How Game Tutorials in Mobile Online Games Affect User Adoption

Conference Paper · January 2021

DOI: 10.1109/ICEIT51700.2021.9375593

3 authors, including:

Zhiyong Xiong
South China University of Technology
27 PUBLICATIONS **128** CITATIONS
SEE PROFILE

Lijun Jiang
South China University of Technology
52 PUBLICATIONS **161** CITATIONS
SEE PROFILE

How Game Tutorials in Mobile Online Games Affect User Adoption

2021 10th International Conference on Educational and Information Technology (ICEIT) | 978-1-6654-2295-6/20/$31.00 ©2021 IEEE | DOI: 10.1109/ICEIT51700.2021.9375593

Xiong Zhiyong
School of Design
South China University of Technology
Guangzhou, China
zyxiong@scut.edu.cn

Wang Jiani
School of Design
South China University of Technology
Guangzhou, China
441547257@qq.com

Jiang Lijun
School of Design
South China University of Technology
Guangzhou, China
ljjiang@scut.edu.cn

***Abstract*—Some studies believe that game tutorials have a positive impact on games, there is limited research on how game tutorials affect user adoption. This study takes MOGs (Mobile online games) as an example, through the study of the adoption of previous games, the influence model of MOGs' adoption in the game tutorial stage is constructed. Structural equation modelling (SEM) was used for data analysis. The results show that perceived usefulness greatly affects satisfaction. In addition, immersion through perception enjoyment also affects satisfaction. The conclusion of this article is that designers need to pay attention to the design of game tutorials, in addition to helping players quickly master the game, but also to improve the immersion and fun at this stage.**

Keywords—mobile games, technology adoption model, game tutorial, perceived enjoyment, satisfaction

I. INTRODUCTION

In 2018, the mobile game market accounted for more than half of global game revenue for the first time. Smartphone and tablet games combined will generate 70.3 billion US dollars in revenue, accounting for 51% of the total global market. There are also the most players in this field, with 2.2 billion people, most of whom play games on smartphones [1]. Especially in China, the market size of mobile games reached 164.61 billion yuan, and the number of users reached 626 million [2]. And mobile games have developed more interactive methods, it is difficult for players to quickly master a new game. Therefore, they usually have a tutorial at the beginning of the game to guide novices into the game. The game as a tool to help players master the game, and the player enters the first stage of the game experience, its importance is self-evident.

In past research, many scholars have explored various factors that influence game adoption or use intention (eg. perceived usefulness, perceived ease of use, perceived pleasure, perceived control, perceived connection, immersion, satisfaction, etc.). However, few studies have explored the influence factors of game tutorials on user adoption. The game tutorial is a very special stage of the game. It is very important to understand how the game tutorial affects user adoption. As for how the various factors in the tutorial stage affect players to continue to play the game, there is currently very limited research. Davis proposed TAM (Technology adoption Model), which describes whether usefulness and ease of use affect user adoption of this technology. After this, scholars continue to expand and integrate it, and apply it to the game field [3]. J. Merikivi proved the effect of perceived enjoyment on game acceptability and investigated the role of perceived enjoyment in promoting the continued use of mobile games, as well as the antecedents of perceived enjoyment [4]. In a study of the acceptability of VR devices with high immersion, the authors found that perceived enjoyment functions as a direct predictor for attitude and in strength even exceeds perceived usefulness [5]. In addition, past research has shown that users with higher satisfaction will be more willing to use information systems again [6][7]. According to the above research, does perceived usefulness, perceived ease of use, perceived enjoyment, immersion, and satisfaction have the same effect on mobile game adoption at the stage of the game tutorial? What factors will affect the adoption more positively? Therefore，this study takes MOGs (Mobile online games) as an example, integrate perceived ease of use, immersive experience, and satisfaction into the technology adoption model, and establish an impact model for mobile game adoption at the game tutorial stage. Hoping that this research can help designers design game tutorials and promote game tutorials in the game field theoretical development within.

II. THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

A. Satisfaction and User Adoption

Satisfaction is the key to whether users will continue to use a service. Hsiao listed user satisfaction as the overall perceived factor in the continued use of mobile social applications, and discussed its impact on users' continued use of applications [7]. Park also integrates satisfaction into the technology adoption model in the player's adoption of mobile social network games [8]. In research, it is common to use satisfaction as a prerequisite for continued use. It is a powerful predictor of usage intention. For games that are optional services, satisfaction may be the ultimate factor in determining user behavior. Based on these studies, this article will also take satisfaction as a prerequisite factor for the player's intent to use the game, and propose the following hypothesis:

Hypothesis 1. Satisfaction positively influences intention of use to the mobile online games.

B. Perceived Usefulness and Perceived Ease of Use

In TAM, perceived usefulness and perceived ease of use are used to explain the reasons why people accept or reject information technology. They are stimulated by external factors that affect the user's behavior attitude and actual

behavior. Davis defines perceptual usefulness as: “the degree to which a person believes that using a particular system would enhance his or her job performance”. Perceived ease of use is defined as: "the degree to which a person believes that using a particular system would be free of effort" [3]. The perceived usefulness of this article refers to: “the degree to which a person believes that using game tutorial would help him or her master the game", includes an understanding of the game world, gameplay, and operation. Because the perceived usefulness of this article is different from the previous research on the definition of perceived usefulness, the game tutorial is a stage to help players master the game. And the perceived ease of use in this article refers to “the degree to which a person believes that playing MOGs would be free of effort, apart from any skill challenges in the game”. Therefore, this article will explore the impact of perceived sexual use on perceived ease of use. In addition, many studies have shown that these two factors have a great influence on users’ network technology adoption [9]. Mun Y. Yi have proved the positive relationship between perceived ease of use and enjoyment [10]. This means that the ease of service may make users more enjoyable. Therefore, this study makes the following hypothesis:

Hypothesis 2. Perceived usefulness positively influences satisfaction to the mobile online games.

Hypothesis 3. Perceived usefulness positively influences perceived ease of use to the mobile online games.

Hypothesis 4. Perceived ease of use positively influences satisfaction to the mobile online game.

Hypothesis 5. Perceived ease of use positively influences perceived enjoyment to the mobile online game.

C. *Perceived Enjoyment*

Many scholars have applied perceptual enjoyment to network technology to explore users’ use psychology and verified the importance of received enjoyment. Games as an enjoyment service, gaming enjoyment is an indispensable factor. J. Merikiv made the perception of pleasure as the main factor, and analyzed the relationship between perceived enjoyment and continuance intention of mobile games [4]. The results show that perceived enjoyment is very important. The game tutorial is used as an auxiliary tool to help players gradually enter the game, and it is also part of the game. The fun experienced by players during the game tutorial stage is likely to affect the player’s intention to continue playing. This article defines perceived enjoyment as: “the extent to which the activity of using MOGs is perceived to be enjoyable in the game tutorial stage aside from the instrumental value of the technology”. And make the following hypothesis:

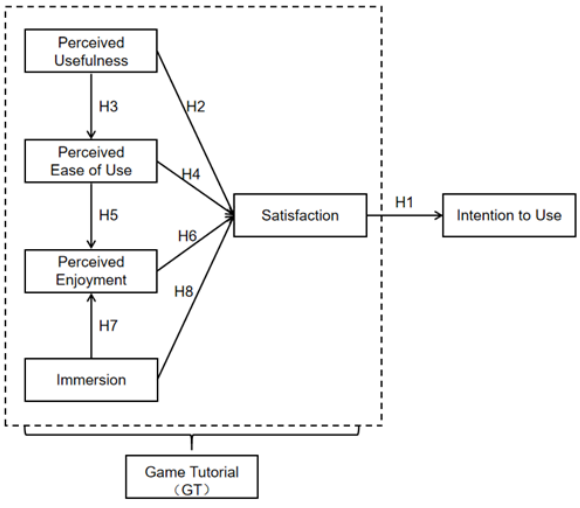

Fig. 1. Research framework.

Hypothesis 6. Perceived enjoyment positively influences satisfaction to the mobile online games.

D. *Immersion*

Immersion is the perception of a virtual environment created by information technology. It is a very important part of the user experience in the game [11][12]. In particular, Teng’s research directly shows that satisfying players’ immersion will increase the loyalty of the game [13]. Based on the above research, this article proposes the following hypothesis:

Hypothesis 7. Immersion positively influences Perceived enjoyment to the mobile online games.

Hypothesis 8. Immersion positively influences satisfaction to the mobile online games.

III. SURVEY

In order to understand the impact of the game tutorial stage on the adoption of players’ MOGs, this article uses an online questionnaire survey. China is the country with the largest share in the mobile gaming market [1]. And college students and office workers with relatively fixed daily schedules and sufficient leisure time account for 80% of all mobile game users [2]. Therefore, the targets of this research survey are undergraduates, graduate students, and young people with shorter jobs in China, the main players of MOGs are in these stages.

Before the formal survey, 27 questionnaire questions were designed based on the questionnaire in the previous literature, and 30 young people with rich experience in online mobile games were invited to conduct a pre-test. During the pre-test period, the participants were asked to ask the interviewees whether they had any difficulties in understanding the questionnaire and explain in detail the areas of their doubts. Then the reliability and validity of these 30 questionnaires were analyzed. According to the analysis results, 6 unqualified questions and 1 redundant question were eliminated, and the words used in the previous pre-test that the interviewee had doubts were revised. Finally, Twenty questions are reserved as formal questionnaires, and 17 main questions and source of questions are shown in Table I.

After going through the upper order procedure, this article disrupts the order of the 17 main questions with high reliability, so as to prevent the subjects from being interfered by similar items. The questionnaire survey used an online questionnaire survey tool and collected 206 valid questionnaires online. Samples without game experience and game types that do not meet the requirements are deleted to avoid possible biases that affect the data. In addition, each person participating in the

questionnaire survey was rewarded with a small red envelope as a questionnaire remuneration.

This questionnaire uses Likert's 7 scale, and subjects were asked to rate each question (1 = "very disagree", 7 = "very agree"). Before the scale is scored, the questionnaire sets up three basic information questions to understand the game experience of the subjects, and uses SPSS 24.0. Descriptive statistics on the basic information, the sample male to female ratio is not much different, 77.1% of the subjects have a year of the above MOGs experience, 39.3% of them have more than three years of MOGs experience. 65.6% of the respondents spent an average of more than one hour playing MOGs per day. Since most of the sample of the questionnaire comes from the gaming social group, most of the subjects have rich experience in the games of the MOGs category. See Table II for details.

TABLE I. QUESTIONNAIRE ITEMS CONDUCTED IN THE MAIN SURVEY

Constructs	*Item*	*Descriptions*
Satisfaction	A1	I am satisfied with the MOGs I am playing. (Game tutorial stage)
	A2	My experience of playing this MOGs has been satisfactory. (Game tutorial stage)
	A3	I am satisfied with what this MOGs has to offer. (Game tutorial stage)
Perceived usefulness	B1	I think the tutorial helped me understand mobile game faster.
	B2	The tutorial helped me master mobile game faster.
	B3	In the novice stage, I can quickly master the operation skills of mobile game according to the guidance.
Perceived ease of use	C1	I think learning to play MOGs is very simple by the tutorial.
	C2	I can master the MOGs skills quickly by the tutorial.
	C3	In the novice stage, I know how to operate exactly according to the guidance.
Perceived enjoyment	D1	I enjoy the process of playing MOGs. (Game tutorial stage)
	D2	Playing MOGs would bring me happiness. (Game tutorial stage)
	D3	I think it's interesting what this MOGs has to offer. (Game tutorial stage)
Immersion	E1	Playing MOGs makes me lack of awareness of time. (Game tutorial stage)
	E2	Playing MOGs makes me loss of awareness of the real world. (Game tutorial stage)
	E3	I have a strong sense of engagement when I play MOGs. (Game tutorial stage)
Intention to use	F1	I intend to playing MOGs in the future.
	F2	I believe i will continue play MOGs in the future.

TABLE II. DESCRIPTIVE ANALYSIS

Variable	*Item*	*Frequency*	*Percent (%)*
Gender	Female	98	47.60%
	Male	108	52.40%
Years playing MOGs	Less than half a year	27	13.10%
	0.5-1	20	9.70%
	1-2	45	21.80%
	2-3	33	16.00%
Hours playing MOGs/day	Less than one hour	71	34.50%
	1-2	76	36.90%
	2-3	36	17.50%
	More than 3 hours	23	11.20%

IV. RESULT

A. Scale Reliability and Validity

Due to changes in the application scenarios of various factors, this paper uses SPSS 24.0. Software to perform factor analysis on the effective questionnaire data, the rotation converges after 6 iterations, and the interpretation of the 6 factors with larger eigenvalues accounts for 86.626% of the total variance. Generally speaking, the total interpretation degree is higher than 50%, which means that the extracted factors are more representative. Table III shows this result very well, and each factor is in its own factor.

After the factor analysis, SPSS 24.0 is used to analyze the composite reliability of the factors. The reliability analysis is to determine the reliability of the scale to ensure the validity of the subsequent model test. From Table IV, it can be seen that each factor The Cronbach's α values are all greater than 0.8, indicating that the use of this f factor metric is reliable. Then, AMOS 24.0. is used to carry out CFA(confirmatory factor analysis). The main purpose of CFA is to test the internal convergence consistency of each variable item to verify the model's convergence reliability and discrimination reliability. All standardized factor loads are greater than 0.7, indicating that the convergent validity is better. And the values of AVE are all greater than 0.5, and C.R. are all greater than 0.8, which proves the convergent validity. The diagonal of Table V is the square root value of AVE. Off-diagonal elements are correlations among constructs. Diagonal elements are larger than off-diagonal elements, therefore, the structure adopted in this study has discriminant validity [14].

B. Structural Model Assessment and Hypotheses Testing

Table V shows the results of the overall model fitting effect, and indicates the evaluation criteria. χ^2/df is the ratio of chi-square to degrees of freedom, and RMSEA is the approximate

TABLE III. LOADINGS OF ITEMS

	1	*2*	*3*	*4*	*5*	*6*
C1	0.892					
C3	0.89					
C2	0.877					
B2		0.852				
B3		0.847				
B1		0.802				
A1			0.865			
A3			0.766			
A2			0.733			
E1				0.852		
E3				0.834		
E2				0.713		
D1					0.823	
D3					0.79	
D2					0.676	
F1						0.813
F2						0.642

TABLE IV. MEASUREMENT ITEMS

	SAT	***PU***	***PEU***	***PE***	***IM***	***IU***
AVE	0.7209	0.7142	0.7645	0.709	0.6072	0.8195
C.R	0.8857	0.8823	0.9067	0.8796	0.8222	0.9002
Cronbach's α	0.886	0.882	0.905	0.88	0.824	0.893

root-mean-square error. Although the GFI is slightly less than 0.9, other values are within the judgment range. Overall, the model has a high degree of fit. Among the total 8 hypotheses, Table VII supports 7 hypotheses. Consistent with previous research on the overall adoption of the game, satisfaction with the game tutorial stage largely determines whether the player will continue to play the game (H1:β=0.297, p<0.001), perceived ease of use and usefulness There is a significant relationship between sex (H3:β=0.297, p<0.001). Perceived pleasure is determined by perceived ease of use and immersion (H5:β=0.35, p <0.001; H7:β =0.626, p<0.001). Perceived usefulness, perceived ease of use, and perceived enjoyment are positively correlated with satisfaction (H2:β=0.373, p<0.001; H4:β=0.235, p<0.001; H6:β=0.36, p<0.001) . In addition, immersion at the game tutorial stage has no significant effect on satisfaction. However, it is positively correlated with satisfaction through the full mediation effect of perceived pleasure.

Fig. 2 shows the path coefficient and significance level of each hypothesis, and the four multivariate correlation squares. Among them, perceived usefulness explains 9% of the difference in perceived ease of use, but it and 58% explain the difference in perceived enjoyment. Perceived usefulness, perceived ease of use, and perceived fun explained 62.2% of the satisfaction difference, and satisfaction explained 69.4% of the difference in game willingness. However, immersion has little contribution to the difference in satisfaction.

TABLE V. CORRELATION MATRIX AND DISCRIMINANT ASSESSMENT

	SAT	***PU***	***PEU***	***PE***	***IM***	***IU***
SAT	**0.849**					
PU	0.61	**0.845**				
PEU	0.477	0.284	**0.874**			
PE	0.665	0.598	0.46	**0.842**		
IM	0.531	0.495	0.253	0.688	**0.779**	
IU	0.796	0.629	0.444	0.719	0.592	**0.905**

[a.] The bold items on the diagonal represent the square roots of the AVE; the off-diagonal elements are the correlation estimates.

TABLE VI. THE RECOMMENDED AND ACTUAL VALUES OF FIT INDICES

Fit index	***x²/df***	***RMSEA***	***GFI***	***AGFI***
Recommended value	<3	<0.08	>0.90	>0.80
Actual value	1.851	0.064	0.895	0.854
Fit index	***CFI***	***NFI***	***TFI***	
Recommended value	>0.90	>0.90	>0.90	
Actual value	0.961	0.92	0.952	

TABLE VII. THE HYPOTHESIS TESTS

Hypotheses	***Path***	***staEstimate***	***S.E.***	***C.R.***	***Supported***
H1	SAT→IU	0.813***	0.098	10.366	Yes
H2	PU→SAT	0.373***	0.051	5.024	Yes
H3	PU→PEU	0.297***	0.076	3.845	Yes
H4	PEU→ SAT	0.235***	0.05	3.32	Yes
H5	PEU→PE	0.35***	0.053	5.224	Yes
H6	PE→SAT	0.36***	0.092	3.491	Yes
H7	IM→PE	0.626***	0.092	7.291	Yes
H8	IM→SAT	0.157	0.09	1.646	No

[b.]P<0.05*;P<0.01**;P<0.001***

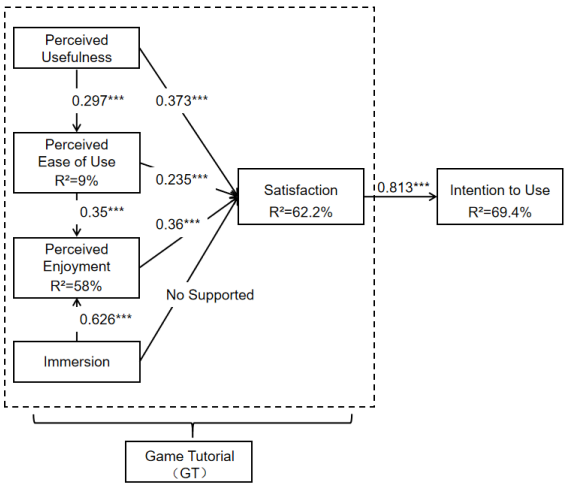

Fig. 2. Summary of hypothesis tests; p<0.001***.

V. CONCLUSION AND DISCUSSION

A. Conclusion

For game designers, perceived usefulness, perceived ease of use, perceived enjoyment, immersion and satisfaction are the factors that designers need to consider in order to retain players. Previous research has studied the influencing factors of player adoption of the game from various angles. On this basis, from the perspective of the game tutorial, the paper establishes the influencing factors model of player adoption at the game tutorial stage, and verifies the model through questionnaire and SME, and draw the following conclusions:

(1) Perceived usefulness, perceived ease of use, perceived enjoyment, immersion and satisfaction have positive effects on player adoption.

(2) Previously, many studies have shown that satisfaction or attitude directly influences the behavior of players' willingness to play [8][15]. Similarly, the results of the paper show that in MOGs, satisfaction explains 69.4% of the willingness to play, which means that the satisfaction with the game tutorial stage is very important for the player retention of this game.

(3) Perceived usefulness, perceived ease of use, and perceived enjoyment have similar predictive power for satisfaction with the game tutorial. The possible reasons are as follows: 1) Perceived usefulness and perceived ease of use are the greatest significance of game tutorials, as the primary purpose of game tutorials is to help players play games.2) Pursuit for perceived enjoyment is the original intention for most players to start playing a game. Therefore, in the game tutorial stage, feeling the unknown enjoyment of the game is a big determinant of players' satisfaction with the game tutorial stage. However, there is no significant direct correlation between immersion and satisfaction, and it influences satisfaction through the mediating effect of perceived enjoyment.

(4) Different from what the game itself means to the player, the tutorial is a tool to assist the player in playing the game, and perceived usefulness of the game tutorial is important.

Perceived ease of use, which indicates the ease of a novice player's understanding and mastery of the game, is influenced by perceived usefulness, and also increases players' satisfaction with the game tutorial stage.

B. Contributions and Implications

In the field of mobile games, this research has a certain degree of contribution in both theoretical and practical applications. From a theoretical point of view, most of the previous research started with the game as a whole, and then studied different platforms or different types of games, and continued to incorporate new factors to expand TAM. This article does not continue to expand TAM, but based on previous research for game tutorials, adjusts the inherent meaning of each factor and understands the relationship between various factors in this stage of the game.

From the perspective of practical application, the research on the game tutorial stage in this article provides designers with the basis for designing MOGs game tutorials. First of all, the game tutorial should satisfy the utility as a tutorial to help the player understand the game operation and gameplay as much as possible. Secondly, the game tutorials currently on the market are often not open enough for the purpose of teaching. Mandatory guidance can easily make the tutorial stage boring, and perceived enjoyment is also an important factor in the game tutorial stage. Therefore, it is very important for players to feel or predict the fun of the game during the game tutorial stage. At present, there are many mobile games that briefly explain the game's world view, and advance the teaching of core gameplay to guide players in practice. Letting players understand the core gameplay of the game in advance will arouse the player's interest. Finally, in the game tutorial stage, the designer can create a unique atmosphere of the game through exquisite picture quality, suitable sound effects, smooth operation, etc. to improve the immersion of the game, thereby enhancing the player's perceived enjoyment.

C. Limitations and Future Research

First, this study collected 206 valid samples, which met the basic requirements of data analysis. But compared to the huge group of mobile games, the sample size is small. In addition, most of the samples are collected from college students in China, and the coverage is small, so the sample data may converge. Although this group is representative of MOGs, it is still not enough to represent the entire mobile game group. Subsequent research can expand the sample size and coverage, and increase the persuasiveness of the conclusion. Or improve the authenticity of the questionnaire by first conducting a controlled experiment of the game tutorial and then filling in the questionnaire. Second, predecessors applied TAM to the game field and continuously expanded the model, incorporating many influencing factors. Based on this, this article integrates perceived usefulness, perceived ease of use, perceived enjoyment, immersion, and satisfaction into a new game acceptance model from the new perspective of game tutorials. These factors are all discussed and empirically discussed by the predecessors. This article does not continue to expand the new factors, and only integrates several major factors with larger influence factors. Therefore, the model construction of this article is not perfect and the scope of discussion is not wide enough. Researchers can continue to expand the model on this basis. Third, this article only superficially analyzes the relationship between factors and the possible reasons for this result. In the future, researchers can further explore the reasons for this empirical conclusion.

ACKNOWLEDGMENT

This research was supported by the grant from the National Natural Science Foundation of China (No. 51105145) and Philosophical and Social Sciences Planning of Guangzhou in 2019 (No. 2019GZGJ18).

REFERENCES

[1] 2018 Global games market report [EB/OL]. [2018-07-30]. https://newzoo.com/products/reports/global-games-market-report/

[2] 2019 China mobile game industry research repor [EB/OL]. [2019-07-05]. http://report.iresearch.cn/report_pdf.aspx?id=3405

[3] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," MIS Quarterly, vol. 13, (3), pp. 318, 1989.

[4] J. Merikivi, D. Nguyen and V. K. Tuunainen, "Understanding perceived enjoyment in mobile game context," in 2016, DOI: 10.1109/HICSS.2016.473.

[5] E. Holdack, K. Lurie-Stoyanov and H. F. Fromme, "The role of perceived enjoyment and perceived informativeness in assessing the acceptance of AR wearables," Journal of Retailing and Consumer Services, pp. 102259, 2020.

[6] A. Bhattacherjee, "Understanding Information Systems Continuance: An Expectation-Confirmation Model," MIS Quarterly, vol. 25, (3), pp. 351-370, 2001.

[7] C. Hsiao, J. Chang and K. Tang, "Exploring the influential factors in continuance usage of mobile social Apps: Satisfaction, habit, and customer value perspectives," Telematics and Informatics, vol. 33, (2), pp. 342-355, 2016.

[8] E. Park et al, "Determinants of player acceptance of mobile social network games: An application of extended technology acceptance model," Telematics and Informatics, vol. 31, (1), pp. 3-15, 2014.

[9] P. Choe and D. Schumacher, "Influence of Different Types of Vibrations on Technical Acceptance of a Mobile Game Aiming for Hedonic Satisfaction," International Journal of Human-Computer Interaction, vol. 31, (1), pp. 33-43, 2015.

[10] M. Y. Yi and Y. Hwang, "Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model," International Journal of Human-Computer Studies, vol. 59, (4), pp. 431-449, 2003.

[11] N. Yee, "Motivations for play in online games," Cyberpsychology & Behavior, vol. 9, (6), pp. 772-775, 2006.

[12] R. M. Ryan, C. S. Rigby and A. Przybylski, "The Motivational Pull of Video Games: A Self-Determination Theory Approach," Motivation and Emotion, vol. 30, (4), pp. 344-360, 2006.

[13] C. Teng, "Customization, immersion satisfaction, and online gamer loyalty," Computers in Human Behavior, vol. 26, (6), pp. 1547-1554, 2010.

[14] M. I. Merhi, "Towards a framework for online game adoption," Computers in Human Behavior, vol. 60, pp. 253-263, 2016.

[15] Y. Liu and H. Li, "Exploring the impact of use context on mobile hedonic services adoption: An empirical study on mobile gaming in China," Computers in Human Behavior, vol. 27, (2), pp. 890-898, 2011.