M-PMV protease was especially momentous because understanding the exact structure of the M-PMV protease is a necessary foundation for seeking new ways to inhibit the bonding of these proteases—which may be the key for anti-viral drugs (Gilski et al., 2011). The implications of these findings spreads even further than combating AIDS in monkeys; knowing the particular structure of other proteins can point to techniques in prevention and treatments of diseases.

2.4 Basic Foldit Game Development

Foldit went through a lot of the same development processes that most mainstream games go through. "The creation of Foldit was a challenging and multidisciplinary project, drawing

together computer science, art, game design, and biochemistry" (Cooper et al., 2010a). Even after its release, Foldit has undergone constant evolution to best meet the needs of the players and facilitate scientific discovery. In the last few years there have been several games that rely on people to recognize and label images; some of these games include the ESP game and Peekaboom (Cooper et al., 2010a). Yet Foldit is unique to these examples because it focuses on the players' abilities to solve problems to create brand new scientific results. The creators of Foldit explain the success of their scientific discovery game as the function of the interactions bewteen scientific experts, game players, and their game development team (Cooper et al., 2010a).



(Cooper et al., 2010a)

The figure above depicts the cycle of these interactions. Foldit has undergone constant evolution, and the iterative feedback loop has been employed to improve the game time and time again to produce the successful game that has produced original scientific discoveries. The experts and game development team faced the challenge of presenting a game that was not overwhelmingly complex, while still holding true to basic properties of proteins (Cooper et al., 2010a). Keeping this in mind, the main quality of the game had to be that it was engaging and

fun. So the designers took a gamified approach to satisfy the needs of a scientific discovery game. "To attract the widest possible audience for the game and encourage prolonged engagement, we designed the game so that the supported motivations and the reward structure are diverse, including short-term rewards (game score), long-term rewards (player status and rank), social praise (chats and forums), the ability to work individually or in a team, and the connection between the game and scientific outcomes" (Cooper et al., 2010b). Without these motivation and engagement techniques, the game would have struggled in gaining player interest and making as strong an impact on science.

2.5 Strengths and Limitations of Foldit

So far I have mentioned some of the strengths of Foldit, but it is also worth considering the limitations of Foldit. On one hand, the example of solving the protein of the virus that causes AIDS in Rhesus monkeys "indicate the potential for integrating videogames into the real-world scientific process: the ingenuity of game players is a formidable force that, if properly directed, can be used to solve a wide range of scientific problems" (Khatib et al., 2011). But, on the other hand, Foldit deals with technical scientific structures that can be extremely complex. An issue with having a game that illustrates and modifies intricate scientific structures is balancing the degrees of freedom of the protein components with the scientific accuracy of the structure movements; Foldit would not be as successful if the protein manipulations in the game were not valid physical movements of actual proteins. So to overcome this the creators cleverly installed a point penalty system for making modifications that are not realistic. This gave the players the freedom to experiment manipulating the parts of a protein, while teaching them which actions and scenarios are not ideal or realistic (Cooper et al., 2010a). Another limitation comes with the

recipe book system of the game. Most of the recipes made in Foldit are private (Cooper et al., 2011), so information and solutions might not be reached as efficiently as possible. These notions of private and public information relates to Robert Merton's sociology of science because Foldit faces Merton's goal of communalism. To reach this goal, players and scientists would have give up intellectual property rights and be satisfied with the pride of progressing science. "More could be done to encourage these players to share these recipes, potentially by enabling players to earn points for others using their recipes" (Cooper et al., 2011). Basically this encouragement would have to follow the fundamental ideals of gamification; based on these principles, rewarding players with status and recognition might motivate players to share and create successful recipes.

2.6 What this means for Gamification, Science, and Health

Foldit is just the start for gamification in the fields of science and health. Based on results of studies performed by Cooper et al., "scientific advancement is possible if even a small fraction of the energy that goes into playing computer games can be channeled into scientific discovery" (2010b). In this particular case, players have proven their abilities can help scientific experts discover novel protein structures. In a larger context, defining these structures is just the first step in advancing health. The ultimate results of the game of solving the structure of proteins are used to help stop certain proteins from attacking the body: "until you know exactly how they [proteins] look like, you can't target them in any way with drugs" (NPR Staff, 2011). From here, scientists can proceed to develop medicines to inhibit the proteins specific for certain diseases from bonding to other molecules. Additionally, the creators of Foldit believe that the approach taken in creating this game can now be further applied to solve other spatial reasoning problems,

thus expanding the pool of human knowledge (Cooper et al., 2010a). Foldit has proven to have successfully employed gamification techniques. Besides this, it is a perfect example of gamification inducing a positive societal change. "Exploring different avenues for looking at scientific problems can lead to new and useful opportunities for problem solving" (Cooper et al., 2010a). I would argue that this could now be extended to fields beyond science where using game mechanics can stimulate constructive and effective societal changes.

It is no coincidence that game design is directly related to learning, and this intentional connection is crucial to the design of the game (Salen, 24). "Many traditional aspects of game design apply to scientific discovery games, including the design of introductory levels to draw newcomers and explain game mechanics, the use of a client-server architecture for competition and collaboration, and the requirement that the game be fun" (Cooper et al., 2010a). By understanding Foldit and analyzing its successes and limitations, I hope to shed light on the potential for gamification in areas other than pure entertainment.

Cooper et al. mention that, "As games grow in complexity, gameplay needs to provide players with powerful means of managing this complexity" (2011). In our technocratic society games are evolving, this is paired with more advanced mediums of playing these games. Whether it is through a portable device with access to the Internet, or a three-dimensional puzzle of the Eiffel Tower, games have undergone immense changes. The products that our society produces and consumes can no longer be expressed as only guns and butter. In this case of gamified science and health of Foldit, the players are helping to produce the previously mentioned immaterial products such as knowledge and information; it is astounding that this game has the capacity to produce novel knowledge. Although Foldit is not the only instance of gamified science, it has proven to be an effective scientific tool and the approaches taken from

this game should be considered for other scientific games. Phylo is a game of multiple sequence alignment in which players attempt to align colored blocks (representing genetic traits) to allow biologists to deduce evolutionary origins of species or trace the sources of specific genetic diseases. After playing Phylo I believe that the game mechanics could be improved to better connect the user to the problems they are solving and make it ultimately more engaging. So even though the game has a scoring system, high score list, and other crucial game elements, its effectiveness will rely heavily on the engagement and amusement of the game. These approaches could also be directed towards Galaxy Zoo, which is a game of classifying images of galaxies taken by a robotic telescope. Galaxy Zoo relies on players to just observe an image and choose options to classify the image, so the game will need to further mature to make the activity something that the players want to take part in over and over. The creators of Foldit embraced this and carefully implemented game mechanics into the game: "We can take lessons from traditional game design to do this [make a fun experience by focusing on the exciting aspects of scientific problems]: rewarding players and keeping them interested are necessary for any game" (Cooper et al., 2010a). Through these examples of where gamification has been utilized in the scientific games, it is clear that some fields of science can benefit from a gamified approach. Thus it will now take the collaboration of game developers and scientists to create the means of employing the capacity of gamification to make engaging and effective games and research models.

3. GAMIFICATION OF EDUCATION

Let me start this chapter by clarifying that this is an analysis of specific educational games. The focus of this chapter is how education and learning are influenced by gamified

approaches and what can be learned from them. To me gamification of education is similar to the idea of "edutainment," which is the "marriage of education and entertainment" (Brown, 117). The main difference between edutainment and gamification is that gamification puts entertainment before education. Essentially gamification of education should ensure that learning is first and foremost entertaining. Edutainment has not had incredible success because the games are developed with the primary goal of being educational and a secondary goal of being entertaining. According to Zichermann, the moment that educational games were introduced to children, the kids could immediately recognize that the games were supposed to be educational (Zichermann, 2010). "Will children learn from a game if is not fun? Judging by the state of the educational software industry, they will not. In other words, if you start with the education and put fun second, learning doesn't seem to work the same way—or as effectively" (Zichermann & Cunningham, 4). The connection between gamification and Mary Poppins has been made several times with Mary Poppins' famous line "A spoonful of sugar helps the medicine go down." Games are the sweet sugar that could make education more palatable for students.

"For archaic man, doing and daring are power, but knowing is magical power. For him all particular knowledge is sacred knowledge—esoteric and wonder-working wisdom, because any knowing is directly related to the cosmic order itself" (Huizinga, 105). If gamification of education continues to prove itself successful, this could bring the magical power back to learning and challenge students to play the games of education in pursuit of knowledge.

3.1 Why Gamification has found its way into Education

> Never before have we, as a civilization, experienced such a large generation gap—and the reason behind it is video games. Within a span of only one generation the world's dominant form of entertainment has shifted from passive (TV, Novels, Comic Books, Theater, etc.) to interactive. (Proto Part I, 2011)

Therefore it would make sense that other aspects of daily life should also follow this interactive nature of games. Principles in neuroscience suggest that pairing play with learning can be beneficial.

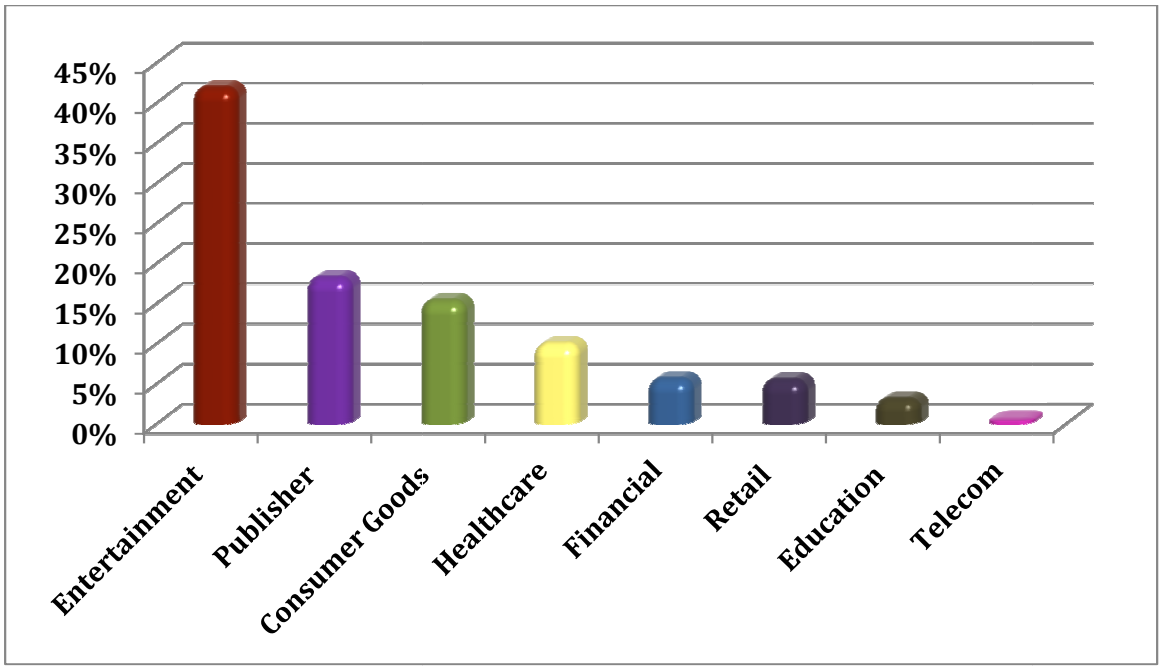
> Learning a new task produces a demonstrable increase in the brain's gray matter in mere weeks. And brain scientists the world over agree that games' challenge-achievement-reward loop promotes the production of dopamine in the brain, reinforcing our desire to play. (Zichermann & Cunningham, 4)

So by using gamification, education can tap into this reward loop when teaching students. Furthermore,

> the history of education during the last century is one of struggle. For the first time in the early part of the 1900s, we had an alternative to the old teaching style of 'Chalk and Talk' with the educational leaders (most notably John Dewey and Maria Montessori) demonstrating the power of interactive student-centered learning. (Proto Part II, 2011)

The challenge now is the implementation of interactive learning. Technology is evolving so quickly that it is easier for teachers to rely on old technologies and styles of teaching. Andrew Proto, who taught middle school for three years and is currently completing a masters of science in early childhood education, suggests that technology is not being used effectively in school because this generation of students already use advanced technologies for various forms of entertainment. He suggests that students should learn how to utilize the same technologies that they use to blog and post videos to perform research, collaborate with other students, and act as a productive learning tool (Proto Part II, 2011). From here gamification can be used to excite students in the classroom with games that are technologically structured to teach them in a way that is engaging and fun.

At the moment gamified classrooms are not pervasive, but during the last few years gamification has hit elementary as well as college classes.



(Meloni, 2011)

This bar graph shows the results of a survey of about a dozen gamification companies in 2011. It displays the breakdown of the companies' client bases by industry with Entertainment at 42%, Publishers at 18%, Consumer goods at 15%, Healthcare/wellness at 10%, Financial at 6%, Retail at 5%, Education at 3%, and Telecom at 1%. Based on this data, it is apparent that gamification companies have not had much work commissioned in the field of education. This is understandable because of how new the style of teaching is, but it would be interesting to see where education will be a few years down the line.

One reason why gamification is reaching education is that there has been a shift from work and leisure time to compulsory and optional time. Compulsory time is reserved for activities that have to be done, but during optional time people choose activities they would like to do (Zichermann, 2010). Zichermann suggests that this transformation, along with our changes in technology, is affecting what people choose to do during optional time. During optional time people are choosing activities that make them feel rewarded the most, and Zichermann explained

that reading books often does not stand a chance in being chosen as an activity to do during optional time because games are specifically designed to maximize rewards for the players (Zichermann, 2010). So even though rewards do not have to be in the form of tangible goods, this effect on optional time is changing behaviors of students and education overall. Gamification, therefore, has the potential to reengage students by incorporating education into optional time. If students choose to play games in their optional time, then it would be reasonable for educators and parents to want them to learn at the same time. Skeptics of gamification might point at the idea that students would just choose "mindless" games over educational ones, so this reemphasizes the importance of game design. In the past educational games have been developed mostly from the involvement of parents and teachers (Zichermann, 2010). So games need to be designed more cleverly to be enjoyable for students in the first place. In a Google Tech Talk Zichermann exclaimed that "Where in the World is Carmen Sandiego?" was the last successful educational game. And since then educational games have not fruitfully stimulated children in the same way because the children could tell that the games put education first and fun second (Zichermann, 2010). Because of this, it is thought that gamification can provide the "illusion of winning" that games can create because it captivates students such that they feel as though the game is fun, which it is the main motivator of playing.

3.2 Gamification in Primary and Higher Education Systems

Gamification has had some difficulty in proving itself in the field of education, especially elementary and lower level schools because of the standardization of lessons and classes. "Our current educational climate focuses on high-stakes testing and national standards; gamification may not be seen as fitting into the traditional mold and preparing our students for these tests. To

best gain administrative and parental buy-in, the focus must remain on the core curriculum standards" (Proto Part I, 2011). Thus in order for gamification to succeed in the field of education, it needs more positive cases to demonstrate that it is a reliable method of teaching children.

Ananth Pai is a 3rd grade teacher at Parkview/Centerpoint Elementary School in White Bear Lake, Minnesota. Mr. Pai realized that as one teacher with twenty students he could not efficiently reach all the children with their individuals needs. So two years ago he looked into technology to help him facilitate and guide learning among all the children. In a mere four and a half months after incorporating gamification and digital assisted learning, his class went from being below average 3rd grade level in the fields of math and reading to a mid-range 4th grade level (Pai, 2011). Not only has he caught the attention of several parents and teachers, but the founder of Best Buy's Geek Squad personally made a trip to Mr. Pai's class to witness his gamified techniques. Using fun games that allow students to compete and learn math and reading skills, Mr. Pai has created a passion among his students for learning. When the founder of Geek Squad came into the class and asked what the children's' favorite things to do on the computer were, they excitedly shouted out the various educational games that Mr. Pai had been using to teach them (Pai, 2011). It appeared that a math game called "Flower Power" was very popular among the children; the description of the game is as follows: "Position flower buds to order decimals, fractions and percentages and create beautiful plants that you can either pollinate for more exotic seeds or harvest for cash" ("Flower Power"). A key to Mr. Pai's success in teaching his children can be attributed to the way they are engaged.

(Zichermann & Cunningham, 68)

The figure above is a social engagement loop that depicts how gamification can make an activity continually engaging. This is not specific to education per se, but games produced for education should follow a similar system to ensure that educators can persistently captivate students with games that are enjoyable. The re-engagement portion of this cycle is crucial to students returning to educational games because they are rewarding; this is necessary for sustaining a rewarding educational experience in children. For these primary school classes, "as long as lessons are properly planned to meet the core curriculum, gamification can be a great tool to help

our students stay engaged and meet these objectives by allowing teachers to creatively differentiate their lesson structure" (Proto Part I, 2011).

Not only has gamification been used in elementary schools for teaching young children, but professors of colleges and universities have also used gamified techniques. "Lee Sheldon, co-director of the game design program at Rensselaer Polytechnic Institute, starts each semester by telling his class the same the thing: 'Congratulations, you have an F.' While the students wrap their heads around their predicament, he quickly adds, 'But you can level up'" (Shapiro, 2011). By having his students gain points and skill levels from completing quests and challenges (e.g. taking tests and making presentations), Professor Sheldon has had tremendous success. The average grade of his class has moved up a full letter grade, and he has almost perfect attendance each class.

So far I have only explained specific gamified classrooms, but these instances are not completely accepted by overarching school systems. Next I will explore a case in which the whole school is devoted to using gamification to foster education.

3.3 A School of Gamified Education: Quest 2 Learn

Quest To Learn (Q2L) is a public school in New York City that opened in 2009. Q2L aims to equip its students with the ability to engage with the technologies of today's digital lifestyle. Similar to the way that Foldit was built upon a feedback loop between game designers, players, and scientists, this special school uses "on-going evaluation and feedback to create opportunities for students to plan, revise, and reflect on their own learning" (Quest to Learn). The school is structured to reach every student with various games and digital media, focusing on students learning by doing. This engagement is meant to inspire and motivate children to

learn. All this is in hopes that students will question and learn to understand the systems of the world through carefully designed lessons. Q2L has mission lab, which is "a working game design, assessment, program evaluation, and curriculum development space physically situated within the school run by the Institute of Play" (Quest to Learn). This mission lab brings a whole new dimension to gamification of education because it brings together professional game designers, curriculum developers, and teachers. Essentially, these professionals make it possible for students to explore education like a game as they attempt to understand core subjects and their relations to modern complex systems. For example, students can find optional quests in which they are challenged to learn about topics to solve a problem. One girl describes her side quest, which began when she found a mission hidden in a library book (Quest to Learn). Compared to the conventional ways of teaching, Q2L uses technology and games to allow students to explore education. In a PBS special on digital media, it was stated that: "Probably the most important things for kids growing up today are the love of embracing change. In a world of rapid change, the need to memorize something is a 20th century skill. The need to navigate in a buzz of confusion, and to figure out how to trust the information that you find…if you can feel confident doing that, the world is yours" ("Digital Media", 2011). These skills are exactly what Quest to Learn attempts to provide its students with to be successful in our dynamic world.

3.4 Possible issues with Gamified Education

As was mentioned earlier, gamification has not readily been accepted by all schools, parents, and administrations. "Like the adoption of videogames by the military as training and recruiting devices, the emergence of videogames in American classrooms represents a major

institutional appropriation of new media and has raised considerable controversy. Many regard edutainment as an aberration or a contradiction in terms" (Brown, 119). According to this idea, work should not be play, and play should not be work. At the same time, in other industries this blending of work and play is inevitable, so it should come as no surprise that education would experience this convergence. It seems as though the controversy is similar to the reaction people have of any new technology. Gamification is a new and foreign technology to many people, despite the fact that it has existed long before the term was coined. Perhaps in the near future mission labs, like those at Q2L, will exist in more locations where gamification is already suggested as a tool for education. "They [curriculum designers] believe that games are the best means of getting the attention of young people. As a medium, however, games do not support institutionalized learning, which Papert [an educational technology researcher at MIT] regards as passive, abstracted, and unnaturally fragmented into separate disciplines" (Brown, 119). The argument here, which has been made by more people than just Papert, is that games allow students to control the process of learning; this takes away power from teachers, who usually determine the process of learning for students. Mainly, gamification of education is still relatively new, so people remain uneasy and skeptical of games being used to teach students.

Additionally, gamifying education can ride along a fine line because the rewards and incentives of playing have to be balanced with learning to foster a genuine desire to learn among students; otherwise students may only look for the reward associated with games without learning. Unfortunately, gamification does not always come cheap, especially for classrooms full of students. Even if teachers are interested in adopting gamified lessons into their curriculum, the state funding will not necessarily be able to cover the costs for new technologies (Proto Part I, 2011). It will be interesting to see the development and progress of the Quest to

Learn school, Mr. Pai's 3rd grade classes, and Professor Sheldon's college courses; how will this change the structures of education and learning?

3.5 Conclusion

John Dewey had the famous quote of: "If we teach today's children the way we taught them yesterday's, we rob them of tomorrow." Gamification offers a new approach for education, where the peoples' passions for games are paired with curiosities of how life works. Overall I think that education should not be reduced to grades and results; the process and methods of education itself can influence the lives of students and affect their attitudes towards learning and other outlooks on life.

4. GAMIFICATION OF HEALTH AND FITNESS

More and more we are seeing video games that are directly linked to exercise and fitness. A few years ago the release of the Wii Fit featured their engaging solution to make exercising fun. With a special Wii Fit board, players engage in activities that test balance, coordination, and other skills that are gauged by the movement and shift of weight on the board. Even more recently Xbox has released the Kinect, which uses cameras and sensors to allow players to control avatars in the game by using their natural body movements. Both of these have been exciting forms of gamification in which fitness and health were considered much more than in videogames in which players simply interact with the television through a controller. To an extent, these forms of technology changed the conventional interaction of videogame and player to an engagement between game and player. This is still just the beginning; in this chapter I will introduce other initiatives and gamified forms of health and fitness that are being tested.

Because health is a serious matter, some forms of gamified health are more obvious attempts to affect a person's health than games which are played on a video game console. Even still, "all serious games have a purpose beyond entertainment that ranges from fitness and health, to training, to social change" (Cooper et al., 2010a). In general, health can be approached with games because many aspects of health can be easily sorted into: "healthy" or "unhealthy." Therefore rules of games can take advantage of these discrepancies to foster healthy decisions more than unhealthy ones.

4.1 What Gamification can do for Health and Fitness?

According to researchers at Carnegie Melon University, "the average young person today in a country with a strong gaming culture will spend 10,000 hours gaming by the age of 21" (McGonigal, 2010). Across the world, 3 billion hours were spent weekly on playing online games in 2010 (McGonigal, 2010). The sheer man hours spent on playing is astounding, so it is natural to wonder what can come of all this time spent on playing video games. "With all this play, we have turned digital games—for our computers, for our mobile phones, and for our home entertainment systems—into what is expected to be a $68 billion industry annually by the year 2012. And we are creating a massive virtual silo of cognitive effort, emotional energy, and collective attention lavished on game worlds instead of on the real world" (McGonigal, 4). Hopefully gamification can be used in a way that can refocus efforts and energy spent on games into something productive for society and reality. So one might wonder how can gamification leverage game mechanics to influence health and fitness?

Sometimes getting fit can be approached as a game. This is exactly what Weight Watchers does; in fact Weight Watchers is just a combination of diet and exercises. According

to Zichermann, the programs are all cunning works of game mechanics to make people feel they mastered the system (Zichermann, 2011). So as people in the Weight Watchers programs achieve goals, they feel as though they have mastered the program; completing these goals and achievements are analogous to finding the secret way to beating a game. Programs like this help people feel like they are earning the reward of better fitness and health, even though the dieting and exercise could be done without the program. Therefore gamification can positively affect the fields of health and fitness by motivating and rewarding users.

Games build urgent optimism, weave tight social fabrics, create blissful productivity, and produce epic meaning—together these characteristics can make super-empowered, hopeful individuals. According to McGonigal, the problem is that these individuals feel as though they can only do this in virtual worlds. Currently we are using games as an escape, but if players feel as though they can be empowered in real life, then they can apply this feeling towards problems in the real world (McGonigal, 2010). An interesting study was recently done at a company called Next Jump that faced the challenge of empowering their employees by gamifying fitness behaviors. At Next Jump they promote exercise in their fully equipped gym to improve overall health, relieve stress, and foster higher productivity (Next Jump Health). Each week the company hosts a fitness challenge in which the employees are split into teams and the team with the highest combined attendance in gym activities wins. They are awarded "healthy points," which can be used towards their corporate perks accounts (Next Jump Health). Through these fitness challenges, it was found that the employees care less about the monetary incentives involved with winning than the pride and status of winning (Kim, 2011). Thus I think Next Jump is making smart choices in taking initiatives in weekly fitness challenges. The competition component of the challenge has boosted employee health, productivity, and happiness (Kim,

2011). In effect, having scores and charts of performance recorded and accessible to employees online make for good friendly competition. This is using Zichermann's highest motivator—status, to encourage engagement in the fitness challenge. When they attend more gym activities they see the results in the online chart, which is also pressure for other individuals and teams to also compete for this status and reputation.

Other recent trends in gamified health and fitness have been the results of technological advances that have truly become integrated into our modern systems and even apparel. Nike released the Nike Plus, which added game mechanics to running. The Centers for Disease Control reported, "more than two-thirds of American adults are overweight or obese, and fewer than 20% get enough exercise. From these statistics, it's clear that physical fitness could be a lot more engaging" (Zichermann, 96). Not only does the Nike Plus track and record where a runner has travelled, it also incorporates social networking and games that make running more rewarding. There are challenges and goals that players can compete among them selves as well as against their friends. "Nike Plus is one of the most polished gamified experiences on the market today, in part because Nike has been continuously improving and tuning the game experience. As runners have continued to play Nike Plus, it has evolved from a fairly clunky iPod app into a sophisticated online social game" (Zichermann, 98). This example shows the constant effort necessary to produce a successful gamified experience. Foldit also underwent several evolutions before becoming the game it is now; gamification requires constant maintenance and feedback from users to find the best way to engage users in performing a particular task.

Another instance of the advance in the gamification of health is Health Month, Healthmonth.com. Health Month is a website that allows players to choose goals that they

would like to accomplish and the website guides players through steady progress. "A new player starts by choosing a set of self-improvement rules for the upcoming month, such as doing household chores or eating more fresh fruit. He answers detailed questions about his goal and rates how difficult he thinks it will be to achieve. Health Month uses the information to calculate the degree of difficulty and number of points to assign to each task" (Zichermann & Cunningham, 105). This sounds like a great way to gamify health because it caters to each player's goals and specific perceptions of difficulty. I think the most difficult challenge for the designers of Health Month would be the points and reward system because with player-created goals and challenges, it would be hard to standardize a reward system that continually engages players without making it too simple or difficult. Moreover, because it may be intimidating for players to start the game of becoming healthier, Health Month has incorporated a spin-wheel of random living healthier tips. This tactic incorporates the slot-machine feel to draw players into the game and the game itself engages players further. "The game weaves a complex set of scores into the game play, each one reinforcing the player's attempt to complete his monthly goals, while providing many ways to win (achieving daily goals, helping others, reducing stress, losing weight, etc.)" (Zichermann & Cunningham, 108). Currently the website has less than 50,000 players signed up, but the prospects of this gamified website seem promising because it tailors regimens for each player. Health Month is just one example where technology has set the foundation for gamification of health and fitness; the highlight of this is the exciting potential to benefit individuals' health and behaviors in their everyday lives.

4.2 An Example of Gamified Health: SuperBetter

SuperBetter is a game that was created by game designer Jane McGonigal as she was recovering from a concussion. One day, at her house, she had hit her head on an open cabinet door. "Diagnosed with a concussion, McGonigal was told that after a week she'd probably be fine. But a week went by, and the symptoms worsened. She couldn't read or answer e-mail; she was often seized by panic" (Joiner, 2011). Eventually this escaladed to a point where doctors were not sure if she would ever fully recover. So it was at this point that McGonigal made the decision: "I'm either going to kill myself, or I'm going to turn this into a game" (McGonigal, 2011). This was the birth of Supper Better; what Jane McGonigal started as a way for her to recover from a concussion, she realized could be used by other people to overcome the health challenges in their lives. When McGonigal was battling her concussion, "She began to see herself as the hero of her own story and asked her loved ones to do specific tasks to participate in her recovery: Kelly called daily to check in and gave her mini missions ('just look out your window and enjoy the view'), Monsef gave her points for walking a bit farther each day, and a friend came over weekly to make her laugh. She reframed the triggers that worsened her symptoms (visual stimulation, caffeine) as 'bad guys' she needed to vanquish and listed her 'power-ups,' the things that consistently helped, like playing with Meche [McGonigal's dog]. 'I started feeling better immediately,' she says. Aside from the occasional migraine, she's now fully recovered" (Joiner, 2011). Of course this is only one case study, so it will take more results to see if this game can truly help other people combat their health issues too. At the minimum McGonigal's success story can be inspirational and motivate others to remain positive, without giving up hope of recovery. SuperBetter offers a way to make steps towards a larger health goal with the support of other people. The approach in SuperBetter is to increase individuals'

personal resilience. In this context resilience "means staying curious, optimistic and motivated even in the face of the toughest challenges" (SuperBetter Story, 2011). Through this resilience-building adventure, players should be able to use SuperBetter as a medium to help them overcome their health struggles.

4.3 The 7 Missions of SuperBetter

Within SuperBetter there are 7 epic missions for players to complete. These include: epic win, secret identity, bad guys, power ups, quests, allies, and future boosts (McGonigal, 2011). Although the exact details of each of these missions are not yet released, each one should be customizable for each player's needs and goals. The game focuses more on performing actions in the real world, so SuperBetter manages and keeps track of progress to retain focus for players on real life goals they can strive to accomplish.

(McGonigal, 2011)

The screenshot above is the concept for how SuperBetter is arranged. Quests are combinations of goals set by the player and also by their support network of allies. It also poses feats to overcome as "bad guys" while including "power-ups" to motivate the player when needed.

4.4 Possible Issues of SuperBetter and Gamified Health

To many, Jane McGonigal's theories that games can change the world seem utopian and unrealistic. The argument that video games can produce positive results in the real world often seems farfetched. I can also imagine that games of health and fitness will develop a form of dependence; players of the games will likely feel as though they are unable to overcome these challenges without the games. When people say they lose weight using Weight Watchers, they

often phrase it as “I lost 10 pounds on Weight Watchers,” rather than claim they just dieted and exercised to lose the weight (Zichermann, 2011). Are we losing faith in humanity with gamification of health and fitness? When will people reach the epiphany of realizing they overcame their issues with their strong will and hard work? Developers of these games, if they design the games properly, will ensure that players are continuously re-engaged with the game. This may turn into a dependence on these games. Perhaps this aspect of gamification will be detrimental to society if people blindly follow them to achieve goals because in the future they might be enslaved to these games that helped them help themselves.

4.5 Conclusion

Even though gamified notions are not completely new to the fields of health and fitness, “technology enables new opportunities to facilitate this process” (CHI, 2011). In the case of Nike Plus, new shoes with sensors built-in that can wirelessly send data to a mobile phone have made new forms of gamified health and fitness possible. A recurring theme of gamified health and fitness seems to be that games can be used as conduits for players to help themselves in the real world. Whether it is by setting monthly goals or increasing personal resilience, gamification may be the solution to engage players with tools to become healthier people.

5. CONCLUSION

Whether or not you believe gamification can affect our lives outside the field of entertainment, games are becoming a large part of everyday life. According to the Entertainment Software Association, “69 percent of all heads of household play computer and video games. 97 percent of youth play computer and videogames. 40 percent of all gamers are women. One out

of four gamers are over the age of fifty. The average game player is thirty-five years old and has been playing for twelve years. Most gamers expect to continue playing games for the rest of their lives" (McGonigal, 11). With statistics like this, it is clear that video games will be in our future. Gamification holds a potential for this future to include ways to solve real problems through games, so how they are accepted and which fields they reach next will depend on how human action affects technology. It will require a continuous collaboration between game designers, experts, and the public to engage players and solve problems.

To reiterate, gamification can be defined as: "the process of game-thinking and game mechanics to engage users and solve problems" (Zichermann & Cunningham, xiv). My goal was to focus on how this was has been leveraged to make recent changes in our lives. "Games are showing us exactly what we want out of life: more satisfying work, better hope of success, stronger social connectivity, and the chance to be a part of something bigger than ourselves. With games that help us generate these four rewards every day, we have unlimited potential to raise our own quality of life. And when we play these games with friends, family, and neighbors, we can enrich the lives of people we care about" (McGonigal, 114). In each case of gamification that I explored, games are designed to improve our lives in one way or another. Foldit gamifies science to help us better understand our world and how it is built. With this understanding we can hope to advance medicine and health. Quest to Learn gamifies education to teach children how to excel in our technological society. It focuses on embracing these technologies to connect with the students and promote engagement and a desire to learn. Ultimately, "a child who is interested in the lesson being taught will be a more productive learner and be less of a discipline problem" (Proto Part I, 2011). SuperBetter positions a patient as a superhero in their own life and motivates them to accomplish health goals with the support of

their friends, family, and doctors. Each of these games implement some form of social connectivity to allow players to help each other and further connect the game to real life. McGonigal understands the importance of connections when she states: "joining any collective effort and embracing feelings of awe can help us unlock our potential to lead a meaningful life and to leave a meaningful mark on the world" (McGonigal, 113). Therefore I think that gamification has potential in almost any field, so long as it makes the activities fun and engaging; gamification equips people with the tools to live meaningful lives.

In some ways, gamification refers to basic ideas of psychology and neuroscience. "All the neurological and physiological systems that underlie happiness—our attention systems, our reward center, our motivation systems, our emotion and memory centers—are fully activated by gameplay" (McGonigal, 28). We are living in a world where technology is spreading gameplay everywhere and making it accessible to more and more people. Games are not only allowing the players win, but are also spreading achievements in the form of knowledge and motivation across the world. I think these achievements are made possible by a person's quest for success. "In many cases, the hope of success is more exciting than success itself. Success is pleasurable, but it leaves us at a loss for something interesting to do" (McGonigal, 68). For this exact reason, gamification holds the potential to bring players the hope of success. In addition to this, when a player is playing a game, the results of failure seem less dire than failure in real life. Thus, games can make players more optimistic about success and make activities more pleasurable. I believe that the cases I have presented can bring success to players and the fields they influence, but at the same time I acknowledge that these as well as other forms of gamification are just emerging. The games are constantly evolving, so we will have to wait to see the future of gamification.

Where are we heading with gamification? Are we moving towards a world where technology and games can help us solve problems and have more fun, or are we just relying on these games and using an indirect method of solving problems? Though I think that gamification of marketing and consumerism only aims to make the largest profit, I believe that gamification in other fields can harness this same energy to produce positive change and solve problems. According to McGonigal, "game design isn't just a technological craft. It's a twenty-first century way of thinking and leading. And gameplay isn't just a pastime. It's a twenty-first century way of working together to accomplish real change" (McGonigal, 13). At the very least gamification has the potential to motivate people and the ways we think, and if it proves to be successful, perhaps the world can change for the better with gamification.

I realize that the way I have portrayed gamification and the examples I have provided paint a very utopian view of gamification. Because of this, it is clear that the recent examples of gamification I have mentioned are not equally compelling or promising. Ian Bogost wrote a criticism of gamification entitled "Gamification is Bullshit." In this blog post, Bogost argues that gamification is bullshit in that it is used "to conceal, to impress or coerce" (Bogost, 2011). Basically he believes that gamification is an exploitation of games as a medium, and that gamification is just a marketing tool. Although I agree that there are several cases where gamification has been used purely for marketing purposes, I believe that Bogost is overly critical of gamification. Perhaps I should now introduce my own term to be distinguished from "gamification." I shall use "engamement" to embody the implementation of games and play to engage users without the intention of direct monetary gain. With this distinction, it might appear that examples I have listed such as SuperBetter and Quest-to-Learn are gamified, but I believe that they still have the potential to help people. Even with monetary incentives, institutions Q2L

can empower students with education and knowledge. I would also counter Bogost's extreme perceptions of gamification with Foldit. This appears to be an example of engamement, and proves that gamification is not always bullshit. Foldit has been making exciting scientific progress, without including motives for direct monetary gain. Therefore if my working term of engamement is taken into consideration, gamification can be bullshit in the Bogost's sense; engamement, however, has the potential for positive, non-monetary outcomes that can make a difference in the world. I am curious to see how gamification and engamement will affect daily life in the future, and the prospective relationship between society and these technologies. Will cases of engamement be strong enough to change behaviors? Ultimately, are gamification and engamement strong enough to be sustainable? I believe that for gamification or engamement to become and remain successful, activities will need to be built with continuous engagement and a strong rewards system. In conclusion, gamification will exist, regardless of the form it takes or alias it hides behind. So I hope that this recent trend in gamification will also result in more designs of engamement and eventually help us better understand the systems of our world.

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