Investigation of Game Performance and Game Immersion: A Gender Difference Approach

Shih Ting Wang*, Sherry Y. Chen, Jie Chi Yang, Song Yu Mei
Graduate Institute of Network Learning Technology, National Central University, Taiwan
* tina66@cl.ncu.edu.tw

Abstract: MMORPGs, which have been increasingly developed in educational settings, are used by diverse learners. Therefore, individual differences are key factors for the development of MMORPGs. Among various dimensions of individual differences, the study presented in this article focuses on gender differences. More specifically, this study investigates how gender differences affect players interact with a MMORPG, with an emphasis on game immersion and game performance. The results showed that females have significantly higher game immersion and performance than males. Furthermore, game immersions have significant effects game performance. These results implies that the design of games or game based learning systems should take into account the unique needs for each gender group.

Keywords: Game immersion, Game performance, Gender differences

Introduction

Video games and computer games are unarguably becoming one of the dominant forms of electronic entertainment for both adults and children around the world. In particular, massively multiplayer online role playing games (MMORPGs) are growing in popularity. In other words, MMORPGs are an entertaining tool for diverse people. Thus, individual differences play an important role. Among various individual difference elements, previous research found that males and females show different immersion and performance for MMORPGs.

Previous study found that the daily game playing time of males is significantly higher than that of females [1], and males are more easily attracted by games [2]. On the other hand, [3] found that the females show less immersion in computer game. Furthermore, [4] found that gender is a significant factor in game immersion and that males tend to become addicts more than females. In other words, gender is a significant factor in game performance.

Previous research also indicated that gender is a significant factor in game performance and male players have higher motivation of performance in the MMORPGs [5]. Additionally, [6] found that the male students outperformed than female students in the game-based learning. [7] and [8] found that males obtained higher scores than females in the game-based learning. However, previous studies focus on game immersion and game performance respectively. There is a lack of the relationships among gender differences, game immersion and game performance in MMORPGs.

In this vein, the aims of the study reported in this article are two-folded. On the one hand, it aims to examine the relationships between gender differences and game

immersion and the effects of players' genders and game immersion on game performance in MMORPGs.

1. Methods

This study explores the effects of players' genders and game immersion on their game performance based on the log data of MMORPGs in Taiwan. Figure 1 illustrates the conceptual structure of this study. This section describes the details of participants, procedures, an MMORPG and measures.

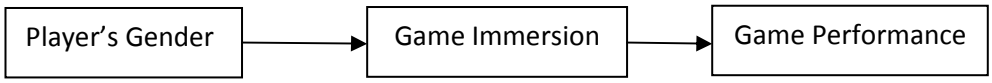

Figure 1. The conceptual structure of research

1.1 Participants

The sample of this study was selected from 51,437 players who registered and logged in a MMORPG within 77 days from April 2011 to June 2011. The criteria used for selecting the sample are that the players needed to interact with the MMORPG for more than 30 days and the interaction took place for 10 minutes on an average per day. According such criteria, the sample consisted of 3,423 players. Table 1 describes the population and sample size, in terms of gender allocation.

Table 1. The population and sample size describes

Source	Size	Male player	Female player
Population	51,437	*n*=39,426(76.65%)	*n*=12,011(23.35%)
Sample	3,423	*n*=2,386(69.71%)	*n*=1,037(30.29%)

1.2 An MMORPG

This study was undertaken based on the log data of a MMORPG, i.e., Soul of Magic. Soul of Magic was developed by a Taiwanese company and released in a Taiwanese market in March 2011. This MMORPG is a free game but players can buy equipment or articles for their avatars. The design of the Soul of Magic is similar to most of MMORPG that involve quests, monster-fighting groups, instances, chat-rooms, selling and buying of articles (e.g., equipment, costumes and virtual treasures). Figure 1 shows the screenshot of this MMORPG.

Figure 1. The screens of this MMORPG

1.3 Procedures

Table 2 characterizes the purposes and recorded items of the game performance and game immersion. The coding scheme of game behavior records built by two developers of this MMORPG and expert validity was employed to ensure the validity of coding.

Table 2. The summary of the game performance and game immersion

Variable	Items	Purpose
Player's description	-	Player's characteristics are identified in this MMORPG.
Game performance	Levels reached finally (LRF)	Players can upgrade avatar's level and awarded articles via quests or instances.
	Quests successfully completed (QSC)	Quests in the game are automatically assigned by the non-player character (NPC) and don't involve any interactions with other players.
	Instances successfully completed (ISC)	Players work together as a group to quickly increase avatar's level and awarded articles via doing instances.
Game immersion	Days spent for playing the game (DSP)	Recorded players login and logout date time.
	Time spent for playing the game (TSP)	Recorded player's play time.

1.4 Measures

The dependent variables of this study include game performance and game immersion while the independent variables include gender differences, DSP and TSP. An independent t-test was applied to conduct statistical analyses.

2. Results and discussion

2.1 Overall

According to the results from the log files, the participants were 2386 male players and 1037 female players. Table 3 presents an overall picture of game performance and game immersion of the participants in this study. More specifically, three attributes are considered for the measurement of game performance, i.e., levels reached finally (LRF), instances successfully completed per day (ISC), and quests successfully completed per day (QSC). On the other hand, two attributes are taken into account for the measurement of game immersion, i.e., days spent for playing the game (DSP) and time spent for playing the game per day (TSP).

Table 3. An Overview of game performance and game immersion

Variables	Attributes	Mean (SD)
Game Performance	Levels reached finally (LRF)	34.32 (10.68)
	Instances successfully completed per day (ISC)	3.56 (4.84)
	Quests successfully completed per day (QSC)	12.25 (10.31)
Game Immersion	Days spent for playing the game (DSP)	48.00 (13.60)
	Time spent for playing the game per day (TSP)	237.81 (218.71)

2.2 Game Performance

Table 4 reveals the attributes that characterize game performance for different gender groups. The mean values of the above attributes are shown in the table. As showed in this table, female players performed better than male players, in terms of the LRF and QSC. However, male players obtained higher ISC scores than females. Furthermore, independent t tests are used to examine whether statistical significances exist between different gender groups. As showed in Table 2, the results indicate that gender difference was a significant factor in determining the game performance, apart from the ISC.

Table 4. Summary of independent t-tests on game performance

Players' gender		LRF	ISC	QSC
Female	Mean	35.10	2.98	13.42
	SD	10.52	4.03	10.10
Male	Mean	33.99	3.81	11.74
	SD	10.73	5.13	10.35
t		3.31**	1.58	5.67***

:p<.01,:p<.001*

2.3 Game Immersion

Table 5 reveals the attributes that characterize game immersion for different gender groups. The mean values of the above attributes are shown in the table. As showed in this table, female players performed better than male players, regardless of DSP and TSP. Furthermore, independent t tests are used to examine whether statistical significances exist between different gender groups. As showed in Table 3, the results indicate that gender difference was a significant factor in determining the game immersion, apart from the TSP.

Table 5. Summary of independent t-tests on game immersion

Players' gender		DSP	TSP
Female	Mean	49.56	240.09
	SD	13.42	215.65
Male	Mean	47.32	236.82
	SD	13.62	220.06
t		4.44***	0.40

****:p<.001*

2.4 Performance vs. Immersion

To further investigate the relationships between game performance and game immersion, players are divided into two groups based on the means of the DSP and TSP. Regardless of the DSP or TSP, the players whose scores are above the means are assigned to the high-immersion group while those whose scores are below the means are assigned to the low-immersion group.

2.4.1 Female Players

Table 6 presents game performance of female players according to the DSP. More specifically, the high-immersion group includes 515 female players (49.66%) while low-immersion group includes 522 female players (50.34%). As showed in this table, the high-

immersion group performed better than the low-immersion group, regardless of the LRF, ISC and QSC. Furthermore, independent t tests are used to examine whether statistical significances exist between the high-immersion and low-immersion groups. The results indicate that the DSP significantly affects females' game performance.

Table 6. Female players' game performance based on DSP

DSP		LRF	ISC	QSC
Low immersion	Mean	31.19	2.65	12.11
	SD	8.18	4.15	9.91
High immersion	Mean	38.95	3.31	14.72
	SD	11.16	3.89	10.15
t		12.75***	2.64**	4.19***

***:p<.01; ***:p<.001*

Table 7 presents game performance of female players according to the TSP. More specifically, the high-immersion group includes 649 female players (62.58%) while low-immersion group includes 384 female players (37.03%). Like DSP, the high-immersion group also performed better than the low-immersion group, regardless of the LRF, ISC and QSC. Furthermore, independent t tests are used to examine whether statistical significances exist between the high-immersion and low-immersion groups. The results also indicate that the TSP significantly affects females' game performance. In brief, immersions have significant effects on females' game performance, regardless of the DSP or TSP.

Table 7. Female players' game performance based on TSP

TSP		LRF	ISC	QSC
Low immersion	Mean	29.98	1.83	8.88
	SD	7.31	3.15	6.58
High immersion	Mean	43.73	4.94	21.10
	SD	9.49	4.58	10.43
t		26.10***	12.91**	23.07***

***:p<.01; ***:p<.001*

2.4.2 Male Players

Table 8 presents game performance of male players according to the DSP. More specifically, the high-immersion group includes 1399 male players (58.63%) while low-immersion group includes 987 male players (41.37%). As showed in this table, the high-immersion group performed better than the low-immersion group, regardless of the LRF, ISC and QSC. Furthermore, independent t tests are used to examine whether statistical significances exist between the high-immersion and low-immersion groups. The results indicate that game immersion significantly affect males' game performance of LRF and QSC, apart from the ISC.

Table 8. Male players' game performance based on DSP

DSP		LRF	ISC	QSC
Low immersion	Mean	30.27	3.78	9.76
	SD	8.24	5.70	9.98
High immersion	Mean	39.26	3.85	14.54
	SD	11.61	4.21	10.23

t	22.12***	0.30	11.40***

***:p<.001*

Table 9 presents game performance of male players according to the TSP. More specifically, the high-immersion group includes 1551 male players (65.09%) while low-immersion group includes 833 male players (34.91%). As showed in this table, the high-immersion group performed better than the low-immersion group, regardless of the LRF, ISC and QSC. Furthermore, independent t tests are used to examine whether statistical significances exist between the high-immersion and low-immersion groups. The results indicate that game immersion significant affect males' game performance.

Table 9. Male players' game performance based on TSP

TSP		LRF	ISC	QSC
Low immersion	Mean	28.81	2.64	6.93
	SD	6.93	4.68	6.31
High immersion	Mean	43.62	5.98	20.69
	SD	9.89	5.25	10.47
t		42.61***	15.90**	39.97***

**:p<.01; ***:p<.001*

The aforementioned results showed that immersions generally have significant effects on females' game performance. However, there is no significant difference between the high-immersion group and the low-immersion group for the ISC based on the DSP.

The aforementioned results suggest that game immersion and game performance are significantly influenced by gender differences. Females have significantly higher game immersion and performance than males. This study's finding is inconsistent with previous studies. A possible reason is that the MMORPG used in this study takes a cartoon-orientation design, and includes less violence and have more social interaction in quests and instances. On the other hand, the MMORGs used in previous studies take a combat-centric design. This implies that players' immersion or performance may be affected by the design of games design or game-based learning design.

3. Conclusion

Games or MMORPGs creates learning opportunities for everyone if suitable considerations are made in the design process. Otherwise, they can impose needless barriers to equal participation in educational settings. The experimental results obtained in this study suggest that gender difference plays an influential role in players' game immersion and performance within MMORPG. Female players and male players have different immersions and preferences, especially for the DSP, LRF, ISC, and QSC. Thus, there is a need to be aware of gender differences when planning to improve the design of games or MMORPGs programs.

This study contributes to the deep understanding of gender differences in the development of games/MMORPGs programs by providing empirical evidence. Gender differences are frequently considered in the literature of individual differences but it is inconclusive as to their relative importance. The findings of this study indicated that the gender difference is a major factor that influences players' game immersion and performance. However, it was only one relatively small study. Further work needs to be undertaken with different game/MMORPG styles to provide additional evidence.

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