Abstract

Gamification has become an increasingly important design paradigm for information systems, impacting both research and practice. Effective gamification requires designers to tap into intrinsic motivations by framing tasks in ways that evoke positive attitudes through challenge and friendly competition. These positive attitudes can lead to greater engagement and encourage help-seeking behavior, a key goal of developing motivated learners. The objective of this paper is to understand the conditions and types of mechanisms that encourage participants to become engaged in a task and seek help to improve. Based on the literature on the game element hierarchy and goal orientation, we propose a theoretical model to explain how different types of learners will respond to different game mechanisms. We outline the design and experiment to test our hypotheses.

Keywords: Gamification, Goal Orientation, Intrinsic Motivation, Learning

Introduction

Gamification has become increasingly important as a design paradigm for information systems, impacting both research and practice (Deterding et al. 2011b; Kankanhalli et al. 2012; Zichermann et al. 2011). Deloitte listed gamification as one of the top five disruptors for 2012 (Deloitte 2012) and Gartner predicts gamified information systems will be deployed in 50-70% of organizations within the next two years (Gartner 2011; Goasduff et al. 2011). As a generation fluent in digital technology and video games (sometimes referred to as “digital natives” (Prensky 2001)) enters the workforce, the appeal of gamification is natural for many users. The once prominent hindrance of adoption of technology is no longer in question as technology has essentially become ubiquitous (Dourish et al. 2011). Further, advances in and the wide acceptance of mobile devices, sensor technology, and social media also contribute to the ease with which a technique like gamification can be implemented relatively easily and in a variety of different contexts. Technological advances allow gamification to be implemented with increasing sophistication and ease, allowing its expansion into new domains.
While much IS innovation research focuses on how technology can affect different core processes of business (Swanson 1994), gamification is not limited to a specific core process, whether technical, administrative, or strategic. It is a technique that affects how a given process is experienced. Innovations like gamification expand our traditional view of technology from being simply a tool by which processes can be made increasingly efficient into a transformational mechanism that has become infused with everyday experience (Yoo 2010). With this understanding, gamification is implemented through the application to specific processes, and particularly those which are often considered less enjoyable or tedious. The core principle underlying gamification is fun (Kankanhalli et al. 2012), so that even mundane tasks can be experienced more enjoyably. Effective gamification requires designers to tap into this intrinsic motivation to frame tasks in ways that evoke fun and enjoyment (e.g., via challenge and friendly competition) for learning and enhancing skills. To support such efforts, theoretical foundations and empirical studies are needed to avoid and/or combat careless and indiscriminant application of gamification components.

As a nascent area, more research is needed to better understand how the creative use of game components can engage different types of users during routine or repetitive tasks. In this paper, we present the design for a study that investigates the effect of gamification on the learning process. The objective of the paper is to examine conditions and types of mechanisms that can lead to engaging experiences in achievement-oriented environments. We believe this research has far-reaching implications, including training, onboarding for new products and services, and educational settings where engaging users in the learning process can be a challenging task.

Literature Review

As a relatively new concept, gamification’s presence in the literature is still quite limited. Deterding, Dixon, Khaled, and Nacke (2011a, p.13) define gamification as “the use of design elements characteristic for games in non-game contexts.” Research continues to refine this definition, clarifying the meaning of each of the words used in this definition (Deterding et al. 2011a; Huotari et al. 2012; Werbach et al. 2012).

To understand design elements characteristic for games, Werbach and Hunter (2012) developed a game element hierarchy to conceptualize three categories of elements, which they term dynamics, mechanics, and components, in order of decreasing abstraction (see Figure 1). They use the metaphor of constructing a house to understand these different levels—at the highest level of abstraction, architects must consider the dynamics of a house, like movement flow, aesthetics, and structural engineering. In terms of gamification, they define dynamics as “the big-picture aspects of the gamified system” that include constraints, emotions, narrative, progression, and relationships. This notion of dynamics requires designers to consider what type of engagement or experience the implementation will affect, similar to what an architect must do to visualize a house and the movement within.

![Figure 1. The Game Element Hierarchy (Werbach and Hunter 2012)](attachment:figure1.png)
Just as blueprints provide a meso-level abstraction of the house, mechanics are “the basic processes that drive the action forward and generate player engagement,” including challenges, chance, competition, cooperation, turns, resource acquisition, and feedback (Werbach et al. 2012). In other words, mechanics provide structures that specify how the dynamics will actually play out. For example, the relationship dynamic might be manipulated differently depending on the mechanic of choice—with challenges, players would perceive each other as competition, whereas the formation of teams will create a collaborative relationship dynamic.

Finally, the nails and two-by-fours are necessary for the house to actually be built. Analogously, components are the “more specific forms that mechanics or dynamics can take” (Werbach et al. 2012), like avatars, badges, scoring, combat, content unlocking, gifting, or leaderboards. Empirically, our proposed study examines this most concrete component of the game element hierarchy, including on-screen scores and leaderboards, to potentially enhance attitudes toward a task. Conceptually, this paper addresses the game dynamic of progression by examining one’s ongoing motivation to learn; further, it addresses game mechanics via processes tied to challenge and competition.

Gamification and Motivation for Life-Long Learning

The context of this study is an education setting for the development of life-long learners. In business education, in particular, the objective is to create learning managers, rather than learned managers (Geddes 2009; Johnson et al. 2006). Two important indicators of successful development of lifelong learners are the motivation to continue learning and help-seeking behavior (Geddes 2009). In order for people to progress, they need to develop and maintain a positive attitude toward their tasks. Gamification is seen as a means to make tasks more enjoyable through the creation or enhancement of favorable attitudes toward a learning task by infusing the intrinsic motivation of “fun.” In turn, with more favorable attitudes toward one’s task, active and engaged learning is more likely to take place.

Motivation is one of the most fundamental concepts studied in psychology, and gamification researchers have drawn from a variety of different theories to explain the mechanisms of gamification for learning. Werbach and Hunter (2012) use self-determination theory to categorize innate human needs as competence, relatedness, and autonomy; they suggest that individuals are intrinsically motivated when a task fills at least one of these needs. Deriving an understanding of motivation from games, Malone (1981) suggests that the three main intrinsic motivations are challenge, fantasy, and curiosity. Similarly, Yee (2006) found that motivations for play boiled down to achievement, social, and immersion components. Bartle (1996) classified players based on their motivations for playing. While not mutually exclusive, achievers derive fun from reaching goals; explorers enjoy discovering the game’s world; socializers play to interact with others; and killers enjoy creating conflict. Even within a single game, different players will be engaged for different reasons. Successful designs are those which are able to recognize and balance multiple motivations.

Help-seeking behavior is another important component of successful learning in educational settings. In the education literature, help-seeking is seen as an important adaptive coping strategy that can promote mastery (Butler et al. 1995). Generally, help seeking in the literature has focused more particularly on avoiding help-seeking (Karabenick 2003; Karabenick 2004; Ryan et al. 2001). For instance, research suggests that help-seeking behaviors are often avoided because they are associated with an inability to complete a task independently, embarrassment, and/or something that should be avoided whenever possible (Karabenick et al. 2011). Such concerns are especially enhanced in the classroom setting when one’s help-seeking behaviors are visible to others. In an online game context, help-seeking behaviors are not necessarily visible to others; however, it is uncertain whether such behaviors associated with gamification (e.g., clicking on “hints” when this option is provided) would be perceived as “threatening to self-worth” (Karabenick et al. 2011).

Goal Orientation and Gamification

Ultimately, the objective of learning is to develop and demonstrate mastery of a given concept, but not all individuals approach this process the same way. In the psychology and education literature, learners are differentiated based on their goal orientations, which include learning goal, performance prove, and performance avoid (Dweck 1986; Geddes 2009; VandeWalle et al. 2001).
Learning goal-oriented individuals’ motivation is increased in the face of obstacles (Dweck 1986) and they are motivated strongly to increase competence and attain mastery (VandeWalle et al. 2001).

Performance prove-oriented learners withdraw after a negative performance (Dweck 1986) and their self-evaluations are heavily based on how they perform relative to others, particularly with those to whom the individual is close to in likeness (Franken et al. 1995; Kilduff et al. 2010).

Performance avoid-oriented individuals interpret all feedback as indicative of their own lack of ability (Dweck 1986).

Goal orientation is congruent with seminal work in social comparison theory, which suggests that humans are fundamentally motivated to evaluate their own opinions and abilities, which abilities are manifested through performance. Festinger (1954) posits that in order for individuals to form opinions about their abilities, they need a reference, whether an objective measure or a social comparator. Individuals seek performance-relevant information in order to evaluate their progress and mastery in their learning environment (Ashford et al. 1983; Geddes 2009). Although Festinger’s original hypotheses claim that when individuals have an objective reference by which to evaluate, they will not rely on social comparison, more recent research suggests that individuals’ evaluations and comparisons might be more complex.

Relating back to the game elements hierarchy described previously, we connect the intrinsic motivation of fun associated with games to maintaining a positive attitude towards learning tasks. At the most abstract level, the game dynamic of progression captures the essence of learning as a process towards mastery. Furthermore, because some learners evaluate themselves relative to others, the relationship dynamic also becomes important when considering how gamification can influence learning.

From the meso-level of the game hierarchy, we incorporate the mechanics of challenge and competition. Challenge is the “repetitive, pleasureful exercise of recently acquired skills” (Malone 1981). This captures the intrinsic motivation of achievement which is desirable in the learning context and relates back to the dynamic of progression. Various components can be used to actually frame the task and create a challenge experience. A time limit, for example, places a limitation on the duration of the challenge to make it more concrete and can incite a sense of urgency. A score component can serve as an objective indicator of how successfully the challenge was completed. One’s score is a form of feedback for individuals, allowing them to evaluate their success based on an objective measure of successful performance (e.g., percent correct or cumulative total). This fundamental game component may be especially desirable for learning goal-oriented learners.

The competition mechanic is grounded in social comparison, where individuals are motivated to achieve in order to perform better relative to other players (Franken et al. 1995). This desire to outperform others also relates to the relationship dynamic. A leaderboard component for creating a sense of competition also acts as a form of feedback for the player. Unlike the score, however, a leaderboard indicates a player’s success relative to other players rather than against an objective measure. Consequently, leaderboard components may prove particularly salient to performance prove-oriented learners.

**Attitude Toward Learning Task**

The implementation of absolute score and comparative leaderboard components serve both as feedback mechanisms, as well as potential motivation to increase learning and perform better in the future. From a game perspective, these components capture the challenge, achievement, and competitive factors that make games fun (Malone 1981; Yee 2006). However, different goal orientations may affect the way those feedback mechanisms are interpreted and internalized; similarly, players may enjoy games for different reasons (Bartle 1996). For learning goal-oriented individuals, low performance is seen as an obstacle which can lead to increased effort (Dweck 1986), similar to Bartle’s conception of achievers. They interpret and value even negative feedback as diagnostic information for correcting future errors (VandeWalle et al. 2001). Further, because they are motivated by mastery and not relative success, we hypothesize that

**Hypothesis 1a:** Learning goal-oriented learners will experience more favorable attitudes toward the task when an objective measure (i.e., absolute score) is displayed, and this effect will be stronger when prior task performance is lower.
Performance-prove oriented learners, on the other hand, more heavily evaluate their performance based on how they perform relative to others (Franken et al. 1995; Kilduff et al. 2010), similar to Bartle’s notion of killers (i.e., those for whom fun is derived from beating others). Additionally, negative performance can lead to withdrawal (Dweck 1986). Thus, we hypothesize that

Hypothesis 1b: Performance prove-oriented learners will experience more favorable attitudes toward the task when a relative measure (i.e., comparative leaderboard) is displayed, but this effect will be weaker when prior task performance is lower.

Performance-avoid oriented individuals’ self-evaluations are also more affected when comparing themselves to others, and they interpret all feedback reflexively and as indicative of a lack of ability (Dweck 1986). Thus, we hypothesize that

Hypothesis 1c: Performance avoid-oriented learners will experience less favorable attitudes toward the task when a relative measure is displayed, and this effect will be stronger when prior task performance is lower.

Help-seeking behaviors

Goal orientation also affects the way learners perceive help-seeking. Given that the objective for learning goal-oriented individuals is mastery, Dweck (1986) found that learning goal-oriented individuals do not avoid seeking help and do not perceive help-seeking as a weakness or a reflection of a lack of competence. We anticipate that

Hypothesis 2a: Learning goal-oriented learners will be more likely to seek help when an objective measure is displayed, and this effect will be stronger when prior task performance is lower.

For both performance prove and performance avoid-oriented individuals, help-seeking is seen as a reflection of incompetence (Karabenick et al. 2011). Ryan et al. (2001) find that those who lack competence are less likely to seek help, and this evaluation of competence occurs particularly for individuals who tend to evaluate themselves relative to others. As poor performance causes performance prove and performance avoid-oriented learners to experience even greater threat to self-worth, we hypothesize that

Hypothesis 2b: Performance prove-oriented learners will be less likely to seek help when a relative measure is displayed, and this effect will be stronger when prior task performance is lower, and

Hypothesis 2c: Performance avoid-oriented learners will be less likely to seek help when a relative measure is displayed, and this effect will be stronger when prior task performance is lower.

Task performance

While attitude toward the task and help-seeking behaviors are important behavioral indicators of learner progress, task performance is also important as an objective way of determining whether their performance is actually improving. Enhanced attitudes toward learning can lead one to continue performing a learning task, ultimately increasing skill level. Therefore, we anticipate that

Hypothesis 3: Attitude towards the task is positively associated with improved task performance.

Further, because help-seeking behavior is an adaptive coping strategy that promotes mastery (Butler et al. 1995), we also hypothesize that

Hypothesis 4: Help-seeking behavior is positively associated with improved task performance.
Research Design

To test our hypotheses, we will conduct a controlled laboratory experiment. A pretest questionnaire will help determine the participants’ goal orientation (learning goal, performance prove, or performance avoid). The task will require subjects to generate a list of words based on a three-letter root. For example, when prompted with “con-”, valid responses would include contact, contract, conflate, etc. Participants will be assigned to a feedback mechanic condition (see below). They will be required to complete four rounds, each with a progressively longer root. We chose this task because it is in line with the goal of this study to explore mundane tasks – it is simple, repetitive, and can be easily understood and performed by the subject. However, the task also gets progressively more difficult. As the player enters valid words within a round, and as the roots get longer between rounds, there are fewer words from which the subject can choose. This creates tension that should encourage subjects to seek help to improve their score, enabling them to “learn” how to do better at the task. To make the task more challenging, subjects will have one-minute for each round.

We further create a sense of challenge and competition around the task of word generation through a gamification feedback mechanism. The main component being manipulated is the feedback mechanic, which reflects whether the individual uses an absolute score or a relative comparison to assess their task performance. After each round, participants will be presented with one of four possible feedback conditions to which they were assigned at the start of the session: an absolute score (how many words provided out of how many possible words), a leaderboard (only reflecting how they did relative to others, with no absolute score), both (displaying how many words they provided compared to others’ scores), or neither (the control group).

Help-seeking behavior will be assessed at the end of each round. Users will be able to select whether they would like to receive a hint before starting the next round. To capture users’ motivation to continue the task, at the end of the mandatory four rounds, users will be asked if they would like to participate in another round but will be informed that this round is optional. After the final round, participants will be presented with a second questionnaire which will assess again the user’s attitude towards the learning task and their enjoyment of the experience overall. The scores for each participant will also be recorded for each round.

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1 It should be noted that “feedback mechanisms” refers to the game mechanic of feedback—in this case either the absolute score or leaderboard display. It does not refer to the traditional literature on feedback.
Conclusion

Despite its great potential, gamification is not a “one size fits all” solution. Without considering individual user characteristics, implementations of points, badges, and leaderboards are destined to be superficial, and we may miss out on leveraging gamification’s more nuanced impacts. This study proposes a theoretically-grounded experiment to test the efficacy of several alternative implementations of gamification artifacts. Specifically, we propose that embedded feedback game components can have differential effects on different types of learners. The implication for those interested in using gamification to motivate others and encourage positive behaviors is that the design must take into consideration not only what components should be used, but also the deeper mechanics and dynamics of an individual’s learning style. We anticipate that understanding users’ motivations will influence the way tasks are gamified in order to enhance intrinsic motivation. Our findings will have implications for those who design software-based tasks that can be mundane, such as new user training, user account configuration, or even instances of data entry. If users can be properly motivated through gamified mechanisms to seek help on their own, they will ultimately learn how to perform the task better, become less dependent on costly support, and more closely engaged with the product or service.

References