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Yunjo An

University of North Texas, United States

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Yunjo An

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Abstract

Gamification has been used in a variety of settings, including business, healthcare, and education. Although there are successful gamification examples, many gamification projects fail due to poor design. Despite the importance of thoughtful design of gamification, previous research on gamification in education has not paid sufficient attention to the design aspect, focusing on whether adding one or more game elements makes any difference. Based on comprehensive literature review and synthesis of gamification design guidance from various experts in the area, the author identified eight design considerations for creating effective gamified learning experiences, including (1) meaning, (2) user-centered design, (3) challenges, personalization, and feedback, (4) choices and autonomy, (5) perils and advantages of extrinsic rewards, (6) social interaction and relatedness, (7) competition vs. cooperation, and (8) failure as an opportunity to learn. Thoughtful design is required to create effective gamified learning experiences. The novelty of using game elements in learning environments may draw students' attention, but poorly designed gamification can have negative effects on student learning and motivation. It is critical to understand that a game element that works in one condition may not work in another condition. Future research should pay more careful attention to design aspects, consider contextual factors, and contribute to developing research-based guidelines for designing effective gamified learning experiences that include both methods and situations.

Introduction

Gamification has been defined as the “process of using game thinking and mechanics to engage audiences and solve problems” (Zichermann, 2010), “the use of game design elements in non-game contexts” (Deterding, Dixon, Khaled, & Nacke, 2011, p. 1), and “the craft of deriving fun and engaging elements found typically in games and thoughtfully applying them to real-world or productive activities” (Chou, 2015, p. 8). In the education context, particularly, Kapp (2012) defined gamification as “using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems” (p. 10). Chou (2015) differentiates between explicit gamification and implicit gamification. Explicit gamification involves strategies that utilize applications that are obviously game-like (e.g., McDonald's Monopoly Game, Foldit). On the other hand, implicit gamification is a form of design that subtly employs game elements and gamification techniques into the user experience (e.g., LinkedIn's progress bar).

Gamification has been used in a variety of settings, including education, health/exercise, crowdsourcing, software development, business, marketing, and entertainment (Koivisto & Hamari, 2019). For example, Khan Academy rewards users for watching videos and solving math problems with points and badges. Domino's Pizza let customers create their own pizza with the gaming app Pizza Hero, which increased sales revenue by 30%. Nike used gamified feedback to drive over 5,000,000 users to beat their personal fitness goals every day of the year. Samsung's gamified system, Samsung Nation, resulted in a 500% increase in customer product reviews and a 66% increase in site visits. Foldit gamers have solved a 15-year AIDS virus protein problem within 10 days. There are many other successful gamification examples (Chou, 2015; McGonigal, 2011). However, many gamification projects fail due to poor design (Burke, 2014). For example, overuse of meaningless badges can lead to badge fatigue and active disengagement. Simply incorporating game mechanics such as points, badges, and leaderboards, does not make the product or experience fun and engaging.

Despite the importance of thoughtful design of gamification, previous research on gamification in education has not paid sufficient attention to the design aspect, focusing on whether adding one or more game elements makes any difference. Points, challenges, badges, and leaderboards are the most common game elements used in gamified learning environments (Majuri, Koivisto, & Hamari, 2018). Research shows mixed results regarding

the effects of those elements on student learning and motivation. Although the majority of studies reported mainly positive results (e.g., Abramovich, Schunn, & Higashi, 2013; Charles, Charles, McNeill, Ustard, & Lack, 2011; Li, Dong, Ntch, & Chasteen, 2013; Mekler, Ruhlmann, Opwis, & Uch, 2013a; Mekler, Ruhlmann, Opwis, & Uch, 2013b; O'Donovan, Gain, & Marais, 2013), some studies reported negative or mixed results (e.g., Dominguez, Saenz-de-Navarrete, de-Marcos, Fernández-Sanz, Pagés, Martínez-Herriz, 2013; Hanus & Fox, 2015). Regarding the impact of leaderboards on motivation of students, for example, research shows that leaderboards provide motivation for some students, while other students do not enjoy competing with others (Dominguez et al., 2013). A recent review of gamification research also shows that while positive research findings are frequent, a majority of the studies report somewhat mixed results (Koivisto & Hamari, 2019).

As Chou (2015) noted, gamification is so much more than PBLs (points, badges, and leaderboards) and requires sophisticated design to create an effective gamified experience. Researchers have also suggested that the effectiveness of gamification depends on the design of gamification and other contextual factors (Hamari, Koivisto, & Sarsa, 2014). It is critical to understand that a game element can have different effects depending on how it is designed and implemented. However, insufficient attention has been paid to the design of gamification. In addition, the scope of game elements used in gamification of learning is very limited (Majuri et al., 2018). This paper aims to provide practical guidelines for designing effective gamified learning experiences, which are supported by research findings and theories. Since current gamification research is mainly focused on “the blueprint” of gamification (i.e., points, badges, and leaderboards (Deterding, 2015; Hamari et al., 2014; Koivisto & Hamari, 2019), the author synthesized gamification design guidance from various gamification experts as well as research findings and implications for gamification design and identified eight design considerations. The eight design considerations, including (1) meaning, (2) user-centered design, (3) challenges, personalization, and feedback, (4) choices and autonomy, (5) perils and advantages of extrinsic rewards, (6) social interaction and relatedness, (7) competition vs. cooperation, and (8) failure as an opportunity to learn, are discussed below.

1. Meaning

Many successful games start with a narrative that provides the player with some engaging context and meaning for gameplay. However, many gamification efforts in education appear to focus on adding superficial game elements, such as points, badges, and leaderboards, without providing a meaningful context. In his video, *Meaningful Play: Getting Gamification Right*, Deterding (2011) pointed out that meaning is one of the missing ingredients in many gamification efforts and emphasized the need for making the experience or activity connected to the user in a meaningful fashion. Other gamification experts and researchers, such as Chou and McGonigal, agree that well-designed gamification provides special or epic meaning for the user (Chou, 2015; Lister, 2015; McGonigal, 2011; O'Donovan, Gain & Marais, 2013).

Chou (2015) developed a gamification framework called Octalysis, which consists of eight Core Drives. The first Core Drive of the Octalysis framework is Epic Meaning and Calling, which is the drive where people are motivated because they believe they are doing something greater than themselves and/or were chosen to take that action. In a similar vein, McGonigal (2011) noted that games are engaging because they make the player a part of something bigger and give epic meaning to their actions. Deci, Eghrari, Patrick, and Leone (1994) found that providing a meaningful rationale for an uninteresting behavior, along with supports for autonomy and relatedness, prompted its internalization and integration. The literature reveals that using an engaging narrative is one of the most effective ways to provide meaning for desired actions. Adding a narrative or story has been shown to be effective in engaging and motivating learners in gamified environments (Chou, 2015; Deterding, 2011; Erenli, 2013; Stott & Neutaedter, 2013; Villagrasa & Duran, 2013).

2. User-Centered Design

A number of research studies show that different people react to the same game element differently and that gamified learning can have different impacts on different learners. For example, Cruz, Hanus, and Fox (2015) reported diverse participant responses to badge systems ranging from indifference to extreme positivity. In their study, badges were seen as both rewards as well as assignments to complete. Abramovich et al. (2013) found that badge acquisition patterns were different across learners with different levels of prior knowledge. Dominguez et al. (2013) found that while a leaderboard served as a source of motivation for some students in their gamified course, other students did not find it fun to compete with their classmates for a rank in the

leaderboard. Koivisto and Hamari (2014) found that women valued social benefits, such as networks of friends, reciprocity between users, and social recognitions, more than men. Landers and Armstrong (2015) reported that users' prior experience and attitudes towards game-based learning influenced their motivation in participating in a gamified system. These findings suggest considering diverse characteristics and needs of learners when designing gamification for learning.

Apparently, one size does not fit all (Deterding, 2015; Nacke & Deterding, 2017; Tondello, Wehbe, Diamond, Busch, Marczewski, & Nacke, 2016). Tsay, Kofinas, and Luo (2018) argued that students do not enter a learning environment like empty vessels and that their own experience and background factors influence their perceptions of and participation in a gamified learning environment. A thorough understanding of users, including their needs, motivation, and characteristics, is a fundamental requirement for successful gamification projects (Morschheuser, Werder, Hamari, & Abe, 2017). Gamification experts, such as Burke and Kapp, suggest that gamification design should follow an iterative, user-centered design process with high degree of user involvement (Burke, 2014; Deterding, 2015; Kapp, 2012; Morschheuser et al., 2017). Educators and gamification designers should put the learner at the center of the design of gamified learning experience. Future research into the effectiveness of gamification should also take into account the role of the user, their goals, and their individual attributes (Koivisto & Hamari, 2019).

3. Challenges, Personalization, and Feedback

Challenges are what make games fun (McGonigal, 2011). For example, golf becomes fun with all the unnecessary obstacles, such as having to use strange sticks, landscape hazards, and certain distances, because the player feels accomplished once such challenges are overcome. Challenges have also been shown to be strong motivators in learning (Malone, 1981; Schlechty, 1997; White, 1959). The second core drive of the Octalysis gamification framework is Development & Accomplishment, which is the core drive where people are driven by a sense of growth and a need to accomplish a goal (Chou, 2015). Chou notes that the key to the Core Drive 2: Development & Accomplishment is to make sure people are proud of overcoming the challenges provided to them.

Well-designed gamification provides engaging and scaffolded challenges with clear goals and rules and allows learners to experience fun from mastery (Deterding, 2011). High levels of frustration or anxiety are avoided by appropriate levels of challenges and careful sequence of the progression of learning (Stott & Neustaedter, 2013). Educators and gamification designers should keep in mind that different learners with different knowledge and skill levels can view a challenge differently. A challenge that is enjoyable to some learners can be too difficult and frustrating to others. By offering multiple levels of challenges and multiple points of entry into the content, gamification can be used to provide personalized learning experience (Kapp, 2016).

Most games give you constant feedback on your actions and show you some type of progress toward the win-state (Chou, 2015; Deterding, 2013). Like games, well-designed gamification tracks individual learners' performance, provides immediate feedback, and shows learners where they are in the learning process, where they are going, and what they still have to do to accomplish their goals (Deterding, 2013; Kapp, Blair, & Mesch, 2013; Kapp, 2016). The visible status and progress can help learners take responsibility for directing their own learning (Kapp, 2016) and also help teachers provide appropriate scaffolding based on individual learners' progress.

4. Choices and Autonomy

According to McGonigal (2011), "[p]laying a game is the voluntary attempt to overcome unnecessary obstacles" (p. 22). She argues that games make us happy because they are "hard work that we choose for ourselves" (p. 28), while school work, which is mandatory and standardized, produces negative stress. Voluntary participation should be considered in gamification design. Gamification is more effective when users can choose whether or not to participate (Mollick & Rothbard, 2014). Gamification may create rule-based experiences that feel like school by making the play mandatory (Lee & Hammer, 2011).

Self-determination theory (SDT) suggests that autonomy, the freedom of choosing what challenges to undertake, is one of the three essential elements that facilitate intrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000). Well-designed gamified learning environments offer multiple routes and allow learners to take different paths to achieve learning goals and work on their challenges at their own pace (Chou, 2015; Deterding,

2013). For example, a beginner may choose to start with an easy challenge, while a more advanced learner can skip easy challenges and start with a more advanced challenge. To make gamified learning successful, it is important to provide a strong sense of autonomy and meaningful choices (Chou, 2015; Deterding, 2013; Lee & Hammer, 2011; Mollick & Rothbard, 2014).

5. Perils and Advantages of Extrinsic Rewards

Most gamification programs use points, badges, and other extrinsic rewards because it is much easier to add an extrinsic reward to a desired activity than to actually make the activity intrinsically fun and enjoyable (Chou, 2015). However, research shows that extrinsic rewards can undermine intrinsic motivation (Deci, Koestner, & Ryan, 1999; Hanus & Fox, 2015; Ryan & Deci, 2000). Hanus and Fox (2015) reported that students in their gamified class, featuring a leaderboard and badges, showed less motivation, satisfaction, and empowerment over time than those in the non-gamified class. Chou (2015) also noted that “there are many motivational traps which result from using too many extrinsic motivation techniques at the expense of intrinsic motivation” (p. 352). Educators and gamification designers should keep in mind that the overuse or misuse of extrinsic rewards might teach students that they should learn or perform desired learning behaviors only when provided with external rewards.

Extrinsic rewards are not always bad. They have some advantages. When properly used, extrinsic rewards can generate initial interest, hook users into an experience, and enhance people’s focus on completing monotonous routine tasks that don’t require creativity (Chou, 2015). According to Chou (2015), however, sticking with the extrinsic motivation techniques can cause dwindled motivation and even burnout. He notes that it is very important to quickly transition into core drives that focus on creativity, self-expression, and social dynamics, which are called Right Brain Core Drives, in order to ensure their long-term engagement. Educators and gamification designers should use extrinsic rewards more carefully and thoughtfully along with other strategies.

6. Social Interaction and Relatedness

There is no question about the importance of social interaction and collaboration skills. More and more games promote social interaction and collaboration and help build social bonds and social networks (McGonigal, 2011). Players in a massively multiplayer online game (MMOG), for example, collaborate and compete with people around the world and often form communities, in which they share their strategies and resources. McGonigal (2011) argues that games strengthen our capacity to cooperate, coordinate, and co-create, and that gamers, especially online gamers, are among the most collaborative people on earth.

Gamification design can be more effective when it properly uses the common and inevitable human desire to connect with one another. The fifth Core Drive of the Octalysis framework is Social Influence and Relatedness, which incorporates social elements that motivate and drive people (e.g., group quests, social treasures, social responses, and competition) (Chou, 2015). Chou (2015) contends that the Social Influence and Relatedness Core Drive can serve as one of the strongest and long-lasting motivations for people to become engaged when it is used properly. The relatedness is also a core component of self-determination theory (SDT), a well-known motivation theory. According to self-determination theory (SDT), social environments can facilitate intrinsic motivation by supporting our innate psychological needs. Further, the theory suggests that relatedness, the need to feel belongingness and connectedness with others, is critical for internalization (Ryan & Deci, 2000).

We are innate social animals and greatly influenced by other people and social norms. Externally motivated behaviors are often performed not because they are interesting, but because they are valued, prompted, and modeled by significant others (Ryan & Deci, 2000). Lee and Hammer (2011) suggested providing social credibility and recognition for academic achievements. Research studies show that social gamification can promote social interaction and improve learning performance (de-Marcos, Garc a-Cabot, & Garc a-López, 2017; de-Marcos, Garc a-López, & Garc a-Cabot, 2016). For example, de-Marcos et al. (2016) compared four experimental conditions, including an educational game, gamification, social networking, and social gamification, and found that while all experimental conditions had positive effects on learning performance, social gamification produced better results across all evaluation items. Educators and gamification designers should consider making gamified learning experience more social by providing opportunities to complete challenges or tasks with peers and by allowing learners to recognize or reward each other’s accomplishments.

7. Competition vs. Cooperation

McGonigal (2011) identified four defining traits of games, including a goal, rules, a feedback system, and voluntary participation, and pointed out that competition and winning are not defining traits of games. Although competition can create an adrenaline rush and a sense of urgency and make an activity fun, most people do not like to be in a constant state of competition. Workplace competition can often increase the probability of burnout, skewed performance, and low company morale (Chou, 2015). Competition can also thwart intrinsic motivation when users focus on winning rather than on the activity itself (Deci, Betley, Kahle, Abrams, & Porac, 1981). As Kapp (2016) noted, gamification design should focus on the learning aspects, not on winning. Hanus and Fox (2015) found that students' intrinsic motivation decreased in a competitive gamified learning environment. Dom nguez et al. (2013) reported that some students didn't find it fun to compete with others. These findings suggest that educators should use competition carefully when designing gamification for learning. When using competition, the goal of competition must be clearly set into the process instead of into the results, making it clear that winning or losing is very low in importance compared with learning (Cantador & Conde, 2010).

The literature suggests using cooperative rather than competitive gamification (Chou, 2015; Garcia & Tor, 2009; Kapp, 2016; Morschheuser, Hamari, & Maedche, 2019). Chou (2015) suggests using strategies which bring individual strengths together and produce effective cooperation and collaboration instead of taking the zero-sum approach. Cooperative play can help improve a positive culture and support the development of individual learners' talents and skills. Similarly, Kapp (2016) suggested using team-based, cooperative gameplay as much as possible as opposed to one-on-one competitions. Team-based games minimize the negative effect of competing directly against one another because the emphasis is on making their team better rather than defeating another individual (Garcia & Tor, 2009). Therefore, team-based gamified environments provide learners with a safe environment, in which they can feel their learning efforts are contributing to a larger purpose (Kapp, 2016). Recently, Morschheuser, Hamari, and Maedche (2019) investigated how competitive, cooperative, and inter-team competitive gamification affects motivation, user behaviors, and the willingness to recommend crowdsourcing application. The results of their study revealed that inter-team competitions led to higher enjoyment and crowdsourcing participation as well as to a higher willingness to recommend the crowdsourcing system compared to pure competitive and pure cooperative gamification. The findings suggest that inter-team competition combines the benefits of both competition and cooperation. Future gamification efforts should explore ways to increase learner motivation and performance through cooperation and inter-team competition.

8. Failure as an Opportunity to Learn

In games, failure is the primary route to learning (Deterding, 2013). Players learn how to achieve a goal through a cycle of probing a new strategy, figuring out how and why they fail, and devising a new strategy based on the lesson from the failure, and so on. Nicole Lazzaro, an expert on gameplay emotions, found that gamers spend 80 percent of their time failing and still enjoy what they are doing (McGonigal, 2011). McGonigal (2011) noted that failure keeps the fun going in many cases since the hope of success is more exciting than success itself. What makes failure fun in games is that it comes with no serious consequences (Deterding, 2013), while failure is a negative and often embarrassing experience that remains on your permanent record in traditional education settings. Mostly importantly, failure is an opportunity to learn more in game environments.

When designing gamification for learning, educators should figure out ways to create a safe environment that encourages learners to take risks and learn through failures. Well-designed 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" (Lee & Hammer, 2011, pp. 3-4).

Conclusion

Thoughtful design is required to create effective gamified learning experiences. Simply adding points, badges, and leaderboards does not make learning more engaging. The novelty of using game elements or terms in learning environments may draw students' attention, but poorly designed gamification can have negative effects on student learning and motivation. In order to design effective gamified learning experiences, educators and gamification designers should (1) provide meaning for desired learning behaviors using a narrative, story, or

other strategies, (2) put the learner at the center of the design of gamified learning, (3) consider providing personalized learning experiences using multiple levels of challenges, informative feedback, and visible progress, (4) provide a strong sense of autonomy and meaningful choices, (5) use extrinsic rewards carefully and transition into right-brain strategies that focus on creativity, self-expression, and social dynamics, (6) promote social connectedness and interaction (e.g., social recognition), (7) consider using team-based, cooperative gameplay rather than one-on-one competition and provide collaboration opportunities (e.g., group quests), and (8) create a safe environment where learners view failure as an opportunity to learn.

As noted earlier, gamification is so much more than PBLs (points, badges, and leaderboards (Chou, 2015), and it's a dynamic process rather than a static product. It is critical to understand that the effectiveness of gamification depends on the context (Hamari et al., 2014). For example, a game element that works in one condition may not work in another condition. Also, a game element can have different effects depending on how it is implemented. Therefore, such questions as "are badges effective for learning?" are not very helpful. We need to know in what conditions they work and when they do not work. Recent research attempts to investigate the effects of isolated game elements (Nacke & Deterding, 2017). It is important to understand the effects of each game element, but researchers should keep in mind that some game elements, such as points, are rarely used independently. Future research should pay more careful attention to design aspects, consider contextual factors (e.g., learners, content, environments), and contribute to developing research-based guidelines for designing effective gamified learning experiences.

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Author Information

Yunjo An

University of North Texas

United States

Contact e-mail: Yunjo.An@unt.edu
