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WHY THEY ENJOY USING THIS GAMING APPLICATION?

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Abstract

As online games become more and more popular, researchers and practitioners want to know what critical factors make people enjoy playing online games. This study suggests that key characteristics of online games are the primary determinants of online gaming enjoyment. The impact of enjoyment on behavioral intention is also investigated. The proposed research hypotheses are tested by using survey responses of 253 online game players. Overall, the results indicate that online game story, graphics, length, and control can predict enjoyment, and that enjoyment has a significant impact on behavioral intention.

Keywords: online gaming, enjoyment, behavioral intention

Introduction

In the past decade, we have witnessed the rapid growth of online game business. Online games are mainly PC games that run on a cluster of servers and are played online through the Internet. *DFC Intelligence* (2006) estimates that the number of global online game players will increase from 124 million by 2005 to 376 million by 2009 and that the worldwide subscription revenue from online games will grow from \$2 billion in 2005 to \$6.8 billion in 2011.

Previous studies find that people play online games for various reasons such as overcoming challenge, alleviating tension, making friends, and killing time, but the most basic goal is to enjoy (Kim et al., 2002). Thus online games should be able to provide players with an enjoyable experience. But what makes online games “fun?” This question is of considerable interest because vendors, sponsors, and operators of online games can benefit greatly from improved understandings of the driving factors behind players’ enjoyable experience.

The purpose of this study is to develop and empirically test a theoretical model to examine the factors contributing to the online gaming enjoyment. The proposed theoretical model suggests that key characteristics of online games, namely, story, graphics, sound, length, and control, are the primary determinants of online game enjoyment. Moreover, the model also examines the subsequent effect of online gaming enjoyment on players’ intention to play online games. By investigating the link between game characteristics and enjoyment, and the link between enjoyment and behavioral intention, the current study provides a clear picture of how game characteristics impact players’ intention to play online games through the development of enjoyable gaming experience.

Theoretical Concepts of Enjoyment

Enjoyment can be defined as the degree to which performing an activity is perceived as providing pleasure and joy in its own right, aside from performance consequences (Venkatesh, 2000). As a state of positive emotional experience, enjoyment can occur not only in the chase of physical activities such as dancing, but also in the pursuit of mental activities such as playing chess (Csikszentmihalyi, 1990).

Enjoyment has received considerable research attention in recent years. Koufaris (2002) finds that shopping enjoyment plays an important role in predicting consumer intention to return to a Web-based store. Venkatesh (2000) finds that enjoyment significantly impacts behavioral intention to use information technology through perceived ease of use. In a study investigating students’ acceptance of an Internet-based learning medium, Lee et al. (2005) find that enjoyment not only directly impacts behavioral intention but also indirectly influences it through attitude.

However, the importance of enjoyment in human behavior has also been challenged in the past. For example, Igbaria et al. (1995) find no significant effect of enjoyment on information system use behavior. Another study, conducted by Teo and his colleagues (1999), finds that enjoyment has an effect on the frequency of usage but no significant effect on the diversity of usage, and thus the authors acknowledge the need for additional research to examine the role of enjoyment in behavior.

In this study, we look at the antecedents and effects of enjoyment in the online gaming context. To our knowledge, studies in electronic commerce have so far explored the role of enjoyment in instant messaging (Li et al., 2005) and online shopping (Koufaris, 2002) but not in online gaming. Based on the factor that players tend to be motivated mostly by intrinsic motivation, we expect that enjoyment is a critical construct in studying online game player behavior.

Research Model and Hypotheses

Drawing upon the established theories and prior empirical findings, we propose a conceptual model that investigates the antecedents and effects of online gaming enjoyment. In our proposed model (as depicted in Figure 1), enjoyment is a function of online game story, graphics, sound, length, and control, and enjoyment predicts intention to play online games while the effects of attitude and subjective norms on behavioral intention are under control.

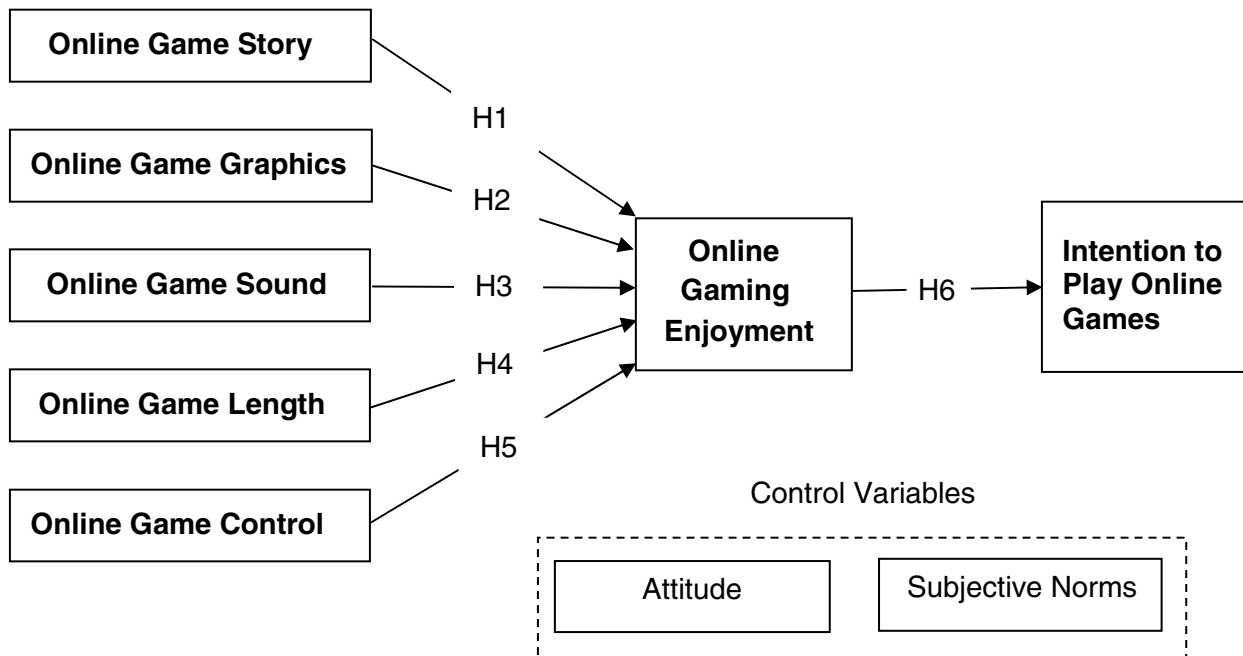


Figure 1: Research Model

The Impact of Online Game Story on Enjoyment

Like movies, most online games have a story to which players may attach their fantasies and desires. An online game story usually tells players what is going on in a game. More specifically, it describes the circumstances of the events or the experiences of the characters that happen in the game sessions (Juul, 2001a).

Online games stress the importance of story a lot. This is because an interesting story can motivate players to explore the game, to continuously return to the virtual game world, and to see the characters through to the end (Pearce, 2003). Moreover, an attractive story can also make the online game more enjoyable and fun by evoking fantasies and sense of curiosity in players. When players have fantasies about an online game they play, they immerse themselves into the story to build a character who determines his own fate by acting within the time and space of a fictional world (Ryan, 2001). Thus, the players are likely to enjoy the tasks such as fighting terrorists and saving the earth from an alien invasion, and forget

momentarily the unpleasant and worrisome things in their real lives. In addition, when players have curiosity about an online game they play, they usually stay online with the game to solve the puzzles, crack the problems, and search for answers to the mystery in the virtual game world. Thus, they are likely to perceive the game as appealing and entertaining.

Hypothesis 1: Online game story is positively related to online gaming enjoyment.

The Impact of Online Game Graphics on Enjoyment

Online game graphics refers to visual information players receive during the game, which are presented in the form of pictures, images, or drawings. Because most people consider online games as mainly visual experience oriented entertainment, the primary goal in the development of the games is to improve the technology for their visual presentation (Smith, 2002). When designers are able to render more and more polygons, they can better present a “big and real” game world, construct more nuanced characters, and depict more precise action details. Assumedly, intensive visual information will give the cyber spaces explored by the interactive players some of the richness of the cinematic signifier (Smith, 2002).

To increase the quality of the gaming experience players have, online game designers pay close attention to how well graphics are developed to represent “reality.” For example, in some online games, the basic facial features of an avatar include a photo-realistic face with slight dynamic changes in expressions (Pearce, 2002). Those changes, such as subtle smile and blinking of eyes, are non-controllable by players but are employed to enhance the liveliness of the avatar. Consequently, the players will perceive the games as amazingly real and psychologically project themselves into the game world. Therefore, the players are likely to enjoy playing the games.

Hypothesis 2: Online game graphics is positively related to online gaming enjoyment.

The Impact of Online Game Sound on Enjoyment

Online game sound refers to auditory information players receive during the game such as music, voice, and other sound effects (such as gunshot, water flow and wind blow). In general, online game sound serves two purposes: expanding the concept of a game’s fictional world and drawing players forward through the sequence of gameplay (Whalen, 2004). Online game sound achieves these two purposes by providing players with more auditory inputs to reinforce the visual effects. Research on cognition and animation suggests that visual objects are perceived as alive and exhibiting anthropomorphic behavior when their actions are accompanied by a synchronized soundtrack (Cohen, 2000). In online gaming context, sound can not only provide an audio complement to action on the screen but also help create a sense of a real physical space (Morris, 2002). In addition, the auditory information through speakers or headphones can make players reach the winning situation sooner by supporting them to perceive the game’s space in 360 degrees (Whalen, 2004). Thus, as a key interaction cue, sound plays an important role in shaping players’ perception toward online gaming enjoyment.

Hypothesis 3: Online game sound is positively related to online gaming enjoyment.

The Impact of Online Game Length on Enjoyment

Online game length is the average amount of time that players spend on reaching the predefined winning situation. Researchers and practitioners believe that there is no magic number to target in terms of online game length but each game has its unique "ideal length" based on the gameplay, story, pacing, and introduction of new elements (Zeschuk and Muzyka, 2004). To allow players to more enjoy an online game, it is critical to integrate the length to the background story of the game (Eilers, 2000), and to match the length to the quality of the experience in the game (Zeschuk and Muzyka, 2004).

A game story is unlikely to be told satisfactorily unless sufficient time is given for its telling. On the other hand, extending a story beyond its natural limits for the sake of game length can not do any good to players' gaming experience but weaken the narrative of the story (Boon, 2006). Thus, online game length becomes a balance. Developers should offer as much gameplay as they can from the available materials based on the background story. At the same time, they should pace their games in a satisfying manner and make it clear to the players that a predefined winning situation can be achieved in a reasonable period of time (Boon, 2006). By doing so, developers are more likely to provide players with an enjoyable online game.

Hypothesis 4: Online game length is positively related to online gaming enjoyment.

The Impact of Online Game Control on Enjoyment

Playing online games to some extent can be viewed as an exercise of control systems (Juul, 2001b), which requires hand-eye-coordination and often causes physical or physiological reactions (Eskelinen, 2001). As one of the most important elements of online games, online game control refers to the mechanism that allows players to manage and direct an online game by using keyboard, mouse, and sometimes other controllers such as game pad and joystick. Thus, the control is also recognized as the interface between online games and players. Online game control plays an important role in gaming experience by impacting players' feelings of how the game is easy to interact. To allow players to grab a mouse and immediately play an online game, the control must be designed in a way that is intuitively understandable and easy to use.

There are few good games with bad controls. When players have difficulties in controlling character movement or in weapon aiming, they perceive the online game as having low play value and thus are less likely to continue, let alone to have fun. On the contrary, when the control is easy to use, players are more likely to consider the online game as a decent and attractive one. Thus, we develop the following hypothesis.

Hypothesis 5: Online game control is positively related to online gaming enjoyment.

The Impact of Enjoyment on Intention

Enjoyment has been found to impact behavioral intention in many online interaction settings. Prior work suggests that enjoyment directly affects the behavioral intentions of online customers (Koufaris, 2002; Li et al., 2005). In addition, past studies also find that enjoyment positively impacts the use of information systems (Davis et al., 1992). In short, the relationship between enjoyment and behavioral intention has received theoretical and empirical support.

Compared with other activities such as online shopping or using information system, playing online games is more experience-oriented and online game players are more motivated by the intrinsic motivations associated with playing online games. Thus, players who experience enjoyment are more likely to be motivated to play online games continually.

Hypothesis 6: Online gaming enjoyment is positively related to intention to play online games.

Control Variables

To test the research model, we control two salient variables known to impact behavioral intention: attitude and subjective norms. According to the Theory of Reasoned Action (TRA), a well-established and accepted general theory of human behavior, behavioral intention can be influenced by an individual's attitude toward the behavior and the individual's subjective norms (Ajzen and Fishbein, 1980).

Methodology

Survey Instrument, Pilot Test, and Data Collection

To test the research model, data were collected via a survey with multi-item scales to measure all research constructs. The scale measuring the online gaming enjoyment is adapted from Koufaris (2002). Measures for intention to play online games are from Agarwal and Karahanna (2000). For control variables, attitude measures are based on Agarwal and Prasad (1999) and subjective norms measures are adapted from Hsu and Lu (2004). The items used to measure online game story, graphics, sound, length, and control are developed in this study. All survey questions use a seven-point Likert scale.

A pilot test of the survey instrument was conducted with 26 online game players to ensure that questionnaire item statements were clear and appropriate. Comments and suggestions were obtained from the participants and the survey questions were modified accordingly. The final measures for all constructs are shown in Table 1 (next page).

The survey subjects of this study are experienced online game players who are undergraduate students at a business school in the eastern United States. In total, 392 subjects completed the questionnaire with regard to the online game website and the game with which they were most experienced. Because of respondents' lack of gaming experience or incomplete survey responses, 139 questionnaires were discarded. Thus, a total of 253 valid surveys are used for data analysis.

Of the respondents, 153 are male and 100 are female. Most participants (83%) are in their early 20s, with the average age being 23. The average weekly online gaming hours of the participants is 3.2 with a range from half an hour to twenty hours. The average years of online gaming experience is 2.8, ranging from several months to twelve years. Finally, home is the dominant location of playing online games.

Table 1: Survey Items	
Online Game Story	
Story1	I like the story of the online game.
Story2	The story of the online game is appealing.
Story3	I am satisfied with the story of the online game.
Online Game Graphics	
Graphics1	I like the graphics of the online game.
Graphics2	The graphics of the online game is appealing.
Graphics3	I am satisfied with the graphics of the online game.
Online Game Sound	
Sound1	I like the sound of the online game.
Sound2	The sound of the online game is appealing.
Sound3	I am satisfied with the sound of the online game.
Online Game Length	
Length1	I like the length of the online game.
Length2	The length of the online game fits my needs.
Length3	I am satisfied with the length of the online game.
Online Game Controls	
Controls1	The controls of the online game are easy to use.
Controls2	It is easy to learn how to use the controls of the online game.
Controls3	I feel comfortable with the controls of the online game.
Online Gaming Enjoyment	
Enjoyment1	I enjoyed playing online games.
Enjoyment2	I enjoyed using online game website.
Intention to Play Online Games	
Intention1	I will play online games frequently in the future.
Intention2	I intend to play online games.
Intention3	I will play online games for a long time.
Attitude toward Playing Online Games	
Attitude1	It is a lot of fun to play online games.
Attitude2	I like to play online games.
Attitude3	Playing online games is attractive.
Subjective Norms	
SubjectiveNorm1	My friends believe that I should play online games.
SubjectiveNorm2	My coworkers believe that I should play online games.
SubjectiveNorm3	My schoolmates believe that I should play online games.

Psychometric Properties of Measures

We use Partial Least Squares (PLS) Graph Version 03.00 to test the research model as well as to measure the reliability and validity of data. PLS is a structural equation modeling (SEM) tool widely used in IS research (Chin and Todd, 1995). The psychometric properties of the measures for the nine latent constructs (including two control variables) are evaluated in terms of the convergent and discriminant validity, and internal consistency reliability (ICR) of the constructs (Chin, 1998).

First, average variance extracted (AVE) can be used to assess the convergent and discriminant validity of latent constructs with reflective indicators. To assess the convergent validity, AVE of a given construct should be greater than .50 (i.e., the square root of AVE should be greater than .707), indicating that the majority of the variance is extracted by the construct from its indicators (Fornell and Larcker, 1981). To assess the discriminant validity, the square root of AVE of a given construct should be greater than the correlations between that construct and all other constructs, indicating that the construct is different from other constructs (Chin, 1998). Second, factor loadings of each indicator can also be used to assess convergent and discriminant validity. The standardized item loadings (similar to loadings in principal components) should be greater than .707, and the items should load more strongly on their respective constructs than on other constructs (Chin, 2001).

Similar to Cronbach's alpha, ICR is also known as composite reliability and can be used to assess the internal consistency for a given group of items measuring the same construct. ICR is considered adequate if its value is greater than .70 (Chin, 1998).

Table 2 (next page) shows the loadings and cross-loadings calculated by correlating nine construct factor scores with all standardized item scores. All items exhibit high loadings ($>.707$) on their respective constructs, and no items load more strongly on the constructs they are not intended to measure.

Table 2: Loadings and Cross-Loadings									
	Story	Graphics	Sound	Length	Controls	Enjoyment	Intention	Attitude	Norms
Story1	0.97	0.45	0.50	0.47	0.30	0.37	0.41	0.42	0.30
Story2	0.98	0.48	0.54	0.51	0.35	0.39	0.43	0.43	0.33
Story3	0.94	0.58	0.57	0.51	0.36	0.34	0.36	0.37	0.32
Graphics1	0.48	0.94	0.62	0.44	0.32	0.35	0.34	0.43	0.26
Graphics2	0.47	0.95	0.62	0.46	0.40	0.37	0.29	0.38	0.26
Graphics3	0.51	0.94	0.70	0.50	0.43	0.36	0.30	0.35	0.23
Sound1	0.52	0.69	0.96	0.45	0.32	0.27	0.26	0.36	0.21
Sound2	0.53	0.66	0.96	0.49	0.35	0.28	0.23	0.33	0.24
Sound3	0.55	0.64	0.96	0.51	0.34	0.27	0.28	0.35	0.24
Length1	0.49	0.49	0.50	0.95	0.52	0.39	0.37	0.44	0.37
Length2	0.48	0.47	0.49	0.95	0.52	0.44	0.38	0.43	0.34
Length3	0.49	0.44	0.44	0.93	0.55	0.45	0.40	0.47	0.38
Controls1	0.33	0.39	0.32	0.51	0.93	0.43	0.38	0.41	0.29
Controls2	0.31	0.35	0.31	0.53	0.91	0.40	0.33	0.35	0.31
Controls3	0.32	0.40	0.35	0.54	0.94	0.41	0.39	0.43	0.33
Enjoyment1	0.37	0.40	0.34	0.44	0.43	0.90	0.60	0.69	0.33
Enjoyment2	0.32	0.30	0.17	0.38	0.37	0.91	0.68	0.70	0.38
Intention1	0.42	0.35	0.28	0.42	0.40	0.65	0.94	0.72	0.51
Intention2	0.40	0.32	0.25	0.38	0.36	0.71	0.95	0.72	0.48
Intention3	0.35	0.26	0.23	0.35	0.36	0.65	0.93	0.69	0.47
Attitude1	0.34	0.39	0.31	0.40	0.36	0.75	0.65	0.92	0.40
Attitude2	0.39	0.38	0.30	0.47	0.45	0.76	0.75	0.94	0.45
Attitude3	0.41	0.34	0.37	0.41	0.35	0.57	0.64	0.84	0.39
Norms1	0.37	0.28	0.28	0.42	0.33	0.37	0.51	0.45	0.92
Norms2	0.20	0.15	0.11	0.25	0.25	0.27	0.36	0.30	0.85
Norms3	0.29	0.28	0.23	0.35	0.30	0.41	0.51	0.46	0.93

Table 3 shows ICRs, square roots of AVEs, and correlations among latent constructs. All ICRs are larger than the minimum reliability criterion (.70). In addition, all square roots of AVEs (on the diagonal in bold) are larger than .707, and in all cases larger than the correlations between that construct and every other construct. Over all, these results provide strong evidence of convergent and discriminant validity, as well as reliability of the measurement instrument.

Table 3: ICRs, AVE Square Roots, and Correlations among Latent Constructs										
Latent Construct	ICR	AVE Square Roots (on-diagonal) and Correlations (off-diagonal)								
		Story	Graphics	Sound	Length	Controls	Enjoyment	Intention	Attitude	Norms
Story	.98	.96								
Graphics	.96	.52	.94							
Sound	.97	.55	.69	.96						
Length	.96	.51	.50	.50	.94					
Controls	.95	.35	.41	.35	.57	.93				
Enjoyment	.90	.38	.38	.28	.45	.44	.90			
Intention	.96	.42	.33	.27	.41	.40	.71	.94		
Attitude	.93	.42	.41	.36	.47	.43	.76	.75	.90	
Norms	.93	.33	.27	.24	.39	.33	.40	.46	.52	.90

Test of the Model and Hypotheses

The hypotheses are tested by examining path coefficients (similar to standardized beta weights in a regression analysis) and their significance levels in the PLS structural model. To examine the statistical significance of path coefficients, we performed bootstrapping with 500 resamples to obtain estimates of t-statistic values (Chin, 1998).

Figure 2 shows path coefficients and significance levels for each hypothesis as well as the variances for the two dependent constructs: online gaming enjoyment and intention to play online games. Online game story, graphics, sound, length, and control together explain 30% of the variance in online gaming enjoyment. The total variance in intention to play online games explained by the research model is 64%.

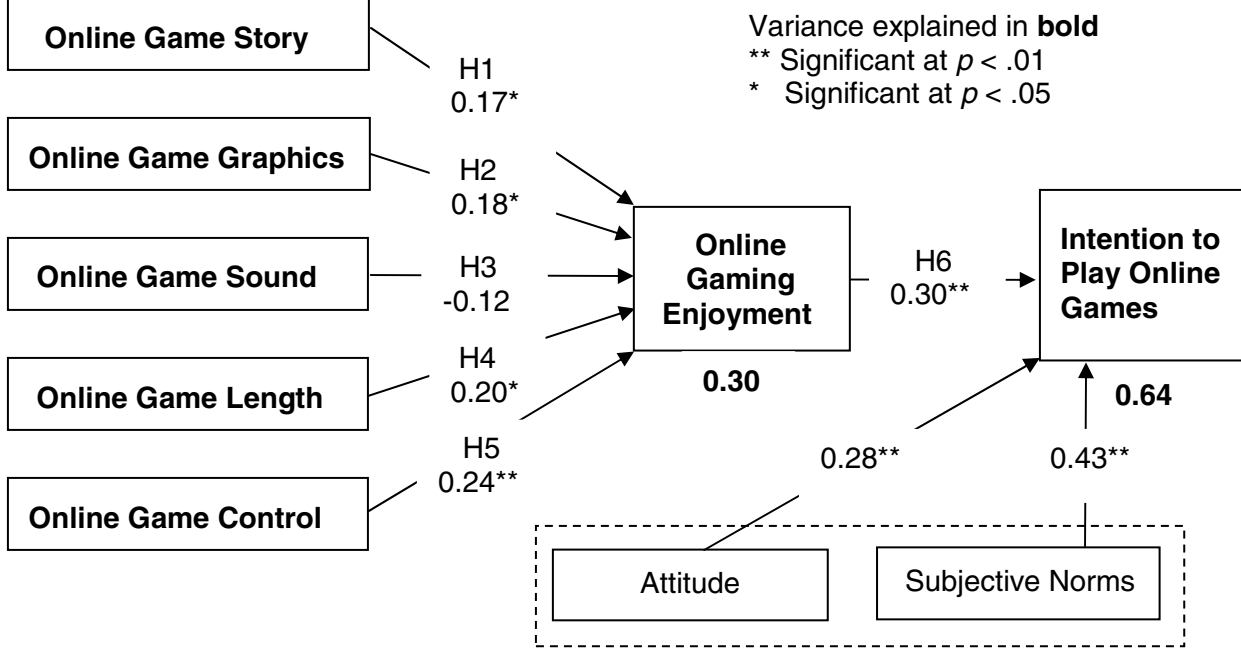


Figure 2: Research Model

Five of the six hypotheses are supported. Online game story, graphics, length, and control all have a significant effect on enjoyment, thus supporting hypothesis 1, 2, 4, and 5. Consistent with the prediction, enjoyment has a significant effect on intention to play online games, thus supporting hypothesis 6. Finally, hypothesis 3, which posits that online game sound has a significant effect on behavioral intention, is not supported. As expected, the two control variables, attitude and subjective norms, are empirically the important predictors of behavioral intention.

Discussion

Summary of Results

The current study shows that online game story, graphics, length, and control have an impact on online gaming enjoyment. Moreover, among these four predictors, online game control is the strongest predictor of enjoyment. The results also indicate that online gaming enjoyment has a great effect on intention to play online games while the effects of attitude and subjective norms on intention are controlled.

We also find that online game sound does not have a significant effect on online gaming enjoyment. The insignificance may be caused by the following reason. Research subjects of this study are undergraduate students. The most popular places for them to play online games are home and school. Because they can not or do not want to disturb family members, roommates, or other students in the same room, the players may not turn on the speakers when playing online games. Also, they may not be able to use headphones as a remedy because of inconvenience or limited availability, which is usually the case when they play online games in school. As a result, these players can not receive auditory information when playing online games. Thus, they may perceive online game sound not an important factor in helping them gain online gaming enjoyment.

Contributions

A primary contribution of this study is that from a user perspective, we propose that the five most important online game characteristics, story, graphics, sound, length, and control, are the key factors contributing to the development of online gaming enjoyment. To our knowledge, this would be the first study to investigate the relationships between these characteristics and online gaming enjoyment. In this way, the current study provides insights into the mechanism of players' formation of emotional response of pleasure.

Another contribution of this study is that we highlight the role of enjoyment in predicting behavioral intention in the online gaming environment. Prior research in e-commerce examined the impact of enjoyment on shopping intentions. The current study indicates that enjoyment also exerts important influences in players' intentions to play online games even when the effects of attitude and subjective norms on intention are controlled. This is consistent with prior studies in electronic commerce, providing additional evidence that enjoyment is an important trigger for behavioral intention.

Implications

This study is motivated by a need to understand the roles of online game characteristics in the development of enjoyment. Our research model and empirical results yield the following implications for future research.

First, this study finds that online game sound does not have a significant effect on online gaming enjoyment. A possible explanation is that most of the time online game sound may not be available to the players in this study due to the constraint of gaming environment. Future research can reexamine the role of online game sound in predicting enjoyment.

Second, this study also shows that online gaming enjoyment plays very significant role in predicting behavioral intention. This implies that enjoyment as conceptualization of intrinsic motivation is important and appropriate in studying online game player behavior. Due to the importance of enjoyment in explaining behavioral intention, more research is needed to explore other potential predictors of enjoyment in online gaming context.

Finally, this study shows that story, graphics, length, and control impact enjoyment. Such a finding implies that vendors should pay close attention to these key online game characteristics. One game design methodology, Playtest Method, may be used to address this issue. The method combines traditional and scientific survey methods with a controlled laboratory environment to collect systematic and quantitative information about experiment participants' perceptions of games.

Limitations

The model needs to be tested in different contexts to establish external validity. Currently, it is unclear how well the model and its findings can be generalized beyond the specific environment of this study. Cook and Campbell (1979) argue that when assessing the generalizability of a study, researchers need to consider both the participants and the setting in which the study is conducted. In addition, Agarwal and Karahanna (2000) suggest that the best way to address generalizability issue is through replication in different contexts to identify the boundary conditions for the theoretical model. Given that the participants of this study are business school undergraduates with the average age of 23 and the setting is an educational

institution, the generalizability of the model and its findings to a wide array of settings and populations requires additional research.

Conclusion

In conclusion, this study investigates whether key characteristics of online games are the primary determinants of online gaming enjoyment. Using a survey conducted at an educational institution, we find support for five out of the six hypotheses. The results of this study confirm the important roles of online game story, graphics, length, and control in predicting enjoyment, and the significant impact of enjoyment on players' intention to play online games. The insignificance of the link from online game sound to enjoyment indicates the need for further research.

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