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Service scenarios - A socio-technical approach to business service modeling

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INTENTION TO LEARN IN MMOG: EXAMINING THE ROLES OF PEER INTRINSIC AND EXTRINSIC MOTIVATIONS

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Abstract

Massively Multiplayer Online Game (MMOG) is a unique categorization of electronic game which allows thousands of players to play simultaneously through the Internet in the same virtual environment. A number of researchers have started to introduce the use of MMOG as a new generation of educational platform, allowing players to interact and to learn together through collaborative game-play. However, the answers for the occurrence of collaborative learning behaviour and the motivational drivers for learning collaboratively in a MMOG are still under-researched.

Motivated by such concerns, this study tests a theoretical model to explain individual's intention to learn by peer motivations. The model employs motivational theories to propose two external motivational factors, namely peer intrinsic motivation and peer extrinsic motivation, and investigates effects of the two new constructs on MMOG players' intention to learn individually and intention to learn collaboratively by building on the cognitive learning theory.

Based on a study with 94 valid current MMOG player responses, PLS analysis shows that peer intrinsic motivation to play has a significant positive influence on the intention to learn collaboratively, while peer extrinsic motivation to play has a significant positive influence on the intention to learn individually. The results of our findings indicate potential implications to researchers, educators and game developers.

Keywords: Collaboration, Learning, Virtual world, Technology Acceptance Model (TAM)

1 INTRODUCTION

This study aims to bring together *Massively Multiplayer Online Game* (MMOG) and technology-based collaborative learning streams of research to examine peer motivational factors influencing intention to learn that is under-researched so far. As a hedonic information system, MMOG is a unique categorization of electronic game. By definition, *"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"* (Steinkuehler 2004). A growing number of researchers have started to introduce the use of MMOG as a new generation of educational platform (e.g. Gee 2004, Childress and Braswell 2006, Mikropoulos 2006), allowing players to interact with each other, and so as to learn together through collaborative game-play. However, the answers for the occurrence of collaborative learning behaviour in MMOG, and the motivational drivers for learning collaboratively in a MMOG environment are still under-researched.

To address this under-researched area, the objectives of this study are to examine the occurrence of collaborative learning behaviour and motivational drivers in MMOG by extending motivation to play to the peer level, bridging the characteristics of MMOG with peer motivations, and investigating the effect of peer motivations towards players' behavioural intention to learn in the context of MMOG.

In the next section, we present the literature review. Then we discuss the research model, hypotheses and methodology, followed by the discussion of the results, implications, limitations and future research directions. The conclusion of this study is presented in the final section.

2 REVIEW OF LITERATURE

The first stream of reviewed research is on MMOG game-based learning which believes MMOG is a new type of computer-mediated communication application and the unique characteristics of MMOG may trigger learning behaviours of game players in the gaming context. The second stream of reviewed research is on the explanation of relationships between motivational factors and intentions to play/use/learn in a gaming context by Technology Adoption Model (TAM).

2.1 MMOG game-based learning

MMOG is a new type of Computer-Mediated Communication (CMC) application, with recreational and playful context that are designed to support dynamic social structures (Pena and Hancock 2006). MMOG consists of several unique characteristics that may trigger learning behaviour in the gaming context:

- Avatar / Virtual Identity: The existence of an avatar is the player's representation which enhances the player's sense of identity and presence, and helps the player to successfully perform the learning tasks (Mikropoulos 2006). The use of avatar in MMOG aligns with Gee's (2004) example of virtual identity in gaming environment that the self created avatar is necessary for players to commit and take on a new identity they value and in which they become heavily invested in deep learning.

- Co-presence: Co-presence is the sense of being there in other places and being together with other people (Biocca et al. 2001). It is the fundamental prerequisite of collaborative learning and it is claimed to be one of the crucial social components of computer-mediated communication (Spears and Lea 1992).

- Collective Identity: Players can join *guilds* (named teams) to socialize and play together. Collaborative-competition is introduced in MMOG and encourages collaboration among in-team players to compete with out-team players. According to the social identity theory (Tajfel and Turner 1979), when individual is faced with such situation, collective identity would be introduced and individuals tend to act in the benefit of the team and discriminate the out-teams.
- Transparency: Transparency in MMOG is to allow players to retrieve values of attributes of avatars in the environment. Such characteristic allows informational influence to happen between players' actions in the virtual environment, which in return generate an internalization process when a player perceives information as a means to enhance his/her knowledge above that of reference groups (Kelman 1961).

2.2   Technology Acceptance Model (TAM): Motivation to Use/Play and Intention to Use/Learn

A game is not necessary to be designed for educational purpose in order to make learning happen from the player's point of view. Squire (2005) argues that commercial computer and video games have mostly been overlooked by educational technologists. Such argument aligns with the constructivist belief of learning, which views knowledge not as information transmitted from a teacher to a learner, but rather as the result of the active engagement of the learner in the comprehension and conception of the information (Bradsford 1979). Looking at the constructivist belief of learning from the Information Systems (IS) perspective, computer games and their subset MMOG fall into the category of hedonic information system (Van der Heijden 2004), in which learning in a MMOG can be a process through motivating a player with an intention to learn and play the game individually and collaboratively.

According to motivational theories (Deci and Ryan 1985), motivation to play can be determined by two fundamental types of motivation, namely intrinsic motivation and extrinsic motivation. From the IS perspective, the area of research on users' acceptance of information systems is mainly rooted in the Technology Acceptance Model (TAM) (Davis 1989), which explains user's intention to use an information systems is affected by perceived usefulness, perceived ease of use, and perceived enjoyment. Based on motivational theories, Davis et al. (1992) further clarifies perceived usefulness as an example of extrinsic motivation, whereas perceived enjoyment is an example of intrinsic motivation.

Moreover, MMOG is more than single player participation due to its "massively multiplayer" nature, in which players' participation can be motivated by his/her peers in the same team. According to cognitive learning theory, learning consists of two components — personal and social (Entwistle and Entwistle 1992). Player-to-player interactions in MMOG allow learning to occur not only individually but also collaboratively. In addition to individual engagement in the learning process, computer-mediated learning can be initiated and motivated at peer level through collaborative learning interaction (Alavi 1994).

With the recognition of the importance of peer motivations, learning intentions, collaborative interaction in game-based learning reported in the TAM and cognitive learning research, this study proposes two new constructs, *peer intrinsic motivation* and *peer extrinsic motivation*, and studies their effects on *intention to learn individually* and *intention to learn collaboratively* in the context of MMOG game-based virtual environment.

3   METHODOLOGY

3.1   Research Model

This study proposes two new constructs, *peer intrinsic motivation* and *peer extrinsic motivation*, and studies their effects on *intention to learn individually* and *intention to learn collaboratively* (See

Figure 1 for the research model, and Table 1 for the definitions of constructs). This study is set in the context of a MMOG game-based virtual environment, *World of Warcraft* (WoW). The reason for us to pick WoW because it is currently the best selling MMOG in the world with over 11.5 million subscribers worldwide (on 23rd December 2008, Blizzard Press Release: http://www.blizzard.com/us/press/081121.html).
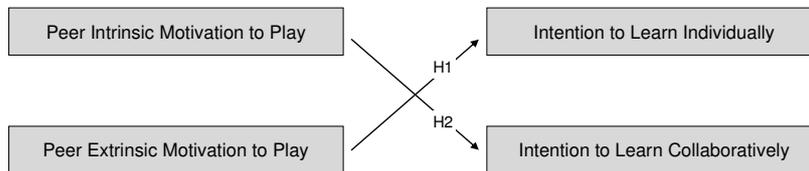
Figure 1.   Research Model

Constructs	Definitions
Peer Intrinsic Motivation to Play (PIM)	… is the perception that an individual will want to perform an activity (i.e. playing a particular game), driven by the desire to have his/her peers engaging in enjoyable, self-determined, and competence-enhancing activity
Peer Extrinsic Motivation to Play (PEM)	… is the perception that an individual will want to perform an activity (i.e. playing a particular game), driven by the desire to have his/her peers obtaining tangible or intangible external rewards
Intention to Learn Individually (ILI)	… is the intention for an individual to learn to perform an activity (i.e. playing a particular game) by him/her own efforts continuously for a period of time
Intention to Learn Collaboratively (ILC)	… is the intention for an individual to learn to perform an activity (i.e. playing a particular game) together with his/her peers (i.e. helping each other to learn) continuously for a period of time

Table 1.   Definitions of Constructs

The concepts of *peer intrinsic* and *peer extrinsic motivations* for a team are new and form the core of this study. A thorough Google Scholar and online article database search did not show any prior work on these constructs.

In distinguishing intrinsic and extrinsic motivations for an individual, it is very important to note that motivation that comes from peers is counted as external factors, not on the game itself (that is being mainly studied in the current game research), but on knowing about team members' enjoyment of the game in general (*peer intrinsic motivation*), and on knowing that team members achieving certain game rewards (*peer extrinsic motivation*).

3.1.1   Social Comparison and Intention to Learn Individually

This hypothesis is formulated based on Tesser and Campbell's (1990) argument that the closer the relationship an individual is to someone, the more likely that envious comparison processes will occur. In the context of MMOG, players can be from the same team or belong to the same *guild*, fighting for the same goal in the same *quest* (a collective task). Transparency characteristic of MMOG allows players to read his/her peers' values of attributes and observe their performance. Applying the concept of envy into the virtual environment of MMOG, feeling of envy will arise when one player perceives another player possesses more superior ability than his/her own.

Envy was seen to be helpful in motivating people to increase their performance in battle or civil competitions such as athletic contents. The effect of upward social comparisons on negative psychological reactions could be explained by the relevance of the superior target person as a role model (Lockwood and Kunda 1997). Consistent with this reason, the social learning literature has found that individuals tend to imitate others whom they perceived as being more successful and/or more highly rewarded (Bandura 1986).

In the MMOG environment, the feeling like "I wish I had what you have" is a result of social comparison between the player and his/her peers. Besides the negative feeling of envy, players may also appreciate the successful players of their team because their external rewards will be shared by the peers including the ones who envy others. In other words, in addition to envy that players focus on competition, players may also focus on helping behaviour and target for sharing of collaborative victory. To our knowledge, the amount of research is limited for this kind of peer extrinsic motivation, generated with the feeling of envy from upward social comparison process and collaborative victory, will motivate a player's intention to learn on his/her own in order to differentiate him/her from his/her peers in a MMOG context. Therefore in this study, we stipulate that a MMOG player, who focuses on peer extrinsic motivation in the game-play process, will have a high tendency to learn on his/her own in the MMOG environment. Therefore, we have the following hypothesis:

Hypothesis 1: Peer extrinsic motivation to play will have a significant positive influence on intention to learn individually in a MMOG context

3.1.2   Knowledge Sharing and Intention to Learn Collaboratively

Kalling and Styhre (2003) comment on the relative lack of attention paid to the role of motivational factors that influence knowledge sharing behaviours. As reviewed by Bock et al. (2005) on the benefit of knowledge sharing, knowledge sharing can benefit individual, group and organization. As MMOG is a kind of hedonic information systems, some MMOG players may focus on the fun-aspect rather than productive-aspect of the game. In general, we may consider the benefits of knowledge sharing at three levels: individual fun, group fun and organizational fun, where group and organizational fun may belongs to our definition of *peer intrinsic motivation*. Individual fun is possibly an interesting area for investigation, however, this study focuses mainly on *peer motivations* and suggests further research on this construct.

According to studies of social capital and knowledge sharing, individuals will be motivated to contribute their knowledge in the community. Wasko and Faraj (2005) proposed two constructs that would affect individual motivation for knowledge contribution: (1) reputation and (2) enjoy helping. In order to share knowledge, individuals must think that their contribution to others will be worth the effort and that some new value will be created, with expectations of receiving some of the value for themselves (Nahapiet and Ghoshal 1998). These personal benefits or "private rewards" are more likely to accrue to individuals who actively participate and help others (Von Hippel and Von Krogh 2003).

In addition to enhancing their reputations, individuals may also receive intrinsic benefits from contributing knowledge. Self-evaluation based on competence and social acceptance is an important source of intrinsic motivation that drives engagement in activities for the sake of the activity itself, rather than for external rewards (Bandura 1986). Players may perceive that helping others with challenging problems is interesting, and because it feels good to help other people by solving their problems (Kollock 1999). Prior research in electronic networks suggest that individuals are motivated intrinsically to contribute knowledge to others because engaging in intellectual pursuits and solving problems is challenging or fun, and because they enjoy helping others (Wasko and Faraj 2000). Therefore, instead of focusing on comparing the extrinsic rewards of peers, a MMOG player who focuses on *peer intrinsic motivation* is likely to share knowledge and learn collaboratively through helping each other to learn in the MMOG environment, and therefore we have the following hypothesis 2:

Hypothesis 2: Peer intrinsic motivation to play will have a significant positive influence on intention to learn collaboratively in a MMOG context

3.2 Development of the Questionnaire

A survey design was used to investigate the aforementioned hypotheses. The literatures on behavioural intention and motivation are reviewed. Survey questions were constructed with reference to prior empirical work and modified to fit the context of this research. All questions were phrased from the perspective of current WoW players, and anchored on a seven-point scale from Strongly Disagree (1) to Strongly Agree (7).

Questions on *peer intrinsic motivation* and *peer extrinsic motivation* were drafted based on *Work Preference Inventory* (Amabile et al. 1994). These questions assessed intrinsic and extrinsic motivation in terms of work preference. Eight questions (four for *peer intrinsic motivation*; four for *peer extrinsic motivation*) were selected from the inventory and modified according to the definition of *peer intrinsic motivation* and *peer extrinsic motivation* from the perspective of current WoW players.

Questions on *intention to learn individually* and *intention to learn collaboratively* were created with reference to construct "behavioural intention" from Venkatesh et al. (2003). With reference to their original source, these questions are modified to assess one's behavioural intention to learn within the next month. Eight questions (four for *intention to learn individually*; four for *intention to collaboratively*) were created based on the definition of *intention to learn individually* and *intention to learn collaboratively*.

A total number of 16 items were generated for the validation process of the constructs. Conceptual construct validation was carried out following Moore and Benbasat's (1991) card sorting procedure. Table 2 presents the measurement of items for the questionnaire.

Peer Intrinsic Motivation (PIM)	
When playing the game World of Warcraft, … **1 (Strongly Disagree) to 7 (Strongly Agree)**	
PIM1	... I am strongly motivated by knowing my teammates find the game enjoyable.
PIM2	... I am strongly motivated by knowing my teammates find the game exciting.
PIM3	... I am strongly motivated by knowing my teammates find the game full of fun.
PIM4	... I am strongly motivated by knowing my teammates find the game interesting.

Peer Extrinsic Motivation (PEM)	
When playing the game World of Warcraft, … **1 (Strongly Disagree) to 7 (Strongly Agree)**	
PEM1	… I am strongly motivated by knowing my teammates get experience points.
PEM2	… I am strongly motivated by knowing my teammates earn reputation points.
PEM3	… I am strongly motivated by knowing my teammates get in-game rare weapons.
PEM4	… I am strongly motivated by knowing my teammates earn gold coins.

Intention to Learn Individually (ILI)	
In the next three months, … **1 (Least Likely) to 7 (Most Likely)**	
ILI1	… I will continue to learn the skills on my own to perform better in the game World of Warcraft.
ILI2	… I intend to learn on my own continuously how to defeat different kinds of creatures in the game World of Warcraft.
ILI3	… I believe I will continuously practice my skills on my own to better control my avatar in the game World of Warcraft.
ILI4	… I plan to continuously acquire more knowledge related to the game World of Warcraft on my own.

Intention to Learn Collaboratively (ILC)	
In the next three months, … **1 (Least Likely) to 7 (Most Likely)**	
ILC1	… my teammates will continue to help me learn how to play better in the game World of Warcraft
ILC2	… I intend to continuously help my teammates learn how to defeat different kinds of creatures in the game World of Warcraft.
ILC3	… I believe I will continuously help my teammates practice their skills to better control their avatars in the game World of Warcraft.
ILC4	… my teammates plan to continuously help me acquire more knowledge which is related to the game World of Warcraft.

Table 2.   Measurement of Items in the Self-Reported Survey

3.3   Data Collection

This study utilizes an online survey website to collect data from current players of WoW. Players of WoW are invited to fill in the survey through online WoW communities, like game forums and corresponding network on Facebook. To guarantee the quality of respondents, raw data are filtered based on the following criterions:

3.3.1   World of Warcraft Experience

One "yes-or-no" question at the beginning of the questionnaire required the respondent to answer "Have you ever played World of Warcraft?" All respondents who indicated without experience in WoW will be filtered.

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 are included in the questionnaire, which ask the respondent to select the race and the class of their strongest avatar. The combination of race and class will then be checked with the above rules. Those who fail this check, or indicate "others" in the selection, will be dropped for analysis.

3.3.2   Definition of Current Participants

Dependent variables of this research are *intention to learn individually* and *intention to learn collaboratively* (see Table 1 for their definitions). One question is added in the questionnaire and the subject is required to disclose "When was the last time you played the game World of Warcraft?". Only those responses which indicate "within one day" and "longer than one day and within one week" will be used for analysis.

The survey received a total number of 94 valid responses from current active players of the WoW after corresponding data filtering procedure. Table 3 summarizes the demographic information of respondents:

Gender	Male	71	75.5%
	Female	23	24.5%
WoW Experience	Less than 1 year	19	20.2%
	More than 1 year but less than 2 years	25	26.6%
	More than 2 years but less than 3 years	30	31.9%
	More than 3 years	20	21.3%
Last Play *	Within one day	81	86.2%
	Longer than one day and within one week	13	13.8%
Overall Weekly Participation	Mean	23.3 hours	
	Median	20.0 hours	
Other MMOG Experience	Yes	57	60.6%
	No	37	39.4%
Age Group	15 or below	1	1.1%
	16 - 20	35	37.2%
	21 - 25	33	35.1%
	26 - 30	16	17%
	31 - 35	8	8.5%
	36 or above	1	1.1%

* This study only consider players who participated in WoW within one week as "current participants"

Table 3.   Demographic Information of Respondents

3.4   Data Analysis

The research model and hypotheses were estimated using 200 iterations of the bootstrapping technique in *PLS Graph 3.00*.

3.4.1   Measurement Model

The Average Variance Extracted (AVE) of PLS analysis attempts to measure the amount of variance that a latent variable component captures from its indicators relative to the amount due to measurement error, and so as to assess the convergent validity of the constructs. AVE values should be greater than the generally recognized .50 cut-off. The Internal Composite Reliability (ICR) of PLS analysis attempts to assess inter-item reliability, and so as to ensure internal consistency of indicators. Acceptable values of an ICR for perceptual measures should exceed .70 and should be interpreted like a Cronbach's Coefficient Alpha. Table 4 summarizes the measurement model results with all ICR and AVE values satisfied the recommended values:

Measures	Items	Composite Reliability	Average Variance Extracted
Intention to Learn Individually (ILI)	4	0.964	0.871
Intention to Learn Collaboratively (ILC)	4	0.968	0.884
Peer Intrinsic Motivation (PIM)	4	0.984	0.939
Peer Extrinsic Motivation (PEM)	4	0.950	0.827

Table 4 – Result of Confirmatory Factor Analysis

Discriminant validity indicates the extent to which a given construct is different from other constructs. To evaluate discriminant validity in PLS analysis, the square root of AVE for each construct should be higher than the levels of correlations involving the construct (Chin 1998). One criterion for adequate discriminant validity is that the construct should share more variance with its measures than with other constructs in the model (Barclay et al. 1995). Table 5 demonstrates discriminant validity with the square root of AVE for each construct is greater than the levels of correlations involving the construct.

	ILI	ILC	PIM	PEM
ILI	0.933			
ILC	0.621	0.940		
PIM	0.308	0.467	0.969	
PEM	0.339	0.376	0.589	0.909

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 5 – Correlation between Constructs

The explanatory power of the structural model is evaluated by looking at the R^2 value of the two dependent constructs. Model testing is divided into two separated PLS analysis: (1) test of hypotheses, and (2) test of the full model. The first analysis tests the proposed hypotheses of this study, while the second analysis tries to validate the proposed research model by considering the other possible paths as full model.

3.4.2   Test of Hypotheses
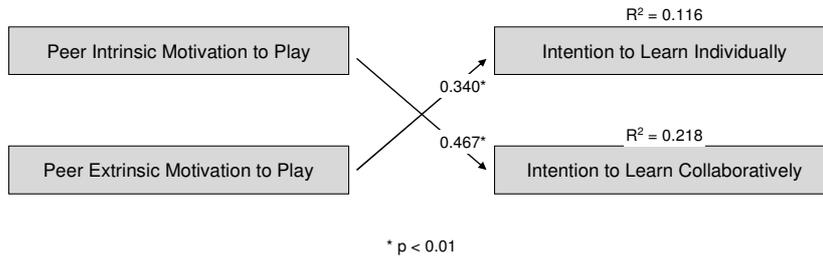
Figure 2.   PLS Analysis Result (Hypotheses)

Hypothesis 1:   Peer Extrinsic Motivation to Play will have a significant positive influence on Intention to Learn Individually in a MMOG context

As shown in Figure 2, the R^2 value for *Intention to Learn Individually* is 12%. The proposed path between *Peer Extrinsic Motivation to Play* and *Intention to Learn Individually* is significant ($\beta = 0.34$, $p < 0.01$). Statistically, this result showed that *Peer Extrinsic Motivation to Play* had a significant positive influence on *Intention to Learn Individually* in a MMOG context.

Hypothesis 2:   Peer Intrinsic Motivation to Play will have a significant positive influence on Intention to Learn Collaboratively in a MMOG context

As shown in Figure 2, the R^2 value for *Intention to Learn Collaboratively* is 22%. The proposed path between *Peer Intrinsic Motivation to Play* and *Intention to Learn Collaboratively* is significant ($\beta = 0.47$, $p < 0.01$). Statistically, this result showed that *Peer Intrinsic Motivation to Play* had a significant positive influence on *Intention to Learn Collaboratively* in a MMOG context.

3.4.3   Test of the Full Model
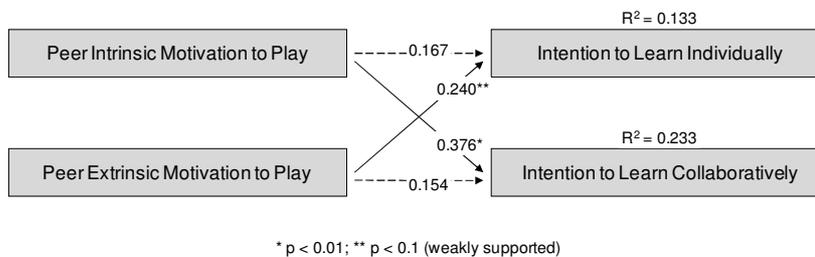
Figure 3.   PLS Analysis Result (Full Model)

Paths to Intention to Learn Individually

The R^2 value for *Intention to Learn Individually* is 13%. As shown in Figure 3, for the links to *Intention to Learn Individually*, only the path between *Peer Extrinsic Motivation to Play* and *Intention to Learn Individually* is significant ($\beta = 0.24$, $p < 0.1$). The path between *Peer Intrinsic Motivation to Play* and *Intention to Learn Individually* is not significant. With the consideration of the full model, this analysis result shows that by including the path between *Peer Intrinsic Motivation to Play* and *Intention to Learn Individually* into the PLS analysis, it will not affect the existing significant path discovered in the first analysis.

Paths to Intention to Learn Collaboratively

The R^2 value for Intention to Learn Collaboratively is 23%. As shown in Figure 3, for the links to *Intention to Learn Collaboratively*, only the path between *Peer Intrinsic Motivation to Play* and

Intention to Learn Collaboratively is significant ($\beta = 0.38$, $p < 0.01$). The path between *Peer Extrinsic Motivation to Play* and *Intention to Learn Collaboratively* is not significant. With the consideration of the full model, this analysis result shows by including the path between *Peer Extrinsic Motivation to Play* and *Intention to Learn Collaboratively* into the PLS analysis, it will not affect the existing significant path as discovered in the first analysis.

Table 6 summarizes the comparison of analysis results:

R^2	Test of Hypotheses	Test of the Full Model
ILI	0.116	0.133
ILC	0.218	0.233

β (Sig. Level)	Test of Hypotheses	Test of the Full Model
PIM ➜ ILI	n/a	0.167 (not sig.)
PIM ➜ ILC	0.467 (p < 0.01)	0.376 (p < 0.01)
PEM ➜ ILI	0.340 (p < 0.01)	0.240 (p < 0.1)
PEM ➜ ILC	n/a	0.154 (not sig.)

Note: ILI: Intention to Learn Individually   ILC: Intention to Learn Collaboratively
PIM: Peer Intrinsic Motivation to Play   PEM: Peer Extrinsic Motivation to Play

Table 6.   Comparison of Analysis Results

4   DISCUSSION AND IMPLICATIONS

4.1.1   Academic

For academic researchers, the study contributes to a better understanding of the motivation to play in a MMOG context. Hedonic information systems (i.e. MMOG) differ from utilitarian information systems in terms of reasons for use, and this study is one of the very few that has attempted to investigate the motivational drivers of user acceptance in a hedonic information system context. More specifically, this study introduces two new constructs, namely peer intrinsic motivation and peer extrinsic motivation to explain players' behavioural intention to learn individually and collaboratively in the MMOG environment. Using the card sorting method and various validations in the data analysis, this study introduces items which are possible to assess the degree of peer motivations and intention to learn under the MMOG context.

Furthermore, unique characteristics of MMOG were put into the explanations of hypotheses in this study, and the results showed that a player's perception on peer intrinsic motivations is associated with his/her intention to learn collaboratively, while the perception on peer extrinsic motivations is associated with his/her intention to learn individually. This study is one of the early attempts to associate characteristics of MMOG with peer motivational factors and learning intentions in a MMOG context, which may help to act as a theoretical foundation for further studies.

4.1.2   Educators

For education practitioners, the results from this study suggest that in a MMOG environment, players' peer intrinsic motivation is associated with their intention to learn collaboratively while players' peer extrinsic motivation is associated with their intention to learn individually. Although the scope of this piece of research does not take into consideration of the context of learning material that MMOG will deliver to the player, the result from this paper is suggesting that educators who want to adopt MMOG

as a platform will need to pay special attention on how they want to manipulate the peer motivational factors and learning intentions of the players from a psychological perspective.

4.1.3   Game Developers

Finally, according to cognitive learning theory, knowledge acquisition consists of two components — personal and social (Entwistle and Entwistle 1992). In the MMOG environment, a player's intention to learn can also be categorized into intention to learn individually and intention to learn collaboratively. From the player's point of view, the design of MMOG forces them to collaborate, and the struggle between the feelings of "envy" and "collaborative victory" may apply to the player from the psychological point of view. The design of the game interfaces should give reasonable expectation to each player on the number of experience points needed for promoting towards the next level, and what kind of spell that his/her avatar can cast (with preview demonstration on the effect).

4.2   Limitation of Study and Future Research Directions

The data of the presented study was collected using a survey method from MMOG players of WoW only. We suggest future research may conduct a boarder survey and compare players of different MMOG. Also, in addition to a snap-shot of self-reflected data collection, a longitudinal study of individual online gaming behaviours is required for in-depth understanding of team dynamics in MMOG environment.

5   CONCLUSION

This study examines players' intention to learn in a hedonic information system - MMOG. More specifically, this study investigates the roles of players' *Peer Intrinsic Motivation* and *Peer Extrinsic Motivation* on both *Intention to Learn Individually* and *Intention to Learn Collaboratively* in MMOG environment. The results indicate that *Peer Intrinsic Motivation to Play* has a significant positive influence on the *Intention to Learn Collaboratively*, while *Peer Extrinsic Motivation to Play* has a significant positive influence on the *Intention to Learn Individually*. The results from this exploratory study also expand our understanding of the use of MMOG for collaborative learning purposes as well as its potential causes of threats like addictiveness rooted by players' continuous "play-to-learn" and "learn-to-play" modes of engagement in MMOG.

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