The Impact of Presence on Users' Trust in Educational Serious Games

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1. Introduction

Although the study of serious games has increased in recent years, most studies have focused on system architecture, design and performance. However, most studies do not explain how serious games provide users' trust. Serious games have encountered limitations on market growth as a result of people's negative bias on games. Therefore, it is important to conduct researches in order to secure users' trust in serious games. The purpose of this study is to identify how serious games gain their trust from users with the usage of the presence and trust theory and to identify the impact of presence on users' trust in these games. Users have two very different purposes when using educational serious games-fun and learning. Therefore, we divided the users' trust into two different sectors-trust in fun and trust in learning. In order to achieve research purposes, we built research model and empirically verified the research by conducting surveys. The results showed that the presence have influence on both trust in fun and trust in learning.

2. Theoretical Background and Research Model

This study is about how game users' social presence and virtual presence affect trust. To conduct this study, we used concept of presence theory, trustworthiness, and trust. Prior researches have revealed that trustworthiness has played a role in trust's antecedent variable. Also, presence is key issue in computer mediated systems. In case of educational serious game, users have two different types for use purposes. They want to enjoy the game and also learn the study using the game. In this reason, we suppose that trust in educational serious games have two types of trust (trust in fun and trust in learning). Based on these theories, we built research model as below.

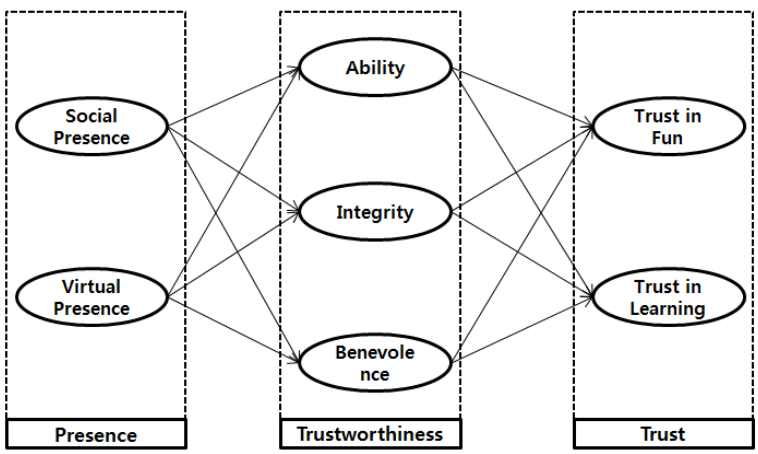

Figure 1. Research Model

3. Methodology

A survey was conducted in Korea in order to empirically test the enhancing trust in the educational serious games. We collect 26 questionnaire items for each of the seven constructs from relevant literatures.

This study tests hypotheses by using Smart PLS 2.0. The partial least squares (PLS) method was used to test the research model and outcome variables. We analyzed the data via PLS. The test of the structural model included estimating the path coefficients and R^2 values, which shows the predictive power of the model.

4. Analysis and Results

The reliability of measurement items was assessed by the internal consistency method. Cronbach's alpha values used for estimating internal consistency, which values for each construct surpasses the recommended value of 0.6 or 0.7. We assessed the reliability of constructs for all items which range from 0.694 to 0.952. We also found that questions used in our study had convergent validity, with significant loadings and t-statistics well above the threshold value [1]. Convergent validity is adequate when items load highly (loading> .50) on their associated factors [2]. We assessed the composite reliability of constructs for all questions which ranged from 0.828 to 0.965. We also found that questions had convergent validity which is evaluated by the use of item reliability, average variance extracted (AVE), and t-statics for factor loadings [3]. It adequate when items load highly (loading> .50) on their associated factors, and the AVE from the construct should be greater than the variance shared between the construct and other constructs in the model for satisfactory discriminant validity. We see from Table 1 that all of the measures loaded much higher than the suggested threshold and shows that verify the discriminant validity of the questionnaire items used in our study.

Table 1 shows the results of the structural model. In the total model, the results show that social presence have significantly effect on trustworthiness (β=0.452, t=7.722; β=0.226, t=3.998; β=0.274, t=4.039) and also virtual presence have significantly effect on trustworthiness (β=0.214, t=3.686; β=0.409, t=7.782; β=0.265, t=3.911). Trustworthiness has significantly effect on trust in fun and trust in learning (AB→ trust in fun β=0.573, t=9.774; AB→trust in learning β=0.288, t=3.841; IN→ trust in learning β=0.262, t=4.032; BE→ trust in fun β=0.196, t=3.432; BE→ trust in learning β=0.240, t=4.075). However, Integrity has not significantly effect on trust in fun (β=-0.029; t=0.449).

[Table 1] Model analysis

Independent Variables	Dependent Variables	Path	t-value
Social Presence	Ability (AB)	0.452	7.722**
	Integrity (IN)	0.226	3.998**
	Benevolence (BE)	0.274	4.039**
Virtual Presence	Ability (AB)	0.214	3.686**
	Integrity (IN)	0.409	7.782**
	Benevolence (BE)	0.265	3.911**
Ability (AB)	Trust in fun	0.573	9.774**
	Trust in learning	0.288	3.841**
Integrity (IN)	Trust in fun	-0.029	0.449
	Trust in learning	0.262	4.032**
Benevolence (BE)	Trust in fun	0.196	3.432**
	Trust in learning	0.240	4.075**

5. References

[1] Wixom, B. H. & Watson, H. J., "An Empirical Investigation of the Factors Affecting Data Warehousing Success," MIS Quarterly, vol. 25, pp. 17-41, 2001.

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[3] Hair, J. F., Anderson, R. E. and Tatham, R. L. Multivariate data analysis with readings: Prentice-Hall, 1998.