How to Engage Users through Gamification: The Prevalent Effects of Playing and Mastering over Competing

Completed Research Paper

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Abstract

Over recent years, gamification has been a frequent strategy to increase user engagement. Gamification of systems is usually associated with incorporating mechanisms for attributing points and badges to guide users' behaviors. However, since the dawn of the digital game industry in the 1980's, Malone's work has shown that the desire to play and master a game are important motivations to engage users. This paper aims to analyze the most engaging factors for gamers in the current context of technology. Using a sample of 717 users whose game preferences were classified into eight categories, representing different emphasis on playing, mastering, and competing, results show that competing is the least important factor to motivate engagement. As a consequence, we question the relevance of some of the most used gamification strategies like attributing points, badges, and reputation to participants. Additionally, we offer some suggestions for development of gamification of systems.

Keywords: Gamification, Engagement, Adoption

Introduction

By the early eighties, Malone (1980; 1984) sought to answer the question of why computer games are so captivating, and how the features that make computer games captivating can be used to make other interfaces equally interesting and fun. Since then, taking advantage of technology development, games have gone through a variety of interactive interfaces. More recently, the subject of games has regained momentum, as gamification has become a frequent practice for designing non-game information systems (Hsu et al. 2013; Li et al. 2014).

The term gamification was introduced after the significant growth in the digital game industry to describe the use of elements of digital game design in a different context from that of play (Deterding et al. 2011). This definition also grew out of the context of information systems, to become used in other situations such as in the workplace, assuming that if digital games are able to entice users to have high levels of engagement, then it is possible that their design elements might also be able to make other products and services more engaging (Oprescu et al. 2014; Simoes et al. 2013).

Gamified applications are not games, per se, but systems that use elements of game design to achieve a specific goal (Crowley et al. 2012; Deterding et al. 2011). For example, gamification in education has nothing to do with students learning by playing a specific game, but learning as if they were playing a game (Simoes et al. 2013). When using gamification, most developers suggest modeling the reward and reputation system of gamified applications with incentive-based designs – mostly virtual (Deterding et al. 2011). This approach stems from the fact that a key part of game design is to address the issue of competition (Liu et al. 2013). For many researchers, the primary mechanism of gamification involves the use of badges as rewards for predefined favorable behaviors (Deterding et al. 2011; Hsu et al. 2013). Reward systems and leader boards, commonly used to enable players to compare with peers and set levels of their own performance, are easily implemented at low cost and are the primary mechanisms used in gamification today (Hamari 2013).

Studies have shown, however, conflicting results about the effectiveness of gamification. In a study on gamification in learning, the use of reward tools was found insufficient to ensure student participation throughout the course, as the students saw no fun in competing with their classmates for a ranking of leaders (Domínguez et al. 2013). Similarly, many users chose not to share personal photos in a gamified geo-tagged service, leading to concerns about whether the rewards were actually incentivizing the desired behaviors (Montola et al. 2009). Likewise, the mere implementation of badge mechanisms did not lead to significant increase in usage activity in the utilitarian peer-to-peer trading services studied and few users showed any interest in the badge rankings of others (Hamari 2013). Again, research results showed that gamification plays only a secondary role in motivating users in relation to the main functions of the systems (Liu et al. 2011).

Gamification critics argue that there are more effective ways of engaging users than the extrinsically motivated scoring system. Options include leaving the user free to explore possibilities not related to the specific objective of performing better, gaining badges, or improving their position in the leader board. Two fundamental problems of employing gamification artifacts are the predominant focus on competition and the undervaluation of the effect of play on individual motivation. Thus, some academics and developers criticize the excessive focus on goal-oriented features, with little incentive for users to also develop a self no-goal orientation (Deterding et al. 2011).

The objective of this paper is to analyze the relative effects on engagement of competitive (against oneself and others) and narrative or exploratory, freely open aspects of current games. We believe that driving our attention back to the origins of gamification, by attentively looking at the current game mechanisms, we can better analyze the richer set of engagement strategies of modern games that may have been overlooked by gamification of systems design in general and provide a contribution through contextual generalization (Tsang and Williams 2012). To fulfill the proposed objective, we explore how engagement is associated with a variety of types of contemporary digital games. On one end we have First Person Shooter (FPS) -- a strongly self-oriented type of game and on the other end are more creative, exploratory designs as in Multiplayer Online Battle Arena (MOBA) -- a group-oriented strategy game -- and strategy games in general. We identify seven categories of games and compare the effects of intrinsic and extrinsic motivations to identify which is considered more individually engaging – both across the game types and within them.

Literature Review

The study of games is not new. In 1949, Huizinga defined the concept of play and classified ways in which the activity can be observed in many different areas of human activity (Henricks 2010). Afterwards, some important contributions in clarifying the concept were made, mainly by Caillois, first published in 1958 and translated to English in 1961 (Caillois 2001).

Although Huizinga and Caillois are not too far apart conceptually (Henricks 2010), Caillois (2001) proposes a framework defining game as an activity with two dimensions, involving both regulation and creativity. Using these two dimensions, he divides the games into four categories: agôn (competitive games), alea (chance games), mimicry (make-believe), and ilinx (associated with the vertigo sensation, like swinging and spinning). Within these dimensions, games vary from a totally spontaneous, free, instinctive, and improvised approach, called paidia, to a form governed by structured rules, called ludus.

In general, the game literature associates paidia with playing and ludus with gaming. Gamification, then is treated as focusing on the latter, by emphasizing the elements of game-design, and not playing (Deterding et al. 2011). By focusing mainly on ludus, however, gamification undervalues "the soul" of a digital game, thus mischaracterizing it. For Caillois (2001), the gradual integration of ludus is a refinement and complement to paidia, which it enriches and disciplines. For our purposes, we assume that different designs of gamified systems have different balances between playing (paidia) and gaming (ludus) that can lead to differential levels of engagement.

Competence and Autonomy as Motivation

The extent to which people are motivated to initiate and persist at specific behaviors is highly influenced by their beliefs that their behavior will lead to desired outcomes, expressed in terms of the fulfillment of the psychological needs of competence and autonomy (Deci and Ryan 2000). Autonomy and competence are seen as underlying aspects of achievement behavior theory, where ability-development goals are contrasted with ability-demonstration goals (Nicholls 1984). Ability-development is the individual aim to develop a self-referential competence for performing a given task; while ability-demonstration goals involve the development of normative competence, or the demonstration of competence in comparison to others (Elliot and McGregor 2001; Elliot et al. 2011; Harackiewicz et al. 2002; Harackiewicz and Elliot 1993). The amount of self-refereed competence in using a specific information system is conceptually similar to self-efficacy (Agarwal et al. 2000; Compeau and Higgins 1995; Marakas et al. 1998; Thatcher and Perrewe 2002).

Both self-referentially and normatively defined achievement goals are competence-oriented motivation instances while the first can also be viewed as important for fulfilling the autonomy needs (Harackiewicz and Elliot 1993). We apply the ability-development concept to the context of digital games and gamified systems and label it Mastery Gamefulness (MG) to represent individual intrinsic motivation toward being skilled in interaction with games or gamified systems. In consequence, mastery gamefulness involves positive attitudes toward learning, practice, and self-oriented assessment that focus on the development of skills and abilities related to using systems, whether games or gamified systems.

Similarly, we apply the ability-demonstration goals concepts to the context of digital games and gamified systems and label it Performance Gamefulness (PG) to represent individual motivation toward demonstrating skills in system operations. Individuals guided by performance gamefulness seek feedback, are attracted to competition, and particularly appreciate situations that highlight performance scores because such a scenario gives the opportunity to demonstrate competence relatively to others (Harackiewicz and Elliot 1993).

Motivation by Playfulness

Playing is a manifestation of people satisfying the psychological need for autonomy. For instance, while playing, an individual can experience a cognitive context where few boundaries and rules are extrinsically

set, allowing more creative and safe behaviors and leading to greater levels of autonomy not available in real live settings (Iwasaki and Mannell 1999). In information systems, playfulness is defined as the degree of cognitive spontaneity in microcomputer interactions (Agarwal and Karahanna 2000; Webster and Martocchio 1992). With technologies increasingly being used not only for utilitarian purposes but also for entertainment and pleasure, it is natural to consider expanding the original concept beyond the use of microcomputers, toward the use of any other type of system. Accordingly, the idea of being motivated toward use by playfulness while using gamified systems and games is perfectly aligned with the concepts of paidia and mimicry (Caillois 2001).

In prior work, playfulness has been presented as a trait, a motivational characteristic of individuals, or a state, resulting from the interaction between the individual and the situation (Venkatesh 1999; Webster and Martocchio 1992). In this paper, we use the state view of playfulness. Perceived Playfulness (PP) is the perception of cognitive spontaneity resulting from the interaction with digital games or gamified systems. It leads to a state of good humor and satisfaction, although in extreme cases it may lead to over-involvement or to spending more time than expected in the fulfillment of a task (Martocchio and Webster 1992; Webster et al. 1993).

Engagement

Engagement is the feeling that a system has caught, captured, and captivated user interest (Jacques et al. 1995). Designing digital environments for engaging experiences is a goal that is becoming increasingly important for several disciplines such as education (Dickey 2005; Kapp 2012), marketing (Brodie et al. 2013; Mollen and Wilson 2010; Pagani and Mirabello 2011), information systems (Goes et al. 2014; Kim et al. 2013; O'Brien and Toms 2008; Webster and Ahuja 2006), and others. However, when it comes to the context of user-generated content systems and digital games in particular, most of their success can be credited to the ability to engage players. Engagement is not only vital to build and retain a base of customers (Li et al. 2014), but users expect that any digital game provides engaging experiences (O'Brien and Toms 2010).
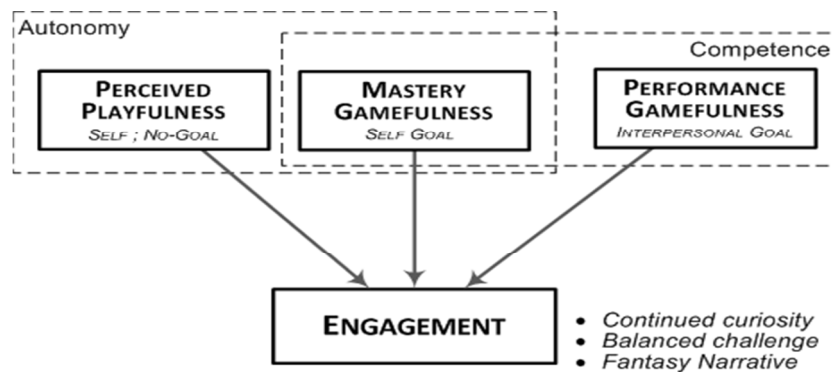

Figure 1 - Conceptual Relations

Engagement is frequently considered related to flow state, defined as an experience in which interactions cause intrinsic pleasure while an individual is involved in an activity (Csikszentmihalyi 1975; Nakamura and Csikszentmihalyi 2002). Users become absorbed by the activity, their focus narrows and they tend to lose the consciousness of themselves due to the immersion in the task, while they begin to experience a sense of full control over the environment in which they are immersed (Agarwal and Karahanna 2000; Kamis et al. 2008; Martocchio and Webster 1992).

However, it is unlikely that game and gamified system users experience a complete loss of awareness of themselves and their surroundings every time they use the system, as proposed by flow. In this view,

engagement is more associated with a stage of immersion (Brown and Cairns 2004) which is the prosaic experience of playing a digital game and can be a less intense experience than flow (Jennett et al. 2008).

Relevant literature presents many views on the dimensions pertaining to engagement (O'Brien and Toms 2010). The dimensions include curiosity (Hua et al. 2009; Malone 1980; Malone 1984; Nakamura and Csikszentmihalyi 2002; Webster and Ahuja 2006), variety (Webster and Ho 1997), focused attention (Csikszentmihalyi 1975; Nakamura and Csikszentmihalyi 2002; O'Brien and Toms 2010; Webster and Ahuja 2006; Webster and Ho 1997), challenge (Csikszentmihalyi 1975; Hua et al. 2009; Liu et al. 2013; Webster and Ho 1997), feedback (Csikszentmihalyi 1975; Martocchio and Webster 1992; Webster and Ho 1997), control (Agarwal and Karahanna 2000; Liu et al. 2013; Nakamura and Csikszentmihalyi 2002; Webster and Ho 1997), narrative and fantasy (Li et al. 2014; Malone 1984), intrinsic interest (Venkatesh 1999; Webster and Ahuja 2006; Webster and Ho 1997), and aesthetics (O'Brien and Toms 2010), to name a few.

In an attempt to work with a manageable number of dimensions of engagement, we group the aspects related to the initial interest as curiosity, novelty, and variety and call it continued curiosity; the aspects related to the interaction as challenge, feedback, and control are called balanced challenge; and the aspects related to narrative and fantasy are called fantasy narrative. These classifications are in line with the findings of Malone (1980; 1984) who claims that in order to be motivating a game should emphasize three aspects: curiosity (both sensory and cognitive); challenge (goals with uncertain outcomes) and fantasies (extrinsic, with little to do with skills, and intrinsic, which are closely related to the user).

Continued curiosity is a state of user curiosity, achieved while submitted to system stimuli, so that cognition and intuition are used while exploring the possibilities and outcomes during the interaction with the system. Curiosity is the excitement of the senses to explore the game's possibilities. An interesting content makes players eager and willing to discover new aspects and explore variants. At the same time, it allows a user to interact with the game and provides the necessary knowledge to participate at a good pace (Hua et al. 2009).

Some of the main motivations for playing online games are enjoying exploration of the game's world and discovering places, missions, or artifacts that others might not know (Yee 2005; Yee 2006). By allowing players to progress through different ways, users experience the power of changing the game's narrative, helping to satisfy their need for autonomy (Przybylski et al. 2010). Thus, discovery and exploration are inextricably linked to players' gaming experience. For example, when the game Super Mario Bros incorporated a feature allowing the character to make the screen scroll laterally, it allowed users to explore areas that were initially hidden, incorporating the possibility of discovery. Later, in first-person games, players leave the outside view and begin to look at the game through the eyes of the character (Dickey 2005), easing the discovery of secrets.

Thus, engagement is largely sustained by the fact that players can still find new things, even if they are playing for a long time. This helps to keep their continued interest and one of the best ways to maintain this interest is to stimulate their curiosity (O'Brien and Toms 2008). Designers of modern games seek to offer meaningful choices to players in order to continuously balance their boundless curiosity with a finite set of resources and talents (Przybylski et al. 2010) and often hide certain pieces of information deliberately so as to stimulate users to keep the interest in exploring unknown parts of the game to find the answers (Qin et al. 2009) usually in a sequence events in the game (Kapp 2012).

Balanced challenge is defined as the amount of incremental effort the system represents for the user compared to an optimal amount in subsequent steps (Qin et al. 2009; Webster and Ahuja 2006). This is experienced by the user, creating a feeling of arousal and control and avoiding anxiety and boredom. One of the reasons games engage users is that their activities challenge users while playfully satisfying individuals' basic need to feel competent (Li et al. 2014; Liu et al. 2013; Przybylski et al. 2010; Yee 2005; Yee 2006). However, the appropriate balance between the game's difficulties and player's skills is considered a critical factor for user engagement. Excessively easy challenges lead to boredom, while overly difficult ones lead to anxiety (Kamis et al. 2008; Nakamura and Csikszentmihalyi 2002; Przybylski et al. 2010).

Historically, the industry began with games designed to meet the need for competence focusing on challenges and goals to be achieved. For example, the first successful digital games such as Pong and Donkey Kong are considered excellent examples of how to present structured competition environments

to gradually increase the challenge given the player's progress in the game (Przybylski et al. 2010). In the modern gaming industry, the balance between the player's skills and the game's challenges remains a core concern. For example, modern home console games such as Halo 3 use internet communication to stimulate competition between players based on their history of performance gamefulness. Microsoft's online gaming network provides a general index of the players' skills by aggregating performance indicators of all players for all games in its console to make it easy for competitors to properly choose their opponents, adjusting the challenge for competitors (Przybylski et al. 2010).

Fantasy Narrative has long been identified as one of the key reasons users appreciate a game. Malone defined fantasy as a set of mental messages that leads to the recall of situations or physical objects that are not actually present, fostering a player's imagination (Malone 1984). Narrative has long been incorporated into game designs as shown in the literature that describes users' greater involvement with a game when it is structured around a story (Boyle et al. 2012; Hua et al. 2009).

Research model

The research model (Figure 2) is based on two fundamental pillars: playfulness and competition. Perceived playfulness as a state is a reaction to the interaction with the system and is supposed to generate positive feelings about the technology as being satisfying and fun, and thus engaging. It is thus expected that the user, by having a playful experience with the system, will have greater involvement with it. Therefore:

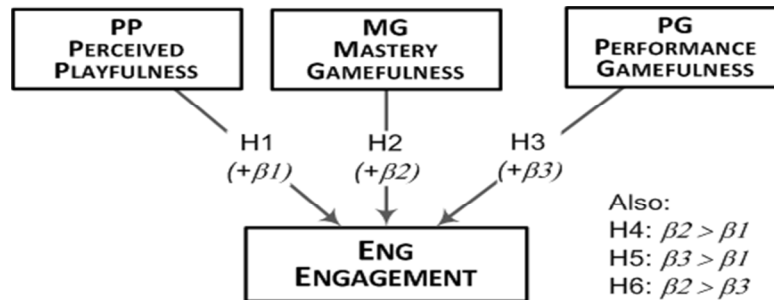*Hypothesis 1:*   *Perceived playfulness is positively associated with engagement*

Figure 2 - Research Model

Competition corresponds to mastery gamefulness and performance gamefulness. Competition can be divided in two components: competition against one's own limitations (mastery gamefulness) and competition against others (performance gamefulness). Whether the purpose is to develop mastery of the game or playing better than other players, the quest for these goals engages the users in the game, increasing their involvement with it. Mastery gamefulness and performance gamefulness are then supposed to positively affect user's engagement. Therefore:

Hypothesis 2:   *Mastery gamefulness is positively associated with engagement*
Hypothesis 3:   *Performance gamefulness is positively associated with engagement*

Challenge is currently considered at the core of games studies. Its popular prominence largely influences how gamification has been applied, leading to the dissemination of features like badges and leader scores. Competition is also strongly considered a major factor to foster involvement with digital games. Therefore:

Hypothesis 4:   *Mastery gamefulness has a greater influence than perceived playfulness on the user's engagement*
Hypothesis 5:   *Performance gamefulness has a greater influence than perceived playfulness on the user's engagement*

Consistent with previous research, performance gamefulness can increase the user's anxiety and have a negative result for some of them. While it is not expected to happen with every player and every context, considered as a whole, it is expected that mastery gamefulness have greater influence on engagement than performance goals. Therefore:

> *Hypothesis 6:   Mastery gamefulness has a greater influence than performance gamefulness on the user's engagement*

Methodology

Table 1 shows the items used to measure engagement, defined as the intensity of individual's perception that a system caught, captures, and captivates interest. Engagement was operationalized based on 6 questions, each of them developed to integrate the theoretical meaning provided by literature to produce a manageable total number of items. We allocate 2 questions per grouped dimension, as follows: ENG1 and ENG2: the aspects related to the interaction as challenge, feedback, and control which characterizes balanced challenge; ENG3 and ENG4: the aspects related to narrative and fantasy which characterizes fantasy narrative; and ENG5 and ENG6: the aspects related to the initial interest as curiosity, novelty and variety which characterizes continued curiosity.

	Question: Playing video games …	**Adapted from**
Balanced Challenge	… challenges me [ENG_1]	(Montgomery et al. 2004) (Fu et al. 2009)
	… develops my game skills [ENG_2]	(Montgomery et al. 2004) (Fu et al. 2009)
Fantasy Narrative	… allows me to enter the game's story [ENG_3]	(Webster and Ahuja 2006) (Yee 2005)
	… allows me to experience other identities [ENG_4]	(Yee 2005)
Continued Curiosity	… stimulates my curiosity [ENG_5]	(O'Brien and Toms 2008) (Fu et al. 2009) (Webster and Ahuja 2006)
	… leads me to want to explore all of the game's possibilities [ENG_6]	(Yee 2005)

Table 1 – Engagement construct operationalization

As there was no previous information about the size of the effects to expect in the model, we performed a power analysis with GPower (Faul et al. 2009) and considered a worst case scenario in which we could face a correlation of 0.3 between each predictor and the outcome, and 0.3 correlation between predictors, for the construct with the higher number of predictors in the model, which result in an effect size as small as $f^2=0.20$ (Cohen 1992). Considering the engagement construct, which is a endogenous variable with 3 predictors (Cenfetelli and Bassellier 2009), a power of 0.85, and a Type I error of 0.01, the minimum sample size was 90.

We surveyed more than 800 individuals. The sample is composed of business undergraduate and MBA students in Brazil (n=134), attendees in the Brazilian Symposium on Computer Games and Digital Entertainment - SBGames (n=263), and attendees in the Brazil Game Show – BGS (n=320), the largest video game fair in Latin America. Data were collected from October 2nd to 29th, 2013 by a senior researcher with the aid of six research assistants. All participants engaged in the study voluntarily. To check for questionnaire comprehension, a validation test was conducted with undergraduate and MBA students. Based on this test, the questionnaire was revised, and the respondents' understanding of the questions and the adequacy of the translation were deemed sufficient.

Category	Description	Examples
RPG	Player "becomes" a character in the fictional world, defined by their talent, strength and cunning. Often played on line massively (Poole 2000)	Elder Scrolls oblivion
Open world	Open world played without a linear structure, usually choosing missions that blend different genres of games (Rabin 2009)	GTA V
Action	Based on reaction (quick answers and reflexes), intensely focused on performance, requiring actions that are not trivial, selecting the right inputs at the right time. Traditional sub-genres: fighting, racing and platform (Apperley 2006; Herz 1997)	Devil May Cry
Strategy (1)	Emphasizes the use of strategy and resemble board war games (Poole 2000; Wolf 2005) being the MOBA - Massive Online Battle Arena - known as real-time action strategy the most popular subgenre	League of Legends
Sports	Adaptations of existing sports or variations of them (Wolf 2005)	Fifa
Shooter (2)	Involve shooting, and generally destroying, a number of opponents or objects. Often played by the character´s perspective (first-person) (Wolf 2005)	Call of Duty
Adventure	To advance you must solve a series of challenges with goals completed in several steps, such as: find the key to open the door, open the door and eliminate enemies across the room (Herz 1997; Wolf 2005).	Journey
Others	None of the above. Eg.: Puzzle, which primary goal is to find solutions to puzzles (Poole 2000; Wolf 2005); Rhythm and Dance, where the player marks the time, rhythm ormovements according to the game (Wolf 2005); Simulation, which allows simulate the dynamics of cities, countries or amusement parks, to name a few (Apperley 2006)	Just Dance, SimCity

Table 2 – Games Categorization and Descriptions

(1) MOBA was included in Strategy type
(2) Shooter = grouping of First Person Shooting (FPS) +Third Person Shooting (TPS)

Var	Definition	Item	Question	Based on
PP - Perceived Playfulness	The intensity of individual cognitive spontaneity while interacting with digital games	PP_1	When interacting with video games I'm spontaneous	(Agarwal and Karahanna 2000; Webster and Martocchio 1992)
		PP_2	When interacting with video games I'm imaginative	
		PP_3	When interacting with video games I'm flexible	
		PP_4	When interacting with video games I'm creative	
		PP_5	When interacting with video games I feel excited	
		PP_6	When interacting with video games I'm original	
		PP_7	When interacting with video games I'm inventive	
MG - Mastery Gamefulness	The intensity of individual intrinsic motivation towards been skilled in digital games	MG_1	When I'm playing video games I like games that challenge me	(Elliot and McGregor 2001; Harackiewicz et al. 2008; Harackiewicz and Elliot 1993; Liu et al. 2011)
		MG_2	When I'm playing video games I prefer games that stimulate my curiosity	
		MG_3	When I'm playing video games I like games that make me want to find out more	
		MG_4	When I'm playing video games I think it is important to master the game	
PG - Performance Gamefulness	The intensity of individual extrinsic motivation towards been skilled in digital games	PG_1	When I'm playing video games it is important to do well compared to other players	
		PG_2	When I'm playing video games I want to do better than other players	
		PG_3	When I'm playing video games my goal is to get better scores or rewards than other players	
		PG_4	Playing video games allows me to be competitive	
		PG_5	Playing video games allow me to compare my skills with those of other players	
		PG_6	Playing video games allows me to show my skills	

Table 3 – Independent variables definitions and operationalization

The initial part of the survey requested demographics information such as gender, age, digital games playing experience, platform (Wii, PS3, Xbox, Live, PSN, offline PC, networked PC, and others), weekly hours of play, favorite game, and reasons for the preference. An open question was used to ask respondents' preferred games, which were categorized based on manufacturers' description (in their websites), media specialized websites like Metacritic (www.metacritic.com) and IGN (www.ign.com), and by similarity with other known games. The final categorization and description of the games are shown in Table 2.

The second part of the questionnaire asked individuals to respond to the survey items by focusing on their favorite game. Constructs were measured using scales based on previous research (Table 3). The scale of mastery and performance gamefulness was based on the work of Elliot, Harackiewicz, and colleagues (Elliot and McGregor 2001; Harackiewicz et al. 2008; Harackiewicz and Elliot 1993; Liu et al. 2011). The playfulness scale came from the work of Agarwal and Karahanna (2000) and Martocchio and Webster (1992). For all constructs a 7-point Likert scale was used, with 1 representing strongly disagree and 7 representing strongly agree.

Results and analysis

Surveys with more than 10% of incomplete or duplicate answers were dismissed, as well as those suggesting an apparent disregard by the respondent (e.g., containing jokes, inappropriate comments, or just a trace vertically marking all the answers as 3). In the few cases of missing values (the few variables with missing values represented less than 1% of all responses), the average of answers was used, except for hours of play per week, to which an average per game genre was used. This process left us with 717 usable responses.

Variable	Category	Frequency	RPG	Open	Action	Strategy	Sports	Shooter	Adv.	Others
Experience	< 1 year	1 (0.14%)								
	1-5 years	46 (6.44%)								
	6-10 years	154 (21.48%)								
	> 10 years	516 (71.97%)								
Weekly play time	<=1 hour	30 (4.2%)								
	1-7 hours	198 (27.6%)								
	7-25 hours	308 (43%)								
	25-40 hours	112 (15.6%)								
	>40 hours	69 (9.6%)								
Age (years)	<18	83 (11.6%)	6	15	10	6	3	33	0	10
	≥ 18; <25	423 (59%)	70	61	59	76	51	56	3	47
	≥ 25; <30	128 (17.9%)	19	23	27	20	10	13	4	12
	≥ 30	83 (11.6%)	9	13	16	7	12	12	4	10

Table 4 – Sample demographics
Note: n=717

An initial analysis of the sample's characteristics shows a large concentration of male respondents (male: 89.1%, n=639; female: 10.9%, n=78), with an average age of approximately 23 years old, a long time experience in using this kind of system – an average of 14.6 years of experience – and allocating a large amount of their weekly hours for digital games, with an average of 18.15 hours per week. As presented in Table 4, sample individuals are relatively young, with 88.4% under 30 years old. There is a concentration of nearly 60% between 18 and 25 years old. Regarding the experience and the number of play hours per week, more than 93% of the sample can be considered experienced in digital games, since they have more than 5 years of experience with digital games; 68.2% of the sample (489 respondents) is comprised of players with more than 7 play hours per week (1 hour per day) and 9.6% play more than 40 hours per week. These distributions are consistent with the general population of gamers.

Quality of measurement model

First, the engagement scale was analyzed by performing an exploratory analysis with all ENG indicators which showed the construct to be one-dimensional (KMO=0.818; Bartlett Sphericity test: χ^2 =842, df=15, p<0.001). As the item-total correlations test showed that the second and fourth items did not meet the criteria of having a correlation above 0.5 with the focal construct, we dropped them from further analysis (MacKenzie et al. 2011). We then performed a confirmatory factor analysis (CFA) with the remaining indicators which demonstrate an acceptable shared variance (AVE=0.54) and good reliability (Cronbach's Alpha = 0.716, RMSEA=0.00, χ^2/df =0.707, p>0.587). We further tested the engagement construct metric invariance along gender groups (χ^2dif=4.064, df=4, p>0.397), which showed no significant differences (Netemeyer et al. 2003).

Construct	Cronbach's Alpha	Composite Reliability	PP	MG	PG	ENG
Perceived Playfulness - PP	0.826	0.878	0.768			
Mastery Gamefulness - MG	0.687	0.828	0.589	0.785		
Performance Gamefulness - PG	0.807	0.867	0.393	0.255	0.788	
Engagement - ENG	0.716	0.824	0.655	0.719	0.336	0.735

Table 5 – Reliability, Correlations and Average Variance Extracted (AVE) per construct
[1] The square root of the Average Variance Extracted is on the diagonal

Table 5 shows the composite reliability values are above 0.824 and the Cronbach's alpha values are above 0.687 for all constructs, which indicates acceptable reliability in the measurement model (Nunnally and Bernstein 1994). Discriminant validity is assessed based on Fornell-Larker's criterion (Fornell and Larcker 1981), which suggests the square root of the average variance extracted (AVE) of each latent variable should be greater than the correlations with other latent variables.

Item	PP	MG	PG	ENG
AVE	0,59	0,62	0,62	0,54
PP_1	0.73	0.43	0.37	0.46
PP_2	0.78	0.49	0.24	0.54
PP_4	0.82	0.52	0.26	0.56
PP_6	0.71	0.37	0.34	0.43
PP_7	0.80	0.44	0.32	0.52
MG_1	0.37	0.73	0.26	0.54
MG_2	0.55	0.84	0.20	0.60
MG_3	0.46	0.79	0.14	0.55
PG_1	0.24	0.16	0.81	0.20
PG_3	0.20	0.08	0.71	0.14
PG_4	0.32	0.22	0.81	0.29
PG_6	0.40	0.27	0.83	0.34
ENG_1	0.44	0.51	0.28	0.71
ENG_3	0.47	0.46	0.20	0.71
ENG_5	0.57	0.53	0.24	0.78
ENG_6	0.44	0.59	0.27	0.73

Table 6 – Correlations between indicators and constructs

Table 5 indicates that all constructs present good discriminant validity except for MG-ENG, which presented only a small margin (0.719 to 0.735 and 0.785). We considered this aspect as not posing a serious threat as required values are given and satisfy the criterion (Hair et al. 2014; MacKenzie et al.

2011). Table 6 shows acceptable values for convergent validity, with factor loadings greater than 0.71. We calculated Variance Inflation Factors (VIF) to test for multicollinearity between endogenous variables. Values were 1.18 (PP), 1.53 (MG) and 1.69 (PP), and are considered adequate (Wright et al. 2012).

Structural Model and Sample Heterogeneity Analysis

The model was estimated with SmartPLS (Ringle et al. 2005). As shown in Table 7, the model explains 60.4% of the variance in engagement. Without segmentation, the effects were found to be positive and significant for mastery gamefulness on engagement (+0.51, p<0.001), perceived playfulness on engagement (+0.32, p<0.001), and performance gamefulness on engagement (+0.08, p<0.01). When considering the game category segmentation, perceived playfulness and mastery gamefulness results were positive and significant for all categories except adventure, while, interesting enough, the effect of performance gamefulness on engagement was significant only for sports (+0.22, p<0.05). It is worth mentioning that soccer, considered the Brazilian national sport, is one of the included modality in the sports category. These findings offer support for H1, H2 and H3.

Game Category	n	Direct Effects to Engagement			Effects differences ([2])			R^2	Adj R^2
		PP	MG	PG	MG-PP	PP - PG	MG - PG		
RPG	104	0.19 *	0.68 ***	-0.02 ns	+0.50 ***	+0.20 ***	+0.70 ***	61.2%	60.0%
Open world	112	0.29 *	0.49 ***	0.04 ns	+0.20 ***	+0.25 ***	+0.45 ***	53.1%	51.8%
Action	112	0.22 **	0.64 ***	0.08 ns	+0.43 ***	+0.13 ***	+0.56 ***	69.8%	69.0%
Strategy	109	0.41 ***	0.37 ***	0.11 ns	-0.04 ***	+0.29 ***	+0.26 ***	57.2%	56.0%
Sports	76	0.29 *	0.55 ***	0.22 *	+0.25 ***	+0.08 ***	+0.33 ***	72.7%	71.6%
Shooter	114	0.38 ***	0.45 ***	0.04 ns	+0.07 ***	+0.34 ***	+0.41 ***	58.2%	57.1%
Adventure	11	0.30 ns	0.30 ns	0.45 ns	0.00 ns	-0.15 ns	-0.15 ns	76.8%	66.9%
Others	79	0.33 **	0.51 ***	0.08 ns	+0.18 ***	+0.25 ***	+0.43 ***	60.4%	58.8%
Total	717	0.32 ***	0.51 ***	0.08 **	+0.19 ***	+0.24 ***	+0.43 ***	60.4%	60.2%

Table 7 – Path coefficients to Engagement and other effects ([1])

(1) Significance estimated considering independence of effects
(2) All effects significance estimated by bootstrap of 5,000 subsamples
(3) (*) p < 0.05; (**) p < 0.01; (***) p < 0.001; (ns) not significant

The main objective of the study did not focus on segmentation across game types. Thus, we tested the effect differences for all predictors' combinations, across games. We found the effect of mastery gamefulness on engagement (β2) is significantly higher than the effect of perceived playfulness on engagement (β1) (+0.19, p<0.001), while the effect of perceived playfulness on engagement (β1) is significantly higher than the effect of performance gamefulness on engagement (β3) (+0.24, p<0.001). Results also indicate the effect of mastery gamefulness on engagement (β2) is significantly higher than the effect of performance gamefulness on engagement (β3) (+0.43, p<0.001). This means that, without consideration of game categories, the main contributor to engagement is mastery gamefulness, followed by perceived playfulness and, lastly, performance gamefulness.

When considering the game category segmentation, surprisingly enough, performance gamefulness is always the lowest weighted factor, or not significant, no matter which category. All categories showed mastery gamefulness as the stronger effect in comparison to perceived playfulness, except for Strategy, where the effect of perceived playfulness marginally higher. These findings show support for H4 and H6, while H5 is not supported as the effect was in the opposite direction.

In summary, H1, H2, H3, H4 and H6 were supported whereas H5 was not supported (the effect is opposite from that predicted).
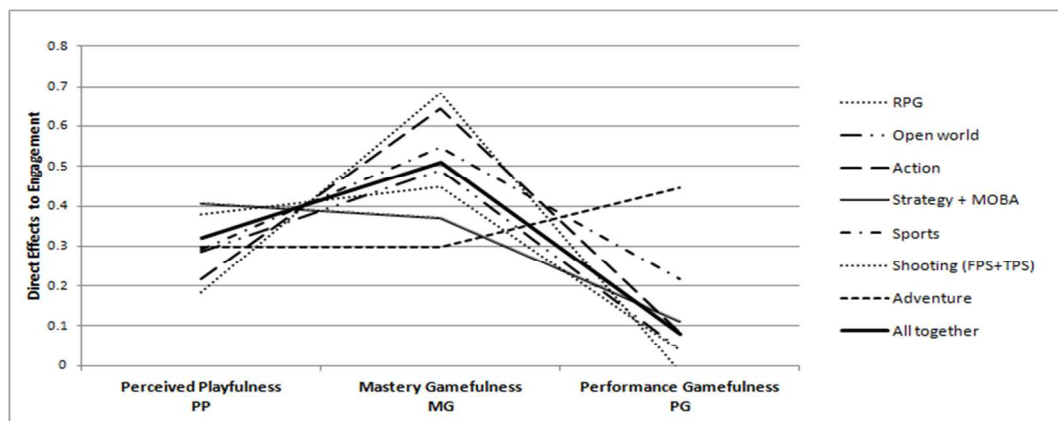
Figure 3 - Direct Effects on Engagement by Game Category

Discussion and theoretical implications

As previous studies on gamification of systems have presented mixed results, in this research the design strategy was to drive conclusions from the richer context of existing gamifying artifacts of digital games to a much less developed context of current gamified systems. While collecting data from a large sample of game categories, we intended to cover the comprehensive miscellanea of artifacts that ultimately will inspire gamification systems developers, perhaps many of the possible feasible combinations not yet implemented in current system gamification context.

The results show that, although there is support for the importance of competition against peers, contrary to the general understanding, the challenge of overcoming the game's obstacles and mastering it is what matters the most to players, regardless of the type of game. On the other hand, competition against peers, the modality where the use of badges and rankings is usually associated, is not the main factor to foster user engagement. Almost all categories of games (except Strategy) showed that competition against oneself (i.e., against a player's own limitations) is the main factor contributing to engagement. Implementation of badges and letter boards in systems gamification may be useful for individuals to set personal references and goals and guide mastery gamefulness, but the way they are presented can emphasize peer competition, which may be ineffective and explain why studies about gamification reveal mixed results.

This research also complements the studies on the user's engagement with technology and the very concept of gamification by bringing to the center of the discussion the issue of fantasy. The story is an important part of the user engagement but so is the freedom to interact and change it. In sum, gamified systems should not be so concerned with rankings and online comparisons to encourage users to compete against each other, but to use as a personal reference, creating challenging environments and guidance for users to achieve their mastery interests.

One might think that such behavior could change from game to game, since those played in multiplayer modes (some of them almost exclusively), like FPSs and MOBAs, would value competition with other players more than the fantasy part of the game or its mastery. However when we run the model for six different game genres (Rolling Playing Games - RPG, Open World, Action, Strategy, Sports, Shooting, and others), not only did mastery gamefulness keep its position as the primary motivator followed by playfulness, but performance gamefulness was not significant.

More surprising is the fact that for games in which one would expect improvement, such as strategy and FPS, we found an increase in the relevance of the playfulness construct (as opposed to mastery or performance goals). These two genres featured the highest perceived playfulness effects across all genres and above the consolidated sample. The impact of perceived playfulness on engagement for shooter

games was .38 and for strategy games was .41. For strategy games, the effect of perceived playfulness was significantly stronger than that of mastery goals, with a difference of 0.04 (p<.0001).

Some factors may help to explain these seemingly contradictory findings. First is the cultural factor. Most of the recent studies on competition in games and on reasons for playing them, which are almost entirely focused on online games, were performed in the United States and in Asian countries like South Korea, where there is a strong culture of higher education competition, which leads to an emphasis on school rankings (Davies and Hammack 2005). At the individual level, it establishes a dynamic of competition among students that reaches extremes in Asian countries. South Korea's educational system, for example, is considered a "testocracy" that defines each student's future employment and career based on their achievements in relation to their peers (Sorensen 1994). This feature even spawned an industry of private tutoring in South Korea (Kim and Lee 2010). Therefore, the issue of competition among peers is very much present in the lives of the young people of these countries. This is vastly different from the Brazilian context, which helps to explain the difference regarding competition with others in both groups.

Another factor that could explain the smaller emphasis given by the surveyed players to competition with third parties, even in strategy games and FPS, could be that players consider the social benefits of connecting with others more important than the competition itself. According to some authors, online games have a strong social character, where the interaction and socialization of individuals is a central point, strongly influencing individuals toward their use and continuation (Animesh et al. 2011; Goel et al. 2011).

Practical implications

This study contributes to information systems development, especially user-generated systems, by clarifying the mistaken overvaluation of ranking systems and the use of badges to engage users by providing competition between participants. Developers should consider giving greater emphasis to the challenges conveyed by the system, more than by peers, and the importance of fantasy and narrative that should be embedded into the systems, and allow users to define rules, strategies and contexts within the system.

Limitations and Future Research

This study has limitations that must be considered while interpreting the results. First, the use of self-reported measures of states may be problematic because they do not fully capture mental states that are beyond the individual's cognitive processes. Further, as the respondents were asked to think about their preferred game before answering the survey, answers represent reassembling of past perceptions and in this cognitive building process can be affected by other contextual conditions.

There are also limitations associated with our research strategy of looking at game characteristics to infer how to better gamify non-game based information systems. Our goal was to bridge the two contexts. However, it is possible that the bridge works only for 'gamers' and a different mechanism will be needed to engage non-gamers. Consider also that the composition of our subject pool is consistent with that of 'gamers' (i.e., largely young males). Thus, future research will be necessary to see if, and how, our results generalize to the broader population of systems users who may not be as interested in games. In this vein, we encourage research that leverages engagement strategies from non-gaming environment as well as work that attempts to tease out the personality characteristics associated with various gaming preferences.

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