Gamification in Education: What, How, Why Bother?

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Abstract
Today's schools face major problems around student motivation and engagement. Gamification, or the incorporation of game elements into non-game settings, provides an opportunity to help schools solve these difficult problems. However, if gamification is to be of use to schools, we must better understand what gamification is, how it functions, and why it might be useful. This article addresses all three questions – what, how, and why bother? – while exploring both the potential benefits and pitfalls of gamification.

Introduction
Games and game-like elements have begun to invade the real world. Gamification, defined as the use of game mechanics, dynamics, and frameworks to promote desired behaviors, has found its way into domains like marketing, politics, health and fitness, with analysts predicting that it will become a multi-billion dollar industry by 2015 (MacMillan, 2011). Some visionaries, like game designer Jesse Schell, envision a kind of *gamepocalypse*, a hypothetical future in which everything in daily life becomes gamified, from brushing one's teeth to exercise (Schell, 2010).

Thus far, gamification has most frequently been used as a clever way to promote a business or product. For instance, players can earn badges, discounts, and other rewards for visiting real-world shops and "checking-in" to the mobile phone application *FourSquare*. Games that are designed to promote positive lifestyle changes are starting to appear as well. *Chore Wars* and *EpicWin* encourage players to complete daily chores, while websites like *Google Powermeter* can encourage household reductions in energy consumption through the use of progress bars and collectible badges.

The potential of gamification, however, goes beyond promoting healthy lifestyles and marketing strategies. Gamers voluntarily invest countless hours in developing their problem-solving skills within the context of games (Gee, 2008). They recognize the value of extended practice, and develop personal qualities such as persistence, creativity, and resilience through extended play (McGonigal, 2011). Gamification attempts to harness the motivational power of games and apply it to real-world problems – such as, in our case, the motivational problems of schools. Motivation and engagement are major challenges for the American educational system (Bridgeland, Dilulio, & Morison, 2006). American schools also face a shockingly high dropout rate: approximately 1.2 million students fail to graduate from high school each year (All4Ed, 2010).

Intuition suggests that gamification may be able to motivate students to learn better and to care more about school. Making the case for gamification, however, requires more than intuition. We must clearly define what is meant by gamification, evaluate it for its benefits and drawbacks, explore current implementations and future possibilities, and better understand the theoretical rationale behind gamification. This will allow us to create effective interventions rather than guessing in the dark.

In this paper, we target these needs by answering three fundamental questions regarding the gamification of education: "what?" "how?" and "why bother?" First, we answer the "what" question by providing an overview of current uses of gamification in education. Second, we address "how" by discussing some potential areas in

which gamification techniques can provide meaningful interventions for today's schools. Finally, we consider "why bother," discussing the significance of gamification along with its benefits and risks.

What: Definitions and Uses

What do we mean by the *gamification* of education? After all, schools already have several game-like elements. Students get points for completing assignments correctly. These points translate to "badges," more commonly known as grades. Students are rewarded for desired behaviors and punished for undesirable behaviors using this common currency as a reward system. If they perform well, students "level up" at the end of every academic year.

Given these features, it would seem that school should already be the ultimate gamified experience. However, something about this environment fails to engage students. In contrast, video games and virtual worlds excel at engagement (McGonigal, 2011). As evidence of this, 28 million people harvest their crops in *Farmville* on a daily basis (Mashable, 2010), and over five million people play *World of Warcraft* for more than 40 hours per week (Blizzard, 2010). On the other hand, the default environment of school often results in undesirable outcomes such as disengagement, cheating, learned helplessness, and dropping out. Most students would not describe classroom-based activities in school as playful experiences. Clearly, the existence of game-like elements does not translate directly to engagement.

Understanding the role of gamification in education, therefore, means understanding *under what circumstances* game elements can drive learning behavior. Making use of Salen and Zimmerman's *Rules, Play, and Culture* framework (2003), we can better break down the impact of gamification. The rules of school as they stand, for example, must be understood not only in terms of their formal effects but also in terms of their emotional and social impact on school's "players." Disengagement from school happens at the social and emotional levels, problems exacerbated by the formal rules of school (Rock, 2004). Gamification can change the rules, but it can also affect students' emotional experiences, their sense of identity and their social positioning

Gamification projects offer the opportunity to experiment with rules, emotions, and social roles. Read an optional library book on the topic being taught in class? Receive "Reading" points. Get perfect attendance and complete all homework assignments on time for a month? Earn an "On Target" badge. Get assigned as a "Lead Detective" role in science class? Work hard to ask the best questions. When playing by these rules, students develop new frameworks for understanding their school-based activities. As suggested by Leblanc (2006), this can motivate students to participate more deeply and even to change their self-concept as learners.

Existing gamification projects apply these principles at vastly different scales. At one end is gamification at the *micro-scale* -- individual teachers who gamify their own class structures. For example, Lee Sheldon, professor at Rensselaer Polytechnic Institute, discarded traditional grading in favor of earning "experience points" and converted homework assignments into quests (Laster, 2010). At the other end of the scale, *Quest to Learn*, a new charter school in New York City, uses game design as its organizing framework for teaching and learning. Game designers work together with teachers to develop playful curricula and incorporate game elements into the entire school day (Corbett, 2010).

In practice, few people will ever get the opportunity to design a school from scratch. However, we believe there is an important role for gamification projects that stretch beyond single classes. We have taken a third path in defining an appropriate scope for our own work at Teachers College Columbia University, creating a 'game layer' which incorporates many different school-based activities. We conceptualize our work as a free, modular toolkit for instructors, who can fit their own instructional needs into a playful meta-game run by expert designers and educators. This meta-game, in turn, attempts to foster concrete goal-setting, clear communication, and the conscious development of student identity as learners. We are currently developing and pilot-testing our project as a customizable paper-based and online toolkit, which we hope to demonstrate is effective at supporting these learning goals.

From these examples, we can catch a glimpse of the variety of potential uses of gamification. When skillfully designed and implemented, we believe gamification can help schools do school better. In fact, this is the standard that gamification in education must live up to. It is not good enough to gamify school because it is the next fad, or because we believe students are motivated by points, or because we think badges will cause students to change their behaviors permanently. We must know what problems we are trying to fix, design systems that fix those specific problems, develop ways of evaluating whether those fixes work, and sustain those fixes over time. Gamification can only provide tools, and those tools must produce results that are worth the investment.

How: Goals and Techniques

Educational gamification proposes the use of game-like rule systems, player experiences and cultural roles to shape learners' behavior. To understand the potential of gamification, however, we must consider how these techniques can best be deployed in practice. In this section, we discuss three major areas in which gamification can serve as an intervention.

Cognitive. Games provide complex systems of rules for players to explore through active experimentation and discovery. For example, the apparently simple mobile game *Angry Birds* asks players to knock down towers by launching birds out of a slingshot. Players must experiment with the game to figure out the physical properties of different tower materials, the ballistics of the slingshot, and the structural weaknesses of each tower. They launch birds, observe the results, plan their next moves, and execute those plans. In short, players' desire to beat each level makes them small-scale experimental physicists.

More broadly stated, games guide players through the mastery process and keep them engaged with potentially difficult tasks (Koster, 2004). One critical game design technique is to deliver concrete challenges that are perfectly tailored to the player's skill level, increasing the difficulty as the player's skill expands. Specific, moderately difficult, immediate goals are motivating for learners (Locke, 1991; Bandura, 1986), and these are precisely the sort that games provide (Gee, 2008). Games also provide multiple routes to success, allowing students to choose their own sub-goals within the larger task. This, too, supports motivation and engagement (Locke & Latham, 1990).

These techniques, applied to schools, can transform student perspectives on learning. Students in schools are often told what to do without understanding the larger benefits of the work. Gamification can help students ask, "If I want to master school, what do I do next?" It gives students clear, actionable tasks and promises them immediate rewards instead of vague long-term benefits. In the best-designed games, the reward for solving a problem is a harder problem (Gee, 2008). Gamification hopes to make the same true for schools.

Emotional. Games invoke a range of powerful emotions, from curiosity to frustration to joy (Lazarro, 2004). They provide many positive emotional experiences, such as optimism and pride (McGonigal, 2011). Crucially, they also help players persist through negative emotional experiences and even transform them into positive ones.

The most dramatic example of emotional transformation in a game is around the issue of failure. Because games involve repeated experimentation, they also involve repeated failure. In fact, for many games, the only way to learn how to play the game is to fail at it repeatedly, learning something each time (Gee, 2008). Games maintain this positive relationship with failure by making feedback cycles rapid and keeping the stakes low. The former means players can keep trying until they succeed; the latter means they risk very little by doing so. In schools, on the other hand, the stakes of failure are high and the feedback cycles long. Students have few opportunities to try, and when they do, it is high stakes. Little wonder that students experience anxiety, not anticipation, when offered the chance to fail (Pope, 2003).

Gamification offers the promise of resilience in the face of failure, by reframing failure as a necessary part of learning. Gamification can shorten feedback cycles, give learners low-stakes ways to assess their own

capabilities, and create an environment in which effort, not mastery, is rewarded. Students, in turn, can learn to see failure as an opportunity, instead of becoming helpless, fearful or overwhelmed.

Social. Games allow players to try on new identities and roles, asking them to make in-game decisions from their new vantage points (Squire, 2006; Gee, 2008). In video games, players may take on the roles of gun-toting mercenaries, speedy blue hedgehogs, elven princesses, and more. Players also adopt roles that are less explicitly fictional, exploring new sides of themselves in the safe space of play. For example, a shy teenager might become a guild leader, commanding dozens of other players in epic battles against legions of enemies.

Developing a strong school-based identity helps engage students with learning in the long run (Nasir & Saxe, 2003). However, many students do not feel like they can "do school" (Pope, 2003). For these students, gamified environments can provide an opportunity to try on the unfamiliar identity of a scholar.

Gamification also allows students to publicly identify themselves as scholars through playing the game. The game can provide social credibility and recognition for academic achievements, which might otherwise remain invisible or even be denigrated by other students. Recognition can be provided by the teacher, but gamification can also allow students to reward each other with in-game currency. Such a design encourages students to reinforce the development of a school-based identity in other students as well as in themselves.

A well-designed gamification system can help players take on meaningful roles that are fruitful for learning. By making the development of a new identity playful, and by rewarding it appropriately, we can help students think differently about their potential in school and what school might mean for them.

Why Bother: Risks and Benefits

The strengths of gamification and schools can be complementary, but they are not necessarily so. There are significant ways in which gamification and schools could each make the other worse. Bringing education and game elements together could turn out like peanut butter meeting chocolate: two great tastes working together, leading to results that are especially important for developing 21st century skills. Gamification can motivate students to engage in the classroom, give teachers better tools to guide and reward students, and get students to bring their full selves to the pursuit of learning. It can show them the ways that education can be a joyful experience, and the blurring of boundaries between informal and formal learning can inspire students to learn in lifewide, lifelong, and lifedeep ways.

The challenges, however, are also significant and need to be considered. Gamification might absorb teacher resources, or teach students that they should learn only when provided with external rewards. On the other hand, playfulness requires freedom - the freedom to experiment, to fail, to explore multiple identities, to control one's own investment and experience (Klopfer, Osterweil & Salen, 2009). By making play mandatory, gamification might create rule-based experiences that feel just like school. Instead of chocolate and peanut butter, such projects are more like chocolate-covered broccoli.

In short, some gamification projects will succeed, and others will fail. Gamification is not a universal panacea. If we are to improve the odds of gamification providing value to schools, we must carefully design gamification projects that address the real challenges of schools, that focus on the areas where gamification can provide the maximum value, that are grounded in existing research, and that address the potential dangers of gamification for both games and schools. In tandem with the creation of gamification projects, we must develop meaningful assessments of whether they are achieving their aims.

As gamification spreads throughout the real world, there is little question it will also impact our schools. By leading with research-based, theory-driven gamification projects, we can work to ensure that the impact of gamification is a positive one. Gamification will be a part of students' lives for years to come. If we can harness the energy, motivation and sheer potential of their game-play and direct it toward learning, we can give students the tools to become high scorers and winners in real life.

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