# Measuring User Engagement in an Enterprise Gamified System

**Ayoung Suh**

School of Creative Media and Dep.

of Information Systems

City University of Hong Kong

18 Tat Chee Avenue, Kowloon,

Hong Kong

ahysuh@cityu.edu.hk

## Abstract

The main purpose of enterprise gamification is to increase employees' engagement in work-related activities, such as knowledge sharing, sales performance, idea competition, and training and education, by using game design elements. Currently, researchers are calling for systematic examination of how gamification ideas are executed in the workplace. Despite increasing scholarly and practical attention to the effectiveness of gamified systems in organizations, the question of how to measure the user engagement within an enterprise gamified system remains unclear. This study raises a methodological issue regarding different approaches to operationalizing user engagement. By testing the proposed model that explains the relationships between game dynamics and user engagement with empirical data collected from 128 users of an enterprise gamified system, this study shows how the effects of different game dynamics on user engagement vary depending on the operationalization of user engagement.

## Author Keywords

Gamification; user engagement; behavioral modeling; measurement; game dynamics; enterprise gamified system
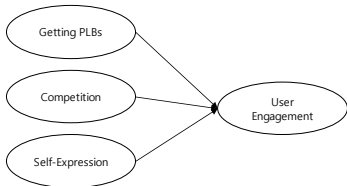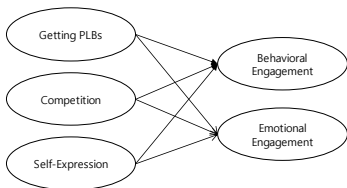
**Figure 1.** Baseline Model



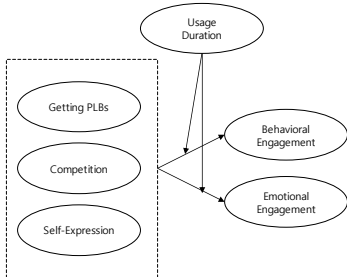**Figure 2.** Model Elaboration (Behavioral vs. Emotional Engagement)



**Figure 3.** Model Elaboration (The moderating effect of usage duration)

## Introduction

Many organizations strategically adopt gamification ideas to enhance their employees' engagement in, for example, knowledge sharing, idea competition, and sales performance (Kapp et al. 2013). Points, levels, and badges (PLBs); leaderboards; and virtual goods are the most commonly used game mechanics in a gamified system. Using these mechanics, organizations are trying to make work-related activities that are not inherently enjoyable game-like and interesting, thus increasing employees' engagement.

While managers acknowledge the potential benefits of gamification ideas, they also point out that it is difficult to maintain sustained user engagement within a gamified system over time. Some researchers have pointed out that the perceived beneficial effects of the game elements used (e.g., getting PLBs) may be short-lived because such extrinsic rewards potentially undermine users' intrinsic motivation (Kankanhalli et al. 2012). For this reason, it has been suggested that a systematic and granular understanding of how to maintain user engagement through game dynamics within an enterprise gamified systems is needed (Deterding, 2014). Understanding the antecedents and motivation of user engagement can assist in the design of appropriate game mechanisms and techniques to enhance their impact (Kankanhali et al. 2012). Of importance is how to operationalize and measure the research variables of interest. What should be measured and how should it be measured in order to determine user engagement?

## Theoretical Background

Users are engaged in a system when it "holds their attention and they are attracted to it for intrinsic rewards" (Jacques et al. 1999, p. 58). Figure 1 shows the baseline model that explains the relationship between game dynamics and user engagement. This study identifies three aspects to be considered when operationalizing user engagement.

*Behavioral vs. Emotional Engagement*
Literature suggests that engagement can be categorized into two perspectives: behavioral and emotional. Behavioral engagement refers to the extent to which an individual is physically involved in doing particular activities during work-role performance (Truss et al. 2013, p. 2659). Emotional engagement refers to a positive state of mind, that is, "an individual's involvement and satisfaction with, as well as enthusiasm for, work" (Harter et al. 2002, p. 269). Behavioral engagement ("doing" engagement) within an enterprise gamified system can be captured by the levels of participation in activities. For example, in the case of a gamified system for knowledge sharing, a user's behavioral engagement can be measured by the number of posts, comments, and knowledge contributions. By contrast, emotional engagement (being engaged) can be captured by a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication and absorption (Schaufeli et al. 2002). Here, the question is: *Do the game dynamics influence user engagement in a different manner depending on the different operationalizations of user engagement?*

*Short-term vs. Long-term Engagement*
One of the methodological issues regarding the measurement of user engagement is how the effects of game dynamics on user engagement vary over time. From the perspective of technology use, researchers

| Game Dynamics | BE | EE |
|---|---|---|
| Getting PLBs | .32*** | .29*** |
| Competition | .22** | .19** |
| Self-expression | .17** | .33*** |

*<.05; **<.01; *** <.001

**BE**: Behavioral Engagement

**EE**: Emotional Engagement

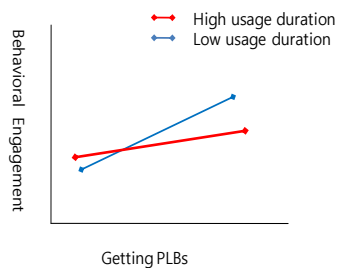Table 1. Summary of PLS analysis at the individual level



**Figure 4.** Moderating effect of usage duration

have found that the positive effects of extrinsic rewards on the use of technology tend to decrease over time (Magni et al. 2010). As users repeatedly interact with others and become used to the reward-based mechanisms within a gamified system, the users' sense of novelty and curiosity decreases, thus reducing the level of needs satisfaction (a main driver leading to intrinsic motivation). As time passes, users may develop a better understanding of the novelty, and the effects of reward-based mechanisms of gamification on needs satisfaction may diminish. Here, the question is: *Do the positive effects of game dynamics on user engagement decrease as usage duration increases?*

*Individual-level vs. aggregated-level Engagement*
While many enterprise gamified systems have been designed for facilitating employees' work-related activities, such as knowledge contribution, sales performance, and participatory activities in training program, research can measure user engagement at the individual and the aggregated levels. Here, aggregated level refers to group, collective, or organization. Even in case of group activities, such as group-based idea competition, assembly-based production, and crowd-based prediction, game dynamics on user engagement at the individual level can contribute to a better understanding of why and how game dynamics induce individual or group engagement. Therefore, multilevel theorizing cutting across individual and aggregate levels is important. The question is:

*How different are the relationships between game dynamics and user engagement at the individual and aggregated levels?*

## Methods
To collect empirical data, this study has conducted a survey in a large global IT consulting company located in Seoul, Korea. The firm has adopted gamification system for the purpose of stimulating employees' motivation for knowledge sharing by transforming the electronic repository-based knowledge management system into an online community-based knowledge sharing system. The survey ended after 131 valid responses were gathered. After removing responses that contained unanswered items, 128 responses were used for the final analysis. In the entire data set, 69% of respondents were male, and 31% were female.

## Results
The data analysis technique of partial least squares (PLS) was used for the analysis.

*Behavioral vs. Emotional Engagement*
The PLS analysis revealed that the relationships between game dynamics and user engagement were different depending on whether behavioral or emotional engagement was measured behavioral and emotional engagement. When behavioral engagement was used as a dependent variable, the game dynamics accounted for 34% of the variance existing in user engagement, and the getting PLBs was the most salient in increasing user engagement, followed by competition and self-expression. By contrast, when emotional engagement was used as a dependent variable, the game dynamics accounted for 48% of the variance of user engagement, and self-expression was the most salient factor in increasing user engagement, followed by getting PLBs and competition. Table 1 summarizes the results of PLS analyses.

| Game Dynamics | BE | EE |
|---|---|---|
| Getting PLBs | .11* | .09* |
| Competition | .34*** | .33*** |
| Self-expression | .31*** | .26*** |

*<.05; **<.01; *** <.001

**BE**: Behavioral Engagement

**EE**: Emotional Engagement

Table 2. Summary of PLS analysis at the team level

*Short-term vs. Long-term Engagement*
This study added the usage duration into the baseline model to examine how the effects of game dynamics on user engagement vary as time passes. The results show that the positive effect of getting PLBs on behavioral engagement decrease as usage duration increases. By contrast, the results show that self-expression and competition are not moderated by usage duration.

*Individual-level vs. aggregated-level Engagement*
The results demonstrate that the game dynamics exert different influences on user engagement at different levels. Table 2 shows the results of the PLS analysis at the aggregated level (the survey data was aggregated at the functional team). The results indicate that competition exerts the most salient influence on user engagement at the team level.

## Discussion and Implications
To create theory-based knowledge regarding the effects of game dynamics on user engagement in the workplace, researchers need to operationalize and measure variables and explain how and why game dynamics X increases user behavior Y. To do so, operationalization of user engagement (as a dependent variable) is important in order for research to become more granular. The results of analyses show the importance of determining how to operationalize user engagement. The concept of user engagement is complex and contains many aspects. If researchers ignore the different facets of user experience, the empirical results of analyses may produce a partial or biased picture of game dynamics within enterprise gamified systems.

## References
[1]  Deterding, S. Gamification Absolved? (2014) http://gamification-research.org/2014/08/gamification-absolved-2/#more-918

[2]  Harter, J. K., Schmidt, F. L., & Hayes, T. L. Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. Journal of Applied Psychology, 87, 2 (2002), 268-279.

[3]  Kankanhalli, A., Taher, M., Cavusoglu, H., and Kim, S.H. Gamifciation: A new paradigm for online user engagement. International Conference on Information Systems. 2012.

[4]  Kapp, K., Blair, L., and Mesch, R. The gamification of learning and instruction field book: Ideas into practice. Wiley, CA. 2013.

[5]  Jacques, R., Preece, J., and Carey, T. Engagement as a design concept for multimedia. *Canadian Journal of Educational Communication*, 24, 1(1995), 49–59.

[6]  Magni, M., Taylor, M. S., and Venkatesh, V. To play or not to play: A cross-temporal investigation using hedonic and instrumental perspective to explain user intentions to explore a technology. *International Journal of Human-Computer Studies*, 68, 9 (2010), 672-588.

[7]  Schaufeli, W.B., Martínez, I.M., Pinto, A.M., Salanova, M., and Bakker, A.B. Burnout and engagement in university students: A cross-national study. *Journal of Cross-cultural Psychology*, 33,5 (2002), 464-481.

[8]  Truss C, Alfes K, Delbridge R, Shantz A, Soane E. Employee Engagement in Theory and Practice, London: Routledge, 2013.