Gamification as a Catalyst for Collaboration

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Abstract
Current research in AIS SIGHCI and ACM SIGCHI is progressing in silos. A stronger collaboration between these two communities would result in more comprehensive, theory-driven technically-sound experimental design and testing. As a more concrete illustration of the benefits of such a collaboration, an ongoing gamification experiment is described in detail. Gamification's value as a catalyst for collaboration is then discussed.

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Gamification; engagement; performance; information systems; human-computer interaction; neurophysiology

ACM Classification Keywords
H.5.m [Information Interfaces and Presentation (e.g., HCI)]: Miscellaneous; K.8.0 [Personal Computing]: Games; J.4 [Social and Behavioral Sciences]: Psychology, Sociology

Introduction

Current research in AIS SIGHCI and ACM SIGCHI is progressing in silos. SIGHCI focuses on the interaction between humans, information systems and tasks,

mostly in a business/organizational context. SIGCHI has a broader, less defined range. It is involved in the design and implementation of technology-based systems, as well as the technology-human interaction, in a multitude of contexts. A stronger collaboration between these two communities would result in more comprehensive, theory-driven technically-sound experimental design and testing, through the technical precision of HCI research and the broad interdisciplinary reach of CHI research. First, gamification will quickly be defined, followed by a detailed description of an ongoing gamification experiment depicting the essence of collaboration between both communities.

Gamification is the application of game-design elements and game principles in non-game contexts [5]. Recently, there has been a considerable amount of research in computer-human interaction showing how gamification can be successfully applied in a variety of contexts [11]. One of the most common applications of gamification is the integration of game-design elements within an employee interfaces to increase organizational productivity through engagement [12]. For example, Klevers et al. gamified the work interface of material-handling workers, which lead to a subsequent rise in motivation, engagement and productivity [8].

There have been integrative frameworks put forward by researcher in both communities: Liu et al. [9] in information systems and Tondello et al. [14] in user experience. Liu et al. developed a framework to design and research gamified information systems. This framework stresses the importance of integrating interdisciplinary perspectives and theories when designing and researching gamified systems. In summary, this framework proposes that the design of gamified information systems has to take into account two types of outcomes: instrumental, which relates to a more tangible outcome (e.g. higher company profit, less absenteeism); and experiential, which relates to an experienced feeling (e.g. engagement at work, positive feeling). Tondello et al.'s framework rather focuses on examining the organizational and individual effects of gamified systems through a well-established psychological motivation theory known as goal-setting theory. In summary, this framework urges researchers to incorporate goal-setting theory mechanisms into the design and research of gamified systems.

Illustrative ongoing experiment

The design of the current experiment was based on recommendations from both the above-mentioned frameworks, which come from two communities: AIS (Liu et al.) and ACM (Tondello et al.). The objective of this experiment is to determine how the gamification of a warehouse employee interface affects employee engagement and performance. Specifically, we have integrated two types of goal-setting (self-set vs. assigned), and performance feedback into the employee interface. Based on three complementary psychological theories of human motivation (self-determination theory [2], job demands-resource model [3], and goal-setting theory [10]) we have developed two hypotheses:

H1: The use of a gamified system where goals are either self-set or assigned and feedback is received will lead to higher engagement and performance, when compared to no gamification.

H2: The use of a gamified system where goal-setting is self-set will lead to higher engagement and performance when compared to assigned goal.

To tackle this research question, we have put together a well-rounded, diverse team of researchers and professionals from both communities. Our team consists of researchers whose background include

information systems, organizational psychology, neuroscience, game design, user experience, as well as professionals who specialize in software design, warehouse management, and user experience. We believe that with the collaboration of such a diverse research team, every aspect of the research design and testing is covered: the software designers create the employee interface and implement game elements based on recommendations from the game design researchers; the warehouse management expert oversees the creation of a realistic simulated warehouse in a lab setting, as well as the creation of experimental tasks that are in line with those done in real warehouses; the experts in UX and the information systems researcher create an experimental design that would allow for the proper evaluation of the gamified employee interface; the organizational psychology and neuroscience researchers integrate the proper neurophysiological tools to properly address the research question, as well as provide hypothesis development and result interpretation based on empirically-validated psychological motivational theory.

In this study, participants will have to complete warehouse picking tasks, which consist of taking a certain quantity an item from a certain compartment in the warehouse shelves (e.g. pick ten red pens from compartment A01002). Participants will have an Android device (Panasonic FZ-N1) strapped to their arm giving them instructions on items and quantities to pick. To test the mentioned hypotheses, three conditions were developed:

Condition 1: in this condition, participants complete the picking task without any set goal or feedback. This acts as the control condition.

Condition 2: in this condition, participants set their own goals at the beginning of the condition (e.g. Today, I want to beat the average time by 30 seconds). When participants have completed the task, on-screen feedback about their performance will appear (e.g.. "Great job, you have completed your goal").

Condition 3: in this condition, participants are assigned a goal (average completion time). All 20 participants will be assigned the same goal. They will also receive on-screen feedback about their performance.

As mentioned above this study will look at engagement and performance as outcome variables. Engagement is a multifaceted concept consisting of cognitive, emotional and behavioral engagement [6]. Physiological measures were used to capture task engagement, without interfering with the task itself, therefore maximizing the ecological validity. Specifically, electroencephalography is used to measure cognitive and emotional engagement [1] [13]. Electrodermal activity and electrocardiography are used to measure emotional engagement. Self-report measures will also be used to evaluate emotional engagement. Observation will be used to evaluate behavioral engagement.

Conclusion

Both networks, regardless of their specific priorities and perspectives, would greatly benefit from research that is interdisciplinary and that includes academic-professional collaboration. Gamification, among other topics, can be used a catalyst for this collaboration because its research is best done when integrating researchers and professionals from a variety of related domains. The ongoing experiment described above is an example research that could help bridge the gap between communities, by integrating both AIS SIGHCI and ACM SIGCHI research, and by fostering collaboration between academic and corporate spheres.

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