
Evaluating User Engagement of a Face-to-Face Mobile Gaming Application

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Abstract

Face-to-face mobile games are an emerging type of game playing that enables multi-user, co-located, competitive, and collaborative playing. This type of games enriches users' experience with social engagement through 2 types of social interactions, person versus person (PvP) and team versus team (TvT). However, the engagement formation mechanism in PvP and TvT interactions is still unknown. The purpose of this study was to evaluate these 2 types of social interaction on user experience with social engagement. Twenty-eight users participated in this experimental study. The results indicated that the competitiveness of players predicts engagement in PvP games, and the cooperation among players predicts engagement in TVT games. The correlation of cooperation and competition with performance was also evaluated in this study.

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Introduction

Over 500 million mobile gaming users exist worldwide and these users created 12.3 billion in revenue in the mobile gaming market in 2013 [1]. Mobile gaming applications are widely used and have driven the development of the computer gaming industry. However, despite the growing market for mobile games, only 2% of new game applications can generate profit and succeed in the market [2]. In addition, even companies that have developed a successful mobile game that has been downloaded by millions of users cannot replicate the development process to successfully provide new games in the market. Consequently, designers develop methods for creating a game that attracts and engages users, and provides them with a favorable gaming experience.

The Entertainment Software Association (ESA) reported that 77% of users prefer to play with others at least 1 hr per week for social purposes [3]. Other studies have

also proven that social interaction is the key element of a successful game [4-5]. Therefore, mobile game designers have implemented social features to enable players to connect with each other in a virtual setting; for example, making new friends and connections by using social networks such as Facebook, Twitter, and Google Plus.

Compared with the social features of mobile games, face-to-face mobile games are more focused on providing social interactions that emulate those that occur in the real world, which is a new type of interaction in mobile gaming. Face-to-face mobile games enable multiuser, co-located, competitive, and collaborative play. This type of social interaction is similar to interactions that occur when playing board video games and can be classified into two types—person versus person (PvP) and team versus team (TvT).

PvP games are characterized by initiating competitive interactions within the game between two or more users. For example, Monopoly is a strategic planning and resource management game, the goal of which is to bankrupt other users. This game satisfied users by providing face-to-face social interactions through the buying and selling of real estate, and the collecting of rent from the houses and hotels of other players. TvT games require users to form two or more groups and fight with each other to achieve a specific goal. For example, in the game Saboteur, users are assigned to either the "Miner" or "Saboteur" group, are given a mixed hand of path and action cards, and take turns successively playing one card from their hand (or discarding it) and collecting a new card from the draw pile.

Face-to-face social interactions result in high levels of engagement in board games, but this type of interaction in mobile games has been rarely studied. Mobile game applications are computer based and provide substantial interactive gaming experiences to the user, compared with board games. Understanding how to enrich users' social interactions is critical for mobile game designers, especially for game companies that aim to attract and engage users in gameplay for an extended period. In this study, the effect of PvP and TvT on the experience of users who engage in face-to-face mobile games was investigated.

Method

We conducted a laboratory experiment on users by using the social interaction types (PvP and TvT) as independent variables and the users' engagement experience as the dependent variable. In addition, the users' competitiveness, cooperation, and game performance were measured.

Participants

Twelve male and 16 female students participated in the experiments. The average age of the participants was 19.86 years (Std. = 1.535). All the users owned at least one smartphone and had at least 2 years of mobile gaming experience.

Materials and procedure

This study implemented an experimental environment by using an iOS tablet game named "The Four Pigs" (<http://goo.gl/yVnOOW>). Students from the China University of Technology in Taiwan developed this game. The Four Pigs involves both interaction types—*freeze tag game* mode (PvP) and *soccer game* mode

(TvT)—and allows four users to play together on an iPad.



Figure 1. The screenshot of *Freeze tag game (PvP)*: Two or more participants played four distinct characters, and one participant was randomly selected as a “ghost” when the game started. The ghost chases the other players, attempting to approach the targets and tag them—touching them with a —while the others try to escape. When a user is tagged, the user becomes the “ghost.” All users must complete the following two goals in 60 s: (a) prevent the designated character from being touched by the ghost and (b) eat as many apples as possible. After 60 s have passed, the system shows a leaderboard and designates the participant who ate the most apples as the winner. The participant who ate the fewest apples was ranked in last place.

The participants learned the rules of the game by playing both games at least once and receiving instruction provided by experimentalists. Subsequently, four of the subjects formed a group, played both game modes, and then completed a questionnaire. The game scores the four subjects achieved in PvP mode were calculated individually; in TvT mode, two of the four people formed a team and competed with the other team. A screenshot and game rule of freeze tag mode and the soccer game is respectively illustrated in **Figures 1** and **2**.

Measures

Engagement. Engagement refers to the generic indicator of game involvement. The 19-item game engagement scale developed by Brockmyer et al. [6] was used for measuring participant engagement after each trial.

Sense of Competition. Competitiveness is the user’s desire to compete with others, including achieving a high score and winning over others. The three-item competition scale developed by Hsu et al. [7] was used for measuring the participants’ sense of competition after each trial.

Sense of Cooperation. Cooperation is the act of working together toward a common goal and is essential when individuals are required to participate in certain activities and perform differentiated tasks. The four-item cooperation scale developed by Hsu et al. [8] was used for measuring the participants’ sense of cooperation after each trial.

Personal performance. The measure of personal

performance comprises the number of apples eaten, users’ rank based on score, and the number of times a user became the ghost.

Group performance. The measure of group performance includes the number of wins, losses, and goals, and the team score.

Results

The relationship between the participants’ sense of engagement and competition and cooperation in PvP mode was first examined. The regression results indicated that game engagement was significantly predicted by competitiveness ($b = .174, p < .05$). In addition, the relationship between the participants’ sense of engagement and competition and cooperation in TvT mode was examined, and the result indicated that engagement is predicted by cooperation ($b = .295, p < .05$).

To examine potential differences between the two game types used in the experiments, Spearman’s correlation analysis was conducted for all constructs. Regarding PvP mode, competitiveness was significantly correlated with the number of apples eaten ($r = 0.574, p < .01$) and rank ($r = -0.787, p < .01$). The correlation between cooperation and number of apples eaten and rank was not significant. Furthermore, the number of times the users were the ghost was correlated with neither the sense of competition nor cooperation.

Regarding TvT mode, competition and cooperation were significantly correlated with the participant’s self-score ($r = 0.694$ and 0.609 , respectively, $p < .01$) and the opponent’s score ($r = -0.512$ and -0.383 , respectively, $p < .01$). Specifically, the number of goals was correlated only with competitiveness ($r = 0.463, 0.609, p < .01$),

which may imply that personal performance is correlated with a sense of competition.

Discussion

According to our research, this study is the first to theoretically determine and empirically test face-to-face mobile game users' experience.

The regression results indicated that game engagement is significantly predicted by competitiveness in PvP mode, which means that the user competes with others to achieve the highest score and win the game. Thus, users enjoy the well-being and prize and continue competing with others. The correlation analysis results also support this finding: participants who wished to improve personal performance (high number of apples and a high rank) became significantly competitive when participating in the game. The result also revealed that engagement is predicted by cooperation in TvT games. This may imply that cooperation encourages users to fight to achieve the team goal. The correlation analysis results also support this finding: participants who strove to improve group performance (high self-score and low opponent score) perceived cooperation among the group members when playing the game. Users were more engaged in the experience of collaborating with teammates than in the experience of competing with the opposing team.

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