

Leaderboard: Analysis Review Behind the Usage in Gamification

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Gamification; the use of game design elements in non-gaming context has reaped a variation of results since its inception. Game elements exist in many different forms most notably the trilogy of Points, Badges and Leaderboards. Of all the elements, leaderboard plays an important role in the competitive world today, including the fields of commerce, social network and education. Therefore, to investigate this, an analysis review of the current trend and researches in gamification from 2017 till 2018 was carried out. The findings showed that leaderboard manages to attract users who prefer a competitive environment to be more engaged and motivated in completing their tasks. Meanwhile the rest of the users get swept away by the competition and eventually drop of the activity due to the lack of interest created by an environment lacking playful situations. It was also identified that team-based leaderboard is a viable match for users from the Generation-Z.

Keywords: gamification; game elements; leaderboard

I. INTRODUCTION

Gamification was first brought up by a game designer Nick Pelling back in 2004, (Rughiniş, 2013) whom at that time tried to use game-like enhanced interface to make electronic transactions such as using the Automated Teller Machine (A.T.M) or in-flight entertainment more eye-catching and engaging. This was meant to create a game like enjoyment to the transaction. He was into infusing gamification into a physical device and at that time was not interested in making use of it in the internet. Thus, the idea faded into the dark until its inception into the World Wide Web and later into the android and apple devices. From this came the definition of gamification; which is the "use of game design elements in non-game contexts" (Deterding & Dixon, 2011; Deterding, Dixon, Sicart, Nacke, & O'Hara, 2011; Zichermann & Cunningham, 2011). Gamification is used to "change behaviour, to educate, or to motivate". Many corporate gamification systems rely upon rewards and a very thin layer of game elements to engage people through points, levels, leaderboards, achievements, and badges. This type of reward-based gamification (Nicholson, 2015) has become

commonplace, almost to the point of being expected, in new social media and information-based applications.

The practicality of using game elements in other fields has picked up significantly in the past few years. This is more noticeable with the gamification of education (Llerena Medina & Rodríguez Hurtado, 2017) seen with platforms such as Kahoot, Quizizz and Frog play, or the gamification of social network such as LinkedIn, Facebook or Twitter and finally the gamification of commerce (Harwood, 2012) with the introduction of points, badges and leaderboards in platforms such as Booking.com, Lazada, Alibaba and many more. These infusion of game elements, creates an extra element of motivation towards using the platforms. Yet, as stated by Nicholson, (2012) putting in a gamification element into an already existing system will disrupt the user interests and creating a sense of meaningless gamification. As supported by Morrison & DiSalvo, (2014) whom investigated the insertion of gamification elements in the Khan Academy platform created short-term engagement of the users towards the system. Besides that, with the current competitive world, it is ideal for a system to make use of an external motivator that invokes the internal drive of users to

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compete and excel. Thus, it is vital to explore how an integral part of gamification elements trilogy; the leaderboard fares when its incorporated into a gamified system.

II. GAME ELEMENTS

Although there are many types of elements that exists in gamification; points, badges and leaderboards are the most rudimentary and vastly used. Points are scores, or tokens achieved by the user by completing certain tasks or activities (Kapp, 2012; Sanmugam *et al.*, 2015). Badges represents individualised prizes accumulated upon completing tasks and finally leaderboards represent ranking in comparison to other users based on one's accomplishment. (Bunchball Inc., 2010; Huang & Hew, 2015).

This research explores the leaderboard, a game element that has a unique identity and characteristics as it can also be used to incorporate both points and badges. This can be done in the form of accumulating the points and badges collected by the users to represent their standings in comparison to their peers or competitors. Therefore, this creates the need to examine the pros and cons of leaderboard in a gamified environment.

III. ANALYSIS REVIEW

Several latest researches of gamification from the past two years (2017-2018) in international journals and proceedings; identified via the Google Scholar and Mendeley; were chosen in the context of gamification but focussing more on the leaderboard game element was chosen and reviewed to see what was analysed throughout their research. The review was based on the positive, negative or neutral outcome of leaderboard on users.

Table 1. Analysis Review of Gamified Research

	TITLE	VARIABLE	SAMPLE	OUTCOME
1	Effects of gamification-based intervention for promoting health behaviours (Uechi <i>et al.</i> , 2018)	Daily steps, health behaviour challenge accomplishment, usage rate, acceptance of the program and game elements	53 undergraduates and graduate students (30: intervention & 23 control group)	High level of usage, motivation due to all aspects of game elements

2	From Input to Output Through Gamification in Primary English Teaching (Fortunate & Cruz, 2018)	game elements, achievement, behaviour	fourth grade pupils from a private school in the Oporto area	Sadness and disappointment reactions are related to competition and to the game elements, leaderboard and stars.
3	The Effect of Interactive Digital Storytelling Gamification on Microbiology Classroom Interactions (Molnar, 2018)	game elements, engagement	2 classes (control & experiment)	Increased levels of participation and interaction
4	Integration of Learning Analytics Techniques and Gamification: an experimental study (Klock <i>et al.</i> , 2018)	game elements, engagement and satisfaction	77 undergraduates	Higher satisfaction level yet no significance in interaction
5	The Interaction of Trait Competitiveness and Leaderboard Design- An Experimental Analysis of Effects on Perceptions and Usage Intention (Fortunate & Cruz, 2018)	competitiveness traits, team based and single player leaderboard	192 participants	Team based leaderboard supports usage intentions and perceptions of participants with high personal development competitiveness. Individualized gameful systems are needed instead of one-system fits all found in business practices
6	A gamification Technique for Motivating Students to learn Code Reliability in Software Engineering (Mi <i>et al.</i> , 2018)	motivation (extrinsic & intrinsic), game elements, interface	161 undergraduates	Points and leaderboard are more effective in motivating students to participate. Neutral response towards the system interface
7	Examining competitive, collaborative and adaptive gamification in young learners' math learning (Jaguš <i>et al.</i> , 2018)	gamification conditions, learning processes and performance	54 primary school students	Leaderboards was not enough to sustain students' performance levels. It can be enhanced via integration of different game elements, including narratives and adaptive mechanisms based on individual performance

8	Investigating Gamification for Seniors Aged 75 (Altmeyer, Lessel, & Krüger, 2018)	Reasons, Social, Perception, game elements	18 (mean age: -84.61)	Main motivation to play is socializing, participants avoided competition and prefer collaboration and care-taking
9	Game mechanics and why they are employed: What we know about gamification so far (Bevins & Howard, 2018)	Mechanics of gamification, educational tools, pedagogy	17 selected research	Leaderboard promoted competitiveness and points/badges contributed to motivation and engagement, while leaderboard did not invoke playfulness
10	Exploring graduate students' perspectives towards using gamification techniques in online learning (Alabbasi, 2017)	Perspective, game elements	Forty-seven (47) in-service and pre-service teacher	Competitive nature of leaderboard creates poor relationship among students, gaining points to go up the leaderboard does not promote thorough learning
11	Don't Make the Player, Make the Game: Exploring the Potential of Gamification in IS Education (Fox, 2017)	Progression bars and leaderboards	208 respondents	Students believe that the inclusion of gamification is useful for learning across all levels of Bloom's taxonomy
12	Gamification: An Initiative to Increase Engagement and Performance in Education (Rashid, 2017)	Points, Leaderboard and Badges	55 graduates	The existence of extrinsic rewards increased engagement levels and performance

IV. DISCUSSION

Based on the analysis review, the positive impact of leaderboard lead to high levels of system engagement and motivation. It has been reported in previous studies that the choice of leaderboard as preferred game elements underlines the feelings of students that competition fuels them to strife further in their learning process (Tüzün, Yılmaz-Soylu, Karakuş, İnal, & Kızılkaya, 2009; Sanmugam *et al.*, 2017). It was documented that in a short term, team-based leaderboard managed to fuel the users with competitive nature. This can be related to the current trend of socializing

among the Generation-Z.

It can be identified based on the research by Mi *et al.*, (2018) that the elements of gamefulness took over from the interest of using the gamified platform interface. Although it shows the positive impact of game elements, yet this can create an unwanted scenario for instance in education where the students may forgo the real reason of learning but only focus on competing as vouched by Alabbasi, (2017) whom found that leaderboard does not support comprehensive learning.

On the negative aspects some users reacted with sadness and disappointment with the leaderboard achievement, due to low esteem created by the continuous defeat in the leaderboard system by their peers (Fortunate & Cruz, 2018). This is more relevant in the world of online gam-ing, where when cheaters or hackers constantly mod their games to their advantage, resulting in the fall of usage by other normal players. While it was also perceived that a certain type of game elements is not enough to cater to user of different needs and personalities thus the need for a variety of game elements. As per importance of socializing a research by Altmeyer, Lessel, & Krüger, (2018) states that some users prefer collaboration instead of competition, this is consistent with the current Generation-Z (Fister Gale, 2015) and concurs with the participants from the silent generation who prefer the same outcome as well. Although the latter may be due to the fact the elderly subjects may prefer the company of people rather than competing with others.

V. CONCLUSION

As a conclusion, it can be stated that although gamification elements of leaderboard can contribute as an engaging and motivating aspect of certain activities yet depending on leaderboard alone can have adverse effects. This includes user fatigue in long term usages as the users deem that continuous competitiveness leads to loss of fun thus affecting the user experience. When the use experience is affected, this leads to eventual disengagement towards the system and eventual drop off in the gamified system usage. This was due to the underlying factor that not all users are competitive; whereas most prefer socializing and collaborating rather than competing with others. Therefore, for future research it will be recommended to divulge more in depth into other aspects

of leaderboards systems, either competitive or objective orientated, allowing the users to lean towards the competitive element that drives them to achieve the goals.

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