The effects of peer intrinsic and extrinsic motivation on MMOG game-based collaborative learning

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ABSTRACT

We combined Massively Multiplayer Online Game and technology-based collaborative learning methods to examine peer motivational factors influencing intention to learn; these have seldom been jointly examined. We proposed two new constructs, peer intrinsic motivation and peer extrinsic motivation, and investigated their effect on a player’s intention to learn individually and collaboratively. Our survey and interview findings showed that an individual player’s peer intrinsic and extrinsic motivations had significantly positive influence on his or her intention to learn collaboratively and individually. Implications for academics, educators, game developers, and players are discussed.

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1. Introduction

Massively Multiplayer Online Game (MMOG) and technology-based collaborative learning have been separate streams of research; we decided to examine how they jointly affected peer motivational factors influencing intention to learn.

As a hedonic IS, MMOG is a unique type of electronic game: “MMOGs are highly graphical 2- or 3-D videogames played online, allowing individuals, through their self-created digital characters or ‘avatars,’ to interact not only with the gaming software (the designed environment of the game and the computer-controlled characters within it) but with other players’ avatars as well. These virtual worlds are persistent social and material worlds, loosely structured by open-ended (fantasy) narratives, where players are largely free to do as they please—slay ogres, siege castles, barter goods in town, or shake the fruit out of trees” [18]. Previous studies have shown that a player spends on average of almost 26 h per week playing MMOGs [24], with a significant impact on the player’s behavior. However, the occurrence of such behavior from the motivational perspective, and the motivational drivers for learning collaboratively in this environment are not yet well known.

A number of researchers have suggested that the use of MMOG is a new generation of educational platform (e.g., [4,5,13]), allowing players to interact with each other and learn together through collaborative game-play. Research on MMOG game-based learning has shown that several unique characteristics of MMOG (e.g., avatar/virtual identity, co-presence, group identity and transparency) may trigger learning behavior in the gaming context. When examining the constructivist belief of learning from the IS perspective, learning in MMOG can be seen as a process resulting from the adoption and continuous use of the game. This process can be triggered by intrinsic and extrinsic motivation as perceived by the players. In addition to individual engagement in the learning process, MMOG game-based learning can occur and be motivated through online player-to-player interaction.

We therefore examined the occurrence of collaborative learning behavior and motivational drivers in MMOG, attempting to extend the concept of motivation to play at the peer level, bridging the characteristics of MMOG by using peer motivations. We also investigated the effect of peer motivation on players’ behavioral intention to learn in the context of MMOG.

2. Literature review

2.1. MMOG game-based learning

MMOG is designed to support dynamic social structures, consisting of several characteristics that may trigger individual and collaborative learning behavior from the problem-based, cognitive learning and constructivist point of view. Table 1 summarizes the characteristics of MMOGs, and provides definitions, etc.

An avatar is the player’s representation that enhances the player’s sense of identity and presence and helps in performing
learning tasks. The use of an avatar in MMOGs aligns with Gee’s example of virtual identity in a gaming environment wherein the self-created avatar is necessary for the players to commit and take on a new identity that they value, and in which they learn deeply.

Co-presence is the sense of being together with other people in the same virtual environment. It is the fundamental prerequisite of collaborative learning and is claimed to be one of the crucial social components of computer-mediated communication.

Players can join named groups (e.g., guilds in World of Warcraft (WoW)) in order to socialize and play together. Collaborative-competition is introduced in MMOGs; it encourages collaborative interaction and learning among in-group players to compete with out-group players. According to Social Identity Theory, when individuals are faced with situations in collaborative-competition, individuals in the group tend to act for the benefit of the group and discriminate against others.

Transparency in MMOGs allows players to observe others and retrieve their performance statistics, which allows informational exchange and influence to occur between players; this leads to the generation of an internalization process, which occurs when a player learns methods and improve knowledge of the game from his or her reference group.

MMOG can also be regarded as a problem-based learning environment [12]. Within this, players learn game-based knowledge and skills (e.g., controlling an avatar, pulling a monster and solving a quest), and act together with other team players to complete the assigned tasks. In our study, we focused on the motivational factors of the MMOG game-based learning environment and their impact on players’ intention to learn the game knowledge and skills.

2.2. TAM: motivation to use/play and intention to use/learn

From the player’s point of view, a game is not generally designed for educational purposes. The constructivist belief of learning views knowledge as the result of the active engagement of the learner in the comprehension and conception of the information. Based on this, from the IS perspective, computer games and MMOG fall under the category of a hedonic IS [19], in which learning can occur as part of the process of motivating a participant with an intention to learn and participate individually and collaboratively.

According to motivational theories, motivation to play results from both intrinsic and extrinsic motivation. Based on motivational theories, TAM considered perceived usefulness as an extrinsic motivation, but perceived enjoyment as an intrinsic motivation [6]. Moreover, MMOG has a “massively multiplayer” nature, in which player participation may be motivated by peers on the same team. According to cognitive learning theory, learning consists of personal and social components. Player-to-player interactions allow learning to occur not only individually but also collaboratively. In addition, computer-mediated learning can be initiated and motivated at the peer level through collaborative learning interaction.

Because of the importance of peer motivations, learning intentions, and collaborative interaction, this we added two new constructs, peer intrinsic motivation and peer extrinsic motivation, and examined their effect on the intention to learn individually and collaboratively in a virtual environment.

3. Research model and hypotheses

We proposed peer intrinsic motivation and peer extrinsic motivation as constructs that affected a participant’s intention to learn individually and intention to learn collaboratively (see Fig. 1 for the research model, and Table 2 for the definitions of constructs). Our study was set in the context of World of Warcraft (WoW), an MMOG game-based virtual environment. The reason for choosing this game was that it is the bestselling MMOG in the world, with over 12 million subscribers worldwide.

3.1. Peer motivations

Many studies have demonstrated the need to include intrinsic and extrinsic motivation to explain IT acceptance, including Computer-Mediated Communication (CMC) applications like instant messaging and the internet-based learning medium. However, in contrast to traditional computer games, MMOG allows for the co-presence of players so that they can play and learn

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**Table 1**

Characteristics of MMOG.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Research discipline</th>
<th>Related literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avatar/virtual identity</td>
<td>Virtual Reality</td>
<td>[5, 13]</td>
</tr>
<tr>
<td>Co-presence</td>
<td>Information Systems</td>
<td>[2]</td>
</tr>
<tr>
<td>Group identity</td>
<td>Management; Virtual Reality</td>
<td>[8]</td>
</tr>
<tr>
<td>Transparency</td>
<td>Human Computer Interface</td>
<td>[7]</td>
</tr>
</tbody>
</table>

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**Table 2**

Definitions of constructs.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer Intrinsic Motivation (PIM)</td>
<td>… the perception that an individual will want to perform an activity, driven by the desire to have his or her peers engage in an enjoyable, self-determined, and competence-enhancing activity</td>
</tr>
<tr>
<td>Peer Extrinsic Motivation (PEM)</td>
<td>… the perception that an individual will want to perform an activity, driven by the desire to have his or her peers obtain tangible or intangible external rewards</td>
</tr>
<tr>
<td>Intention to Learn Individually (ILI)</td>
<td>… the intention for an individual to learn to perform an activity by his or her own efforts continuously for a period of time</td>
</tr>
<tr>
<td>Intention to Learn Collaboratively (ILC)</td>
<td>… the intention for an individual to learn to perform an activity together with his or her peers (i.e., helping each other) continuously for a period of time</td>
</tr>
</tbody>
</table>
as teams [14]. Therefore, we were interested in intrinsic and extrinsic motivational factors at the collaborative level and believed that MMOG could provide both peer intrinsic motivation and peer extrinsic motivation.

In distinguishing between the intrinsic and extrinsic motivations of an individual, it is important to note that motivation that comes from peers is counted as an external factor on knowing about team members’ enjoyment of the game in general (peer intrinsic motivation), and that team members achieve certain game features and rewards (peer extrinsic motivation).

3.1.1. Peer Intrinsic Motivation
Intrinsic motivation is driven by the goal of being engaged in enjoyable, self-determined, and competence-enhancing behavior. Within an online game setting, players tend to be mostly motivated by intrinsic interest [9]. If a player finds MMOG enjoyable through the gameplay process, he or she will be driven by intrinsic motivation and will enjoy the game itself.

Thus, peer intrinsic motivation is driven by the goal of engaging in a behavior that complies with norms and values. As members of a community, individuals are normatively and intrinsically motivated to engage in, or refrain from, a given behavior depending on the community’s norms and values, which Gottschalg and Zollo call “normative intrinsic motivation” [17]. Instead of individual enjoyment, players can achieve collective enjoyment by completing quests as teams, and by joining guilds. MMOGs therefore have two essential characteristics: co-presence (being together with others in the same virtual environment) and group identity (having joined a guild, its name will be displayed together with the name of the avatars).

3.1.2. Peer Extrinsic Motivation
Extrinsic motivation is driven by the goal of obtaining work rewards or outcomes such as money, power, or recognition; its impact depends jointly on the rewards (or sanctions) and their importance to the individual. In the context of MMOG, a player’s avatar is rewarded by leveling-up once he/she has accumulated enough experience points. At the same time, the player can collect in-game credits and weapons upon completion of quests and after defeating monsters. These acts in MMOG make avatars wealthier and stronger [15]. Unlike traditional computer games, an MMOG player’s previous effort (i.e., experience points, level of the avatar and statistical figures, weapon and items, etc.) must be stored in the game and cannot be reset even when a previous effort led to an undesirable outcome. The combination of these characteristics of MMOG generates extrinsic motivations in the player.

The setting of MMOG involves community conflict. Rewards in MMOG can be awarded to the team (collaborative victory) and the guild upon completion of a collaborative task. Peer intrinsic motivation is driven by the goal of engaging in behavior in which players interact with in-group members in a variety of ways in order to share knowledge and skills that help to increase their capital and to increase chance of winning.

According to Social Identity Theory, individuals with the same group identity tend to act for the benefit of the team and to discriminate against other players.

3.2. Research hypotheses

3.2.1. Social comparison and intention to learn individually
The closer the relationship between individuals, the more likely that an envious comparison will occur. In the context of MMOG, players may come from the same team, belong to the same guild, and/or be fighting for the same goal in the same quest. The transparency characteristic of MMOG allows players to read his/her peers’ values of attributes and to observe their performances. Applying the concept of envy to the virtual environment of MMOG, suggests that feeling of envy will arise when one player perceives that another possesses superior ability.

Envy can be helpful in motivating people to increase their performance in civil competitions. The effect of upward social comparisons on negative psychological reactions could be explained by the use of the superior target person as a role model. Then the individuals tend to imitate others whom they perceive as being successful and/or highly rewarded.

In the MMOG environment, the feeling of “I wish I had what you have” results from a social comparison between the player and his/her peers. In addition to envy, players may appreciate the fact that successful players on their team help them achieve external rewards that are shared by all other members in the team. Therefore, in our study, we hypothesized that:

**Hypothesis 1.** Peer extrinsic motivation will have a significant positive influence on intention to learn individually in an MMOG context.

3.2.2. Knowledge sharing and intention to learn collaboratively
Bock et al. [3] hypothesized that the benefit of knowledge sharing is spread between individuals, groups, and organizations. As MMOG is a kind of hedonic IS, some MMOG players may focus on the fun-rather than on the productive-aspect of the game. Group and organizational fun belong to our definition of peer intrinsic motivation.

According to studies of social capital and knowledge sharing, individuals will be motivated to contribute their knowledge to other individuals in the community. Wasko and Faraj [22] proposed two constructs that would affect individual motivation for knowledge contribution: (1) it would enhance their reputation; and (2) it usually came from individuals who enjoy helping. Such personal benefits or “private rewards” are more likely to accrue to individuals who actively participate and help others.

In addition to enhancing their reputation, individuals may also receive intrinsic benefits from contributing knowledge. Self-evaluation is an important source of intrinsic motivation that drives engagement in activities for the sake of the activity itself, rather than for rewards. Players may perceive that helping others with challenging problems is interesting, and that it feels good to help others by solving their problems. Individuals are motivated intrinsically to contribute knowledge to others because engaging in intellectual pursuits and solving problems is challenging or fun. Therefore, instead of focusing on comparing the extrinsic rewards of peers, an MMOG player who focuses on peer intrinsic motivation is likely to share knowledge and learn collaboratively through helping one another; therefore, we hypothesized:

**Hypothesis 2.** Peer intrinsic motivation will have a significant positive influence on intention to learn collaboratively in an MMOG context.

4. Research methodology
In our study, data were collected by using a self-report survey and from interviews. The survey was used to collect data on peer motivations and intentions to learn, and to analyze the effects of peer motivations on intentions to learn. Interviews with individual players were used to explain how the unique characteristics of MMOG affected their peer motivation and intentions to learn.

4.1. Survey design
Survey items were designed and developed by using material from prior empirical work, modified to suit the context of our
All items were devised from the perspective of current WoW players, and anchored on a seven-point Likert scale from “Strongly Disagree” (1) to “Strongly Agree” (7). Items on peer intrinsic motivation and peer extrinsic motivation were based on the Work Preference Inventory [1]. These assessed intrinsic and extrinsic motivation in terms of work preference. Eight items (four for peer intrinsic motivation, and four for peer extrinsic motivation) were selected and modified according to our definition of the two constructs, from the perspective of current WoW players.

Items on intention to learn individually and intention to learn collaboratively were created from Venkatesh et al.’s [20] reference to construct behavioral intention. These items assessed intention to use an IS within the coming months. Eight items (four for intention to learn individually; four for intention to learn collaboratively) were created based on our definitions of these two constructs based on the perspectives of current WoW players.

Thus, a survey with four-four-item constructs was developed using conceptual construct validation and was pretested in our pilot study. Table 3 presents the final survey items:

### 4.2. Data collection and respondents

The survey was open to the public through an online survey distribution system for one week. Invitations were sent through WoW networks to online community websites, e.g., Facebook, and through online WoW forums.

The target respondents were current players of WoW. In the survey a self-reported item was designed to indicate the last time he/she had participated in the game. To guarantee the quality of responses, raw data was filtered as follows:

1. World of Warcraft (WoW) Experience

One “yes-or-no” question at the start of the questionnaire asked the respondent: “Have you ever played World of Warcraft?” Respondents who replied “without experience” were not included in the analysis.

According to the design of WoW, players create their avatar by selecting race and class. Limited by the design, several classes are exclusive to certain races. Based on these rules of combinations, two questions were included in the questionnaire; these asked the respondent to select the race and the class of their strongest avatar. The combination of race and class would be checked; those that failed or indicated “others” in the selection, were dropped from analysis.

### 2. Definition of Current Participants

One question was added so that the subject was asked to tell, “When was the last time you played the game World of Warcraft?” Only responses which indicated “within one day” or “longer than one day and within one week” were used for analysis.

Through the online survey distribution system, we received a total of 130 replies. Several other items were included in the survey so that we could check whether the player truly participated in the game. After filtering those respondents that failed this validation process, a total of 94 valid data points were left for data analysis. Most of the respondents were young males (72.3% between the ages of 16–25, and 75.5% were male), and mainly from the server in Taiwan or the USA (90.5%). The sample distribution was thus consistent with that of another MMOG study (which found 80.8% of MMOG players were male, and 75.4% between 18 and 39). Table 4 shows the demographics of the respondents:

### 5. Data analysis

We chose PLS to test our hypotheses because it can handle small sample sizes. Similar to other SEM methods, it simultaneously assesses the reliability and validity of the measures of theoretical constructs and examines the relationship among them [23]. PLS requires a sample size of 10 times the number of predictors, using the indicators of either the most complex formative construct or the largest number of antecedent constructs leading to an
endogenous construct, whichever is greater. For the analysis, we used PL S Graph 3.0.

5.1. Measurement model

The AVE was used to assess the convergent validity of the constructs. Its values should be greater than the normally required 0.50 cut-off criterion. The Internal Composite Reliability (ICR) of the PLS analysis attempts to assess inter-item reliability, in order to ensure internal consistency of indicators. Acceptable values of an ICR for perceptual measures should exceed 0.70 and can be interpreted as its Cronbach Alpha Coefficient. Table 5 summarizes the measurement model results with all ICR and AVE values exceeding the recommended values.

5.2. Model testing

The research models and hypotheses were estimated using 200 iterations of the bootstrapping technique in PL S Graph 3.0. The explanatory power of the structural model was evaluated by looking at the $R^2$ value of the two dependent constructs. The first set of analysis was the full model testing, which included all possible paths between independent variables and dependent variables. The second set of analysis was for hypothesis testing, which included the paths solely between Peer Intrinsic Motivation and Intention to Learn Individually (Hypothesis 1) and between Peer Intrinsic Motivation and Intention to Learn Collaboratively (Hypothesis 2) (Fig. 2).

5.3. Full model testing

5.3.1. Paths to Intention to Learn Individually

The $R^2$ value for intention to learn individually was 13%. As shown in Fig. 3, for the links to intention to learn individually, only the hypothesized path (i.e., Hypothesis 1) between peer extrinsic motivation and intention to learn individually was significant ($\beta = 0.24$ and $p < 0.1$). The path between peer intrinsic motivation and intention to learn individually was not significant.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Weight</th>
<th>Loading</th>
<th>Standard Error</th>
<th>t-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer Intrinsic Motivation (PIM)</td>
<td>PIM1</td>
<td>0.23</td>
<td>0.96</td>
<td>0.01</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>PIM2</td>
<td>0.26</td>
<td>0.98</td>
<td>0.01</td>
<td>110</td>
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<tr>
<td></td>
<td>PIM3</td>
<td>0.26</td>
<td>0.97</td>
<td>0.01</td>
<td>86</td>
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<tr>
<td></td>
<td>PIM4</td>
<td>0.28</td>
<td>0.97</td>
<td>0.01</td>
<td>96</td>
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<td>Peer Extrinsic Motivation (PEM)</td>
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<td>0.92</td>
<td>0.02</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>PEM2</td>
<td>0.28</td>
<td>0.92</td>
<td>0.03</td>
<td>35</td>
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<tr>
<td></td>
<td>PEM3</td>
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<td>0.88</td>
<td>0.03</td>
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<tr>
<td></td>
<td>PEM4</td>
<td>0.25</td>
<td>0.91</td>
<td>0.03</td>
<td>33</td>
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<tr>
<td>Intention to Learn Individually (ILI)</td>
<td>Ili1</td>
<td>0.25</td>
<td>0.92</td>
<td>0.03</td>
<td>32</td>
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<tr>
<td></td>
<td>Ili2</td>
<td>0.26</td>
<td>0.94</td>
<td>0.03</td>
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<tr>
<td></td>
<td>Ili3</td>
<td>0.25</td>
<td>0.94</td>
<td>0.03</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Ili4</td>
<td>0.31</td>
<td>0.94</td>
<td>0.02</td>
<td>52</td>
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<tr>
<td>Intention to Learn Collaboratively (ILC)</td>
<td>ILC1</td>
<td>0.26</td>
<td>0.92</td>
<td>0.02</td>
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<tr>
<td></td>
<td>ILC2</td>
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<td>0.94</td>
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<td></td>
<td>ILC3</td>
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<td></td>
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<td>0.95</td>
<td>0.01</td>
<td>79</td>
</tr>
</tbody>
</table>

Both standard errors and t-values are for loadings, not weights.
Table 7

<table>
<thead>
<tr>
<th></th>
<th>ILI</th>
<th>ILC</th>
<th>PIM</th>
<th>PEM</th>
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<tbody>
<tr>
<td>ILI</td>
<td>0.93</td>
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<td></td>
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<tr>
<td>ILC</td>
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<tr>
<td>PEM</td>
<td>0.34</td>
<td>0.38</td>
<td>0.59</td>
<td>0.91</td>
</tr>
</tbody>
</table>

Note: ILI, Intention to Learn Individually; ILC, Intention to Learn Collaboratively; PIM, Peer Intrinsic Motivation; PEM, Peer Extrinsic Motivation. The shaded numbers in the diagonal row are square roots of the average variance extracted.

Table 8

<table>
<thead>
<tr>
<th>R²</th>
<th>Test of hypotheses</th>
<th>Test of the full model</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILI</td>
<td>0.12</td>
<td>0.13</td>
</tr>
<tr>
<td>ILC</td>
<td>0.22</td>
<td>0.23</td>
</tr>
</tbody>
</table>

β (Sig. level): Test of hypotheses Test of the full model

<table>
<thead>
<tr>
<th>Path</th>
<th>Test of hypotheses</th>
<th>Test of the full model</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIM → ILI</td>
<td>n/a</td>
<td>0.17 (not sig.)</td>
</tr>
<tr>
<td>PIM → ILC</td>
<td>0.47 (p &lt; 0.01)</td>
<td>0.38 (p &lt; 0.01)</td>
</tr>
<tr>
<td>PEM → ILI</td>
<td>0.34 (p &lt; 0.01)</td>
<td>0.24 (p &lt; 0.1)</td>
</tr>
<tr>
<td>PEM → ILC</td>
<td>n/a</td>
<td>0.15 (not sig.)</td>
</tr>
</tbody>
</table>

Note: ILI, Intention to Learn Individually; ILC, Intention to Learn Collaboratively; PIM, Peer Intrinsic Motivation; PEM, Peer Extrinsic Motivation.

5.3.2. Paths to Intention to Learn Collaboratively

The R² value for intention to learn collaboratively is 23%. For the links to intention to learn collaboratively, only the hypothesized path (i.e., Hypothesis 2) between peer intrinsic motivation and intention to learn collaboratively was significant (β = 0.38 and p < 0.01). The path between peer extrinsic motivation and intention to learn collaboratively was not significant.

Insignificant paths from the full model testing were removed, leaving the hypothesized paths (i.e., Hypotheses 1 and 2) for the next round of analysis.

5.4. Hypothesis testing

The R² value for intention to learn individually was 12%. The proposed path between peer extrinsic motivation and intention to learn individually was significant (β = 0.34 and p < 0.01). Statistically, this result showed that peer extrinsic motivation had a significant positive influence on intention to learn individually in an MMOG context. Thus with the consideration of the full model, our analysis result showed that even when including the path between peer intrinsic motivation and intention to learn individually in the analysis, the path did not affect the significant paths of Hypothesis 1.

The R² value for intention to learn collaboratively was 22%. The proposed path between peer intrinsic motivation and intention to learn collaboratively was significant (β = 0.47 and p < 0.01). Statistically, this showed that peer intrinsic motivation had a significant positive influence on intention to learn collaboratively in an MMOG context. With the consideration of the full model, this result showed that even when including the path between peer extrinsic motivation and intention to learn collaboratively in the analysis, the path did not affect the significant of Hypothesis 2.

Table 8 summarizes the comparison of analysis results.

6. Discussion

The main objective of our study was to test a model of peer motivations, as allowing us to investigate why people might have intentions to learn in an MMOG. Our results provided support for the model and supported for our hypotheses.

6.1. Interview results

Interviews were conducted with four WoW players to collect a set of qualitative data.

Similar to the survey invitation, interviewees were recruited from the WoW networks in the online community websites using a random sampling technique. The descriptions of the interviewees are summarized in Table 9. Interviews were conducted using a predefined interview protocol to direct the interview process, as suggested by Irani [10]. All interviews were tape recorded for

Fig. 2. PLS analysis result (full model).

Fig. 3. PLS analysis result (partial model on hypotheses).
scripting and analysis. The duration of each interview was approximately 2 h, and conducted one-on-one. Following the protocol, interviewees were asked questions related to the following issues: (1) their personal background and demographic information, including gaming experience, their personality, gaming style and preference; (2) their interpretation of peer motivations in MMOG and what unique characteristics may drive their peer motivations in MMOG; (3) their anticipated relationship between peer motivations and intentions to learn in MMOG; (4) their personal stories and events at the time of gameplay, including their interpretations and analyses of our results from testing the two hypotheses; and (5) their personal views on MMOG, including the design and characteristics of the game and the styles of their in-game peers. Data from the interviews was used to explain and confirm our quantitative data.

6.1.1. Intention to Learn Individually

With Hypothesis 1 we argue that the feeling of envy and desire for collaborative victory driven by peer extrinsic motivation would stimulate a player’s intention to learn individually. As hypothesized, the result indicated that peer extrinsic motivation had a significant positive influence on intention to learn individually in an MMOG context.

The desire for a collaborative victory was shown by the following statements from one interviewee:

“During a raid, each player will have their own responsibility, and if I cannot handle my role correctly, the whole raid will fail.”

“Some bosses will require the team to cast a special spell, or use a special item when its HP (i.e., Health Point) drops to around 50%, and if one of the teammates cannot cast this spell at the right time, the whole team needs to play the quest once again.”

Based on Johnson and Johnson [11], individual accountability for a group reward can motivate a cooperative group to achieve high levels of individual learning. Thus MMOG players are motivated to learn to perform well individually in order to achieve a collaborative victory. More specifically, rewards are given both to individuals for their correct actions and also to the team or guild upon completion of specific tasks.

However, when players focus on extrinsic rewards, they may feel that all players, including teammates, are competitors. Based on our argument, the transparency and co-presence characteristics of MMOG facilitate players’ observations of each other. When a player observes that he/she lacks another player’s superior quality, achievement, or possession that he/she desires, a feeling of envy may be triggered [21].

The influence of envy can be seen in the following statements from an interviewee:

“In the game World of Warcraft, there are some strong monsters in the game which are designed to be very challenging, and the first guild who defeated such a monster will have the guild’s name recorded in the game as ‘1st killer.’ When I see another guild posting gameplay records on Youtube for the process of being the ‘1st killer’, I really wish to be a member of that guild. I think next time I should do better for my guild in order to make my guild be the ‘1st killer.’”

Nevertheless, with the triggering of this feeling of envy, and the necessity to improve to achieve collaborative victory, the player may be motivated to learn individually in order to more successful and highly rewarded.

In contrast to the real world, some of our abilities are limited physically. Players in the MMOG environment can freely customize their avatars to define their specialty (coupled to their corresponding skills), and play continuously accumulating experience points. Eventually, MMOG players’ dreams of possessing particular abilities occur by their leveling-up.

Based on the Nonaka’s dynamic theory of organizational knowledge creation [16], knowledge can be created and learned through socialization. In our study, we suggested that players may learn through socialization (by observation) in the MMOG environment. This is a form of imitation – learning by observing another’s behavior and performance.

In a multiplayer environment, virtual identity and its transparent characteristics are factors that are different from traditional computer games, where personal learning experience relies mainly on individual participation in pattern searching and trial-by-error. However, in MMOG, observation and team playing result in envy and collaborative victory and players can be motivated with the intention to learn individually through socialization.

6.1.2. Intention to Learn Collaboratively

WoW allows an avatar to join only one guild, a player can actually create multiple avatars, use them for different purposes, and thus work in different guilds. The combination of race and class is a strategic decision because this combination will pre-define the list of skills and avatar’s statistical figures during the advancement of level as the game progresses.

In Hypothesis 2, we argued that the helping behaviors driven by peer intrinsic motivation would stimulate a player’s intention to learn collaboratively. Our survey result indicated that peer intrinsic motivation had a significant positive influence on intention to learn collaboratively in an MMOG context. This argument was confirmed by statements from the interviewees:

“Usually experienced players are those who enjoy the game, and they will not mind helping others even though they don’t know them in the game, as long as everyone in the environment feels happy.”

In contrast to players’ perceptions of peer extrinsic motivation, which may stimulate the feelings of envy and collaborative victory, those who are motivated by peer intrinsic motivation will focus on the gameplay process but not on observable and measurable outcomes. Players also consider that happiness can be shared among the community instead of competing with each other.

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Description</th>
<th>WoW experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A male university graduate, age 26. With more than 10 years of experience on computer gaming. Spending around 1 h daily on computer games.</td>
<td>Since 2004 immediately after the release of WoW</td>
</tr>
<tr>
<td>B</td>
<td>A male undergraduate student, age 20. With around 5 years of experience on computer gaming. Spending around 3 h daily on computer games.</td>
<td>Around 2 years</td>
</tr>
<tr>
<td>C</td>
<td>A male postgraduate student, age 22. Spending around 5 h weekly on computer games.</td>
<td>Around 3 years</td>
</tr>
<tr>
<td>D</td>
<td>A male secondary school student, age 18. Spending most of his spare time on WoW.</td>
<td>Less than a year</td>
</tr>
</tbody>
</table>
“Usually higher-level players are those who enjoy the game, and in order to have his guild run smoothly, we will usually share our experience with new guild members and hope such enjoyment for the game can be transferred to them.”

Compared with the intention to learn individually, intention to learn collaboratively is driven by peer intrinsic motivation. Sharing of knowledge is achieved by leading discussions on the strategies and following the instructions given by experienced teammates.

The motivational force that stimulates intentions to learn is the group identity, but with anonymous individual identity of the players. The avatar is a projection of the player’s virtual identity in the virtual environment. In the MMOG environment, players interact with the virtual environment through their avatars, and this may eliminate fear of interaction, and encourage intention to learn individually and collaboratively through socialization and knowledge sharing respectively.

7. Implications

The results of our study are expected to have a long term impact on our understanding of the use of MMOG for organizational learning and management of education goals as well as for examining the potential causes for threats.

7.1. Academics

For researchers, we have provided a better understanding of the motivation to play in an MMOG context. Hedonic IS differ from utilitarian IS in terms of their reasons for use, and we investigated the motivational drivers of user acceptance in such an IS context. Using the card sorting method and various validations in the data analysis, we have introduced items that can be used to assess the degree of peer motivation and intention to learn within the MMOG context.

Furthermore, our results showed that a player’s perception of peer intrinsic motivations is associated with his/her intention to learn collaboratively, whereas the perception of peer extrinsic motivations is associated with his/her intention to learn individually.

7.2. Educators

Players’ peer intrinsic motivations are associated with their intention to learn collaboratively in an MMOG environment; in contrast, players’ peer extrinsic motivations are associated with their intentions to learn individually. Our findings suggest that educators who want to adopt MMOG as a platform will need to pay special attention to how they want to manipulate the peer motivational factors and learning intentions of players from a psychological perspective. An educator should carefully identify the purpose of teaching in the virtual environment setting. For example, if collaborative learning is the purpose, the educator should act as a coordinator and evince the value of caring teammates, encouraging group work, sharing of joy, and rewarding the group instead of the individual. On the other hand, if the purpose is to create a competitive environment to cultivate individual learning, the educator should act as a coordinator and encourage feelings of envy by listing performance figures for participants.

7.3. Game developers

MMOG players may learn continuously through socialization by observing and imitating other players using their virtual identities. In general, the design of current MMOG environments may promote a comfortable atmosphere for players to socialize and cultivate helping behavior and intention to learn continuously or additively. However, to improve MMOG game quality and gamers’ participation through playing and learning, game developers should pay careful attention to the design of the game so that it can induce peer extrinsic motivation with the envy and collaborative victory feelings (which can stimulate intention to learn individually), and that provokes peer intrinsic motivation with a “collective enjoyment atmosphere” (which can stimulate intention to learn collaboratively). In addition, we may design better game interfaces that can give reasonable expectations to each player of the number of experience points needed for promotion towards the next level, and the kind of spell that his/her avatar can cast.

7.4. Game players

The MMOG learning process may be addictive in nature. Game players must set a clear goal that should be reasonable. Once the goal is met, they should determine rationally whether they would like to continue to play restart the game. More importantly, sources of envy can be found easily outside the game environment.

8. Limitations of study

There are two limitations related to the setting of this study. The first concerns how data are collected. Our data were collected from MMOG players of WoW using an online survey and interview. The survey was open to the public through an online survey distribution system for a fixed period of one week, while the interviews were scheduled during three days. Being an exploratory research, the small sample size and the data collection methods could lead to sample bias.

The second limitation relates to what data are collected. Our model was designed to collect MMOG players’ perceptions only on peer motivations and intentions to learn. However, we should also have collected data on to the collaborative learning behavior during game playing.

9. Conclusion

Our study proposed two new constructs, peer intrinsic motivation and peer extrinsic motivation from a psychological perspective, and examined their effect on players’ intentions to learn in the context of a hedonic IS using a multi-method protocol. The survey results indicated that individual players’ peer intrinsic motivations positively influenced their intention to learn collaboratively, while individual players’ peer extrinsic motivations significantly influenced their intentions to learn individually. Our findings suggest that a specific design of the game may be able to induce feelings of envy together with collaborative victory among MMOG players, and may also to provoke a collective enjoyable atmosphere.

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References


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