

Impacts of Forced Serious Game Play on Vulnerable Subgroups

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Introduction

Digital games for entertainment are selected and played voluntarily by players with different preferences. Games for learning, on the other hand, can be quite the opposite. There are of course informal learning games which are supplementary to formal education and also played voluntarily. But many serious games are used in formal learning contexts, such as high school curriculum, corporate training, or military simulation. The players cannot choose to play these serious games or not, they are often assigned as a part of formal education or training, and sometimes they are used as assessments of whether the player has gained the desired outcomes.

Because the audience is not self-selected, serious games face a much more diverse player audience than entertainment games. The audience for serious games may include “disadvantaged player,” for example, non-gamer who rarely play any kind of digital games, or resistant players who dislike that particular game. These players are disadvantaged because they must devote more effort into learning how to play game (Cardinu, Maas, Rosabianca, & Kiesner, 2005; Croizet et al., 2004), or to overcome emotional rejection to play at all. There may also be gender differences because previous studies have shown that female devote less time to gaming than males (Winn & Heeter, 2009), and plays a less variety of game genres (Lenhart, Kahne, Middaugh, Evans, & Vitek. 2008).

This would not be a concern if the only consequence was lack of fun, but when the serious games are assigned as educational, training, or simulation tools. Being a disadvantaged player may result in not learning the required knowledge and skills, or unable to pass formal assessments. The ramifications of this are obvious, though surprisingly overlooked in the digital game-based learning community at present. In this study, we used survey data and actual gameplay data to measure how three subgroups of disadvantaged players (non-gamers, resistant players, and females) approach and play serious games. We also discussed implications for game design.

Our hypotheses and research questions are:

H1: Resistant players will have 1) lesser commitment to play; 2) experience less positive and more negative affect; 3) experience less focused attention; and 4) perform worse than eager players who like the game.

H2: Non-gamers will have 1) lower commitment to play; 2) experience less positive and more negative affect; 3) show less focused attention; and 4) perform worse than will avid and moderate gamers.

RQ1: How do not enjoying a game and being a non-gamer relate to the choice of difficulty level and other measures of self challenge?

RQ2: How does gender intersect with commitment, affect, performance, and challenge?

Methods

330 undergraduates from four large telecommunication or history classes at a large Midwestern university were recruited for this research. The participants completed an initial survey measuring their previous game experiences, game preferences, game frequency, and player demographics. Then the participants were randomly assigned to play two out of four different online casual games. The four games were chosen for this study because they represented a variety of genre and serious game design intentions, three of the games were serious games and one was an entertainment game for comparison. The participants were asked to play for 10 minutes on each game and completed a post-play survey immediately after. The post-play survey measured their reactions towards the game they just played. While the participants were playing the game, our system collected gameplay data about their choices, actions, including time and frequency in the games.

The independent variables in this study are how much time per week participants normally spend gaming (non-gamers or gamers), player liking of the game (their eagerness or resistance to play), and gender. The dependent variables in this study were Commitment, Affect, Performance, and Challenge. Since the four games have different content and features, we constructed the constructs using variables specific to each game. The constructs were determined before the study based on pre-test results. The constructs were tested for reliability, Cronbach's alpha ranged from .76 to .88.

We used one-way ANOVA including post-hoc Tukey comparisons across individual sub-group means to compare player and gamers. T-tests were used to examine the relationship between gender and each dependent variable.

Findings

For required serious games to have their intended impact, a player's commitment to play for the assigned duration or longer almost certainly matters. When people assigned to play for 10 minutes stop playing before the assigned duration, the likelihood they will receive the intended benefit from playing is low.

Commitment: We found that an average of 16.80% players across four games played for less than five minutes, long before their assigned 10 minutes. A player's previous gaming experience (gamer or non-gamer) was not significantly related to their game commitment in three of the four games. The only game that reached significant difference was a tower-defense entertainment game. However, interest in the game (eager or resistant) was a better determinant of commitment than was gaming experience. Gender was significantly related to commitment for three of four games. Males showed more commitment in the two games that involved shooting, and females were more committed to the education game that requires management of resources and relied on knowledge about the constitution to win.

Affect: Positive and negative affect along with player attention during play mitigate whether or not a serious game has the desired impact. Positive affect may enhance learning. Negative affect may interfere with learning (Covington, Omelich, & Schwarzer, 1986; Thomas et al., 2006). Attention may enhance learning. We found that gaming frequency (gamer or non-gamer) may interact with negative affect in serious games, but this is highly depending upon the nature of the serious game. Avid gamers who played the tower-defense entertainment game experienced more focused attention than moderate gamers and non-gamers. But for the other three games, gaming frequency had no relationship to attention.

Performance: Performance was significantly lower among non-gamers in three out of the four games, the exception, although not significant, conforms to the same direction. Resistant players (those who would not play the game anyway also performed worse than those who would play anyway across three of the four games. However, gender performance was not significantly different in three of the four games, males performed better in the exceptional game.

Challenge: Optimal levels of challenge is a big deal for game design in general, and is likely very important for serious games. Game designers often discuss Csikszentmihalyi's (1991) idea of flow (Salen & Zimmerman, 2004) – just the right amount of challenge relative to the player's ability. Too much challenge leads to frustration and too little challenge leads to boredom. Participants in this study found two of the games difficult and the other two easy. There was no difference in previous gaming experience (gamer or non-gamer). Significant difference was only found between eager and resistant players on the two easy games. Those who would play anyway (eager) experienced the game as more challenging than those who might or would not play anyway (resistant). There were no gender differences.

Discussion

Hypothesis 1 was confirmed. Our research strongly suggests that the most important threat to a serious game having its intended impact is when players dislike the game and would not play it on their own if not assigned to do so. Resistant players were less committed (play for less time), experienced less positive affect, less focused attention, and more negative affect than eager players who would play even if they did not have to. Resistant players performed worse and played in such a way that they experienced less challenge during the game. Serious games are likely to be least effective for players who dislike a game and most effective for those who like the game.

Hypothesis 2 was partially confirmed. Non-gamers were at a serious disadvantage as far as performance. To the extent that getting the intended impact from a serious game depends upon playing well, non-gamers were mostly left behind. Non-gamers experienced similar amounts of positive affect but more negative affect in two of the four games, which might be expected to interfere with learning or cognitive benefits.

Males tended to seek more difficult challenges in games than females did. On two of four games (the two games which involved shooting), males were more committed (played for longer). On the learning game, females showed significantly stronger commitment. Performance was rarely different by gender. Affect was only different for one of the games. The optimal amount of challenge may be the most important gender difference to consider when designing serious games.

By conducting parallel analyses of four different games, this research strongly documents that resistant players and non-gamers face disadvantages when playing serious games. Our analyses go beyond simply comparing performance among three potentially vulnerable groups. We looked at three dimensions of serious game play (player commitment, player affect, and challenge seeking) that psychology and learning theories predict would have an impact on learning. Our study used only a single measure of performance to represent potential intended benefits of each game. These findings should be replicated with particular serious games, using more elaborate and complete measures of performance/intended impact. Future research should consider how serious games might be designed or introduced to players to mitigate these kinds of predictable resistant player and non-gamer issues. Deeper understanding of subtle gender differences related to challenge in games could lead to design ideas to optimize gameplay for diverse challenge-seekers.

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