EXPLORING INTENTIONS TO USE VIRTUAL WORLDS FOR BUSINESS

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ABSTRACT

Virtual worlds are becoming increasingly sophisticated, showing potential as a platform for a variety of collaborative activities in business. This exploratory study examines user's intentions to use the virtual world Second Life (SL), and the factors associated with the intentions. Based on Technology Acceptance Model (TAM), flow theory, and extended models of TAM, a research model is proposed with seven constructs. The model is tested through a survey administered to business school students who have participated in a business-oriented exercise using Second Life. Results show that perceived usefulness and perceived enjoyment have significant impacts on behavioral intentions to use SL for business activities, while perceived ease of use is not a significant direct antecedent to behavioral intentions. Additionally, computer playfulness and computer self-efficacy are shown as important predictors to perceived ease of use. Implications and limitations are discussed.

Keywords: virtual world, Second Life, Technology Acceptance Model, perceived enjoyment

1. Introduction

The social networking capabilities of Web 2.0 have enabled an Internet platform that is much more collaborative than it was just a few years ago. In addition to traditional uses such as information dissemination, advertising, and sales transactions, the Web is rapidly becoming an accepted place to conduct meetings, teach or take a class, interact virtually with others, or just socialize online.

Three-dimensional (3-D) social networking environments, or Internet-based virtual worlds, have been emerging rapidly since about 2003. The virtual world environment is an immersive, virtual reality space where people interact with one another via avatars, which are graphical, 2- or 3-D representations of a user. Among the most well known Internet-based virtual world today is Linden Labs' Second Life (www.secondlife.com), a 3-D virtual world where users can socialize, collaborate, and conduct business using voice and text chat through personal avatars. Virtual worlds are attracting attention in industry as well as academia for their potential to enhance online collaboration and commerce.

Gartner, Inc., a leading information technology research and advisory company presented its forecast for the future value of virtual worlds at its 2007 conference, stating that by the end of 2011, 80 percent of active Internet users and Fortune 500 enterprises will be participating in some form of virtual world [Gartner 2007]. They project that the community-related and collaborative aspects of virtual worlds will be of most value to corporate Internet users, while transaction-based, commercial activities will be of less importance. While they proposed that the collaborative and community aspects of virtual worlds will be significant, they also cautioned companies to invest cautiously, as the technology is young, and will continue to develop and mature.

Many companies, most notably IBM, are already investing strategically in the three-dimensional (3-D) Internet technologies that enable virtual worlds [Lohr 2008; Ringo 2007; Sarvary 2008]. In a recent study conducted by IBM, the potential impact of 3-D gaming technologies on the IT industry was examined [Paris 2007]. Results

suggested that companies should seriously consider the impact that games and virtual environments will have on business applications, products, and services. They further implied that virtual world environments may have transformative potential to improve business processes, collaboration, and customer experiences. IBM's research results are backed by first-hand experience within its own organization. For several years, IBM has been exploring and measuring the value online collaboration techniques (including online discussion boards with sophisticated text mining tools) to improve collaborative innovation among its geographically dispersed employees. Their most recent trials using Second Life revealed that the social nature of this visual and immersive environment led to more positive collaboration outcomes [Ringo 2007]. IBM promotes the 3-D Internet as "the essential tool for helping people work, live and play to their fullest potential" [IBM 2008]. In April 2008, it was reported that IBM and Linden Labs began working together to develop a new Second Life project behind their corporate firewall [Lohr 2008]. In August, they released a 15 minute rich-media Webcast demonstrating the work they have done in recent months using avatars in Second Life to educate IT managers and CIOs on energy efficient data center technologies and services.

There is a growing body of literature that explores the use of virtual worlds and avatars in business. In one recent article, Kock [2008] explores the potential of two of the most popular virtual worlds, Second Life and World of Warcraft. He looks specifically at e-collaboration behavior and task outcomes, as well as commercial trade outcomes. His conclusion is that the publicized benefits are justified, but that the evolution and stability of this technology is still quite young. Reeves, Malone, & O'Driscoll, [2008] examine the use of virtual worlds in leadership development, and argue that such multi-player online environments provide a unique platform where a variety of leadership skilled can be simulated such as communication, collaboration, and decision making. Edery [2008] suggests exploring the potentials of virtual worlds for marketing and advertising. He proposes that reverse product placement, which is commercial translation of fictional brands or products from games into the real world, could be significant, and that companies that blend the virtual and physical world brands could be rewarded with lower costs for market entry and enhanced customer relationships.

V-commerce, or Virtual Commerce, describes the integrative use of the 3-D Internet and virtual worlds to market products and services. Barnes [2007] has recently developed a research agenda to examine the effectiveness of advertising towards intent to purchase. With more than 100 virtual worlds currently in existence online, new 3-D Internet environment models are emerging as opportunities to explore new integrative marketing channels. Barnes' research is among the first to empirically test the potential for avatars and virtual objects to influence trust and the intention to make purchases online in a 3-D virtual world. V-learning can be viewed as an extension of e-learning [Baxter 2008]. Cross, O'Driscoll, and Trondsen [2007] propose ways in which the capabilities of virtual worlds may be used to enhance existing learning models in organizations. Besides the well known value of the Internet for electronic collaboration and anytime/anywhere learner and teacher participation, virtual worlds provide the new element of an augmented reality. With a self-created avatar, a participant can take on any role or persona in the virtual world and exist in that character, or any number of different characters. Furthermore, the virtual place itself can be a simulation of a real environment or one based strictly on the limits of the creator's imagination. This has the potential to create new simulation opportunities for learning in both corporate and academic settings. In another recent study, Arakji and Lang [2008] developed a framework for organizations to measure the potential business costs and benefits associated with having a virtual presence in a virtual world. Using a model based on decision tree analysis, they examined a series of potential v-commerce events and interactions in a virtual world, providing calculated probabilities for a variety of expected outcomes. While the actions measured were simulations, this framework may provide the initial step in studying the potential business value that might be available through strategic investments in virtual world technology.

In this paper, we investigate the potential of Second Life (SL) as a business, or v-commerce environment by exploring individuals' intentions to use the technology for business activities. Second Life was chosen as the virtual platform because it is currently one of the most widely known virtual worlds. Second Life has grown from 2 million residents in January 2006 to almost 15 million residents as of September 2008, with over 1.2 Million users logging in during the last 60 days (Secondlife.com.) As previously noted, a good deal of anecdotal evidence suggests that there are many positive attributes associated with virtual worlds for e-collaboration and learning-commerce. In addition, the notion that the 18-34 year old group is the ideal target for this type of technology-enabled experience is commonly agreed upon. To date however, there is little, if any, empirical evidence to suggest that this population group perceives the expected value of virtual worlds the way industry analysts and corporate researchers suggest. Using a survey based on the Technology Acceptance Model (TAM), flow theory, and extended models of TAM, our exploratory study empirically examines undergraduate business students' acceptance and intention to use virtual worlds for business activities.

2. Conceptual Background

This study applies the Technology Acceptance Model [Davis 1989] to a group of business students experienced in using Second Life. TAM has been recognized as one of the most powerful models in examining the acceptance of new information technology (IT). Adapted from the Theory of Reasoned Action (TRA) model, TAM posits that two beliefs – perceived ease of use (PEOU) and perceived usefulness (PU) - determine one's behavioral intention to use a technology (BI). Additionally, TAM indicates that PU is influenced by PEOU. Subsequent studies have applied TAM to a wide range of IT [Davis & Venkatesh 1996; Fang, Chan, Brzezinski, & Xu 2006], including E-commerce [Gefen 2003; Gefen & Straub 2003]. These studies show that TAM holds across various types of IT.

While the parsimony of TAM makes it easy to apply to a variety of situations, the leanness of the model is also considered as its key limitation. A number of studies have been conducted to examine additional antecedents of IT use, such as positive image [Moore & Benbasat 1996], cultural dimensions [Mao & Palvia 2006; Straub, Keil, & Brenner 1997], and habit [Gefen 2003], to provide a better understanding of other factors that contribute to the adoption or abandonment of new IT.

With the immersive and interactive 3-D interface of SL, we postulated that the experience of being engaged or simply having fun would have an impact on intentions to use SL. Developed in psychology, the flow theory describes a state in which people are so involved in an activity that nothing else seems to matter [Csíkszentmihályi 1990]. Adapted into studies of technology adoption, the concept of perceived enjoyment (PE) was proposed, which is defined as the extent to which the activity of using a specific system is perceived to be enjoyable in it's own right, aside from any performance consequences resulting from system use [Davis, Bagozzi, & Warshaw 1992]. Studies have found perceived enjoyment as a significant antecedents to users' intentions to adopt technologies such as web browsing [Novak, Hoffman, & Yung 2000], and instant messaging [Lu, Zhou, & Wang 2008]. While PU captures the extrinsic motivation, PE can be considered as capturing the intrinsic motivation aspect. In this study PE is examined as an additional predictor to BI.

In addition, three variables were explored as antecedents to PEOU. Examining the antecedents to PEOU is important not only because PEOU may affect BI both directly and indirectly, but also because it relates to users' perceptions in the early stage of using a system. Based on decision making theories, Vendatesh [2000] proposed that individuals shape their perceived ease of use of a new system based on their general beliefs regarding computers and computer use. In particular, three antecedents were proposed as important: computer playfulness (CP), which is defined as the degree of cognitive spontaneity in microcomputer interactions; computer self-efficacy (CSE), which represents one's belief about her/his ability to perform a specific task/job using a computer; and computer anxiety (CA), which is an individual's apprehension, or even fear, when she/he is faced with the possibility of using computers. These factors have been shown to affect individual's perceptions of how easy it is to use IT [Venkatesh 2000].

3. Research Model and Hypothesis

Based on TAM, flow theory, and extended TAM theories, the research model examines seven variables: PEOU (Perceived Ease of Use), PU (Perceived Usefulness), PE (Perceived Enjoyment), CP (Computer Playfulness), CSE (Computer Self-Efficacy), CA (Computer Anxiety), and BI (Behavioral Intention) to use Second Life (SL) for business purposes. The relationships among the variables and the hypotheses are depicted in Figure 1.

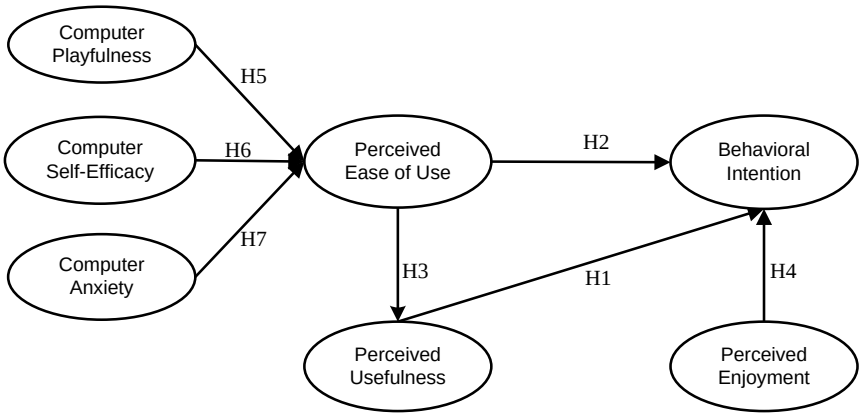


Figure 1: Research Model

According to previous studies on TAM and flow theory, the hypothesized relationship among PEOU, PU, perceived enjoyment, and intended use are specified in H1-H4:

- H1. PU will positively affect BI to use SL
- H2. PEOU will positively affect BI to use SL.
- H3. PEOU will positively affect PU of SL.
- H4. Perceived enjoyment will positively affect BI to use SL.

Based on previous studies of extended TAM and antecedents to PEOU, the hypothesized relationships between CP, CSE, CA and PEOU are:

- H5. Computer Playfulness will positively affect PEOU of SL.
- H6. Computer Self-Efficacy will positively affect PEOU of SL.
- H7. Computer Anxiety will negatively affect PEOU of SL.

4. Data Collection

Data were collected through a survey in fall 2007. The survey was given to undergraduate and continuing studies business students at a university in the northeastern United States. The participating students were from two junior-level E-commerce classes and two senior-level Management Information Systems classes, and ranged in age from approximately 20-35 years old. Prior to the survey, students were given a brief introduction to SL, and an assignment involving hands-on interaction with SL. The activities include downloading and installing the Second Life client software, creating an account, and completing Linden lab's orientation island. After these basic activities, students were asked to work in virtual teams, visiting two corporate islands in Second Life (IBM and Dell), and completing tasks such as finding product information at a corporate information center, and configuring computers to specific requirements. Students were instructed to take snapshots of team members working together in Second Life, and write up a report reflecting on their experiences. All students were given three weeks from the introduction to SL to submitting the assignment. Figure 2-1 and 2-2 are two screenshots of student teams working on collaborative learning and problem solving tasks in SL.

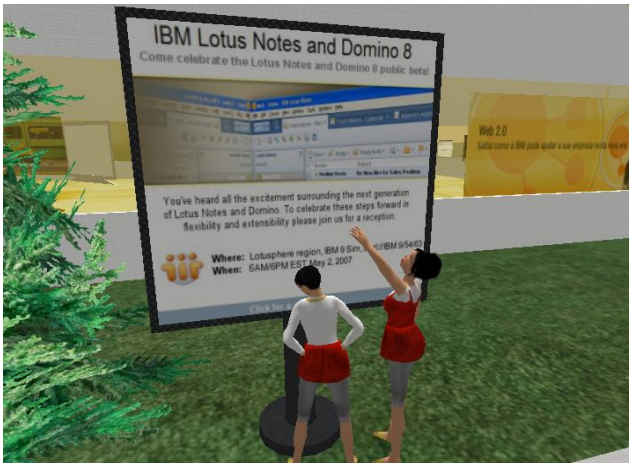


Figure 2-1: Student teams working on learning tasks on IBM island

Figure 2-2: Student teams working on computer configuration tasks on Dell island

After completing the assignment, students were given the URL to participate in the online survey. The questionnaire instructed students to think about SL being used at their work place in the future for a variety of business activities, and provided examples such as conducting business meetings, collaborating virtually with colleagues all over the world, advertising products, and recruiting and hiring.

The survey was available online for one week. The survey was anonymous. Students provided their names at the end of the survey for the sole purpose of obtaining extra credits, which were incentives for survey participation. Students' names were deleted from the survey database as soon as extra credits were awarded.

In constructing the questionnaire, the PEOU, PU, and BI items were adapted from Davis [1989]. While some previous studies have treated PE as a multi-dimensional concept, the three-item scale of PE is considered to be most robust and widely used, and thus adopted in our study [Novak et al. 2000]. The CP, CSC, and CA items were

adapted from Venkatesh [2000]. All items were measured on a seven-point scale ranging from strongly disagree (1) to strongly agree (7). The questionnaire also collected user information such as demographics, current use of social networking sites, and previous knowledge of Second Life. The questionnaire and the SL hands-on assignment were given to a few student volunteers to test clarity in wording and instructions, and were examined separately by the investigators of the study. Minor revisions were made in both documents before they were used in the main study.

Table 1 lists the main constructs measured in the questionnaire. Note the instructions provided in the survey reminds students to think about SL being used at work place for business activities such as business meetings, collaboration with colleagues all over the world, advertising of products, and recruiting and hiring when answering questions such as perceived usefulness.

Table 1: Items for the Latent Constructs

Construct	Items in the Questionnaire	
Perceived Ease of Use (PEOU)	PEOU1	I found it was easy to get SL to do what I want it to do.
	PEOU2	My interaction with SL was clear and understandable.
	PEOU3	It was easy for me to become skillful at using SL.
Perceived Usefulness (PU)	PU1	Using SL in my work would enable me to accomplish tasks more quickly.
	PU2	Using SL in my job would increase my productivity.
	PU3	Using SL would enhance my effectiveness in my work.
Perceived Enjoyment (PE)	PE1	I had fun using SL
	PE2	I found using SL to be enjoyable.
	PE3	The actual process of using SL was pleasant
Computer Playfulness * (CP)	CP1	The following questions ask you how you would characterize yourself when you use computers: Unimaginative
	CP2	Unoriginal
	CP3	Uninventive
Computer Self-Efficacy (CSE)	CSE1	I could complete the job using a software package: If there was no one around to tell me what to do as I go
	CSE2	If I had never used a package like it before
	CSE3	If I had only the software manuals for reference
	CSE4	If I had seen someone else using it before trying it myself
Computer Anxiety (CA)	CA1	Computers do not scare me at all
	CA2	I feel at ease in a computer class
	CA3	I feel comfortable working with a computer
Behavioral Intention to use SL (BI)	BI1	Assuming the business functions would be available in SL, I predict that I will use it on a regular basis.
	BI2	I intend to use it.

* Note the negative items for Computer Playfulness were converted to positive in data analysis

5. Data Analysis and Results

The data were analyzed using Structural Equation Modeling (SEM) and SmartPLS software [Ringle, Wende, & Will 2005]. This approach allows simultaneous analysis of the measurement model (factors), and the structural model (path analysis), and have been widely used. The sections below provide the results of respondents' demographics, measurement model, and structural model.

5.1 Demographic Statistics

Among a total of 90 students, 77 valid responses were collected, resulting in the response rate of 85.6%. Among the respondents, 68.8% were male (n=53) and 31.2% were female (n=24). The majority of the respondents were between 20-24 years old (n=66, 85.7%). The respondents reported very experienced in using a PC (Mean=6.06, SD=1.017), and very experienced in using the Internet (Mean=6.60, SD=1.09).

When asked about whether they have an account and use a social networking site regularly, the top two sites reported are Facebook and Myspace. Table 2 lists respondents' current use of social networking sites.

Respondents were also asked about their use of Second Life before the study. The great majority had never heard about SL before (68.8%), or had heard about SL but do not have an account (18.2%).

Table 2: Use of Web 2.0 Sites

Web 2.0 Sites	Frequency	Percent
Facebook	57	74%
MySpace	33	42.9%
LinkedIn	13	16.9%
Other sites	10	13%

5.2 The Measurement Model

The reliability of the constructs is reported in Table 3. As shown, the composite reliabilities of the different measures all exceed the recommended 0.70 level, and the AVE for each measure all exceed 0.70, as well as the Chronbach's Alpha. The results indicate that the measures are robust in terms of their internal consistency reliability.

Table 3: PLS Results of the Measurement Model

	AVE	Composite Reliability	Cronbach's Alpha
BI	0.83	0.91	0.80
PEOU	0.78	0.91	0.86
PU	0.91	0.97	0.95
Perceived Enjoyment	0.83	0.94	0.90
Computer Anxiety	0.70	0.87	0.79
Computer Playfulness	0.90	0.97	0.95
Computer Self-Efficacy	0.80	0.94	0.92

Table 4: Convergent Validity and Factor Loadings (bolded)

	BI	Computer Anxiety	Computer Playfulness	Computer Self-Efficacy	Perceived Enjoyment	PEOU	PU
BI1	**0.93**	0.20	0.23	0.14	0.48	0.42	0.83
BI2	**0.89**	0.14	0.13	0.26	0.59	0.45	0.59
CA1	0.13	**0.80**	0.23	0.50	0.06	0.14	0.09
CA2	0.29	**0.85**	0.23	0.46	0.24	0.23	0.22
CA3	0.04	**0.85**	0.33	0.36	0.13	0.23	0.00
CP1	0.21	0.31	**0.95**	0.03	0.25	0.19	0.15
CP2	0.18	0.36	**0.94**	0.04	0.20	0.14	0.11
CP3	0.19	0.27	**0.96**	0.03	0.25	0.27	0.08
CSE1	0.20	0.54	0.07	**0.91**	0.25	0.24	0.11
CSE2	0.12	0.48	-0.02	**0.90**	0.33	0.30	0.11
CSE3	0.25	0.43	0.04	**0.92**	0.30	0.25	0.15
CSE4	0.21	0.37	0.05	**0.83**	0.29	0.23	0.14
PE1	0.46	0.07	0.21	0.28	**0.87**	0.60	0.42
PE2	0.53	0.27	0.26	0.33	**0.95**	0.68	0.43
PE3	0.58	0.16	0.21	0.30	**0.92**	0.65	0.55
PEOU1	0.41	0.13	0.09	0.29	0.58	**0.86**	0.44
PEOU2	0.42	0.16	0.16	0.16	0.66	**0.87**	0.37
PEOU3	0.42	0.34	0.32	0.30	0.62	**0.91**	0.43
PU1	0.71	0.14	0.09	0.14	0.49	0.46	**0.93**
PU2	0.81	0.07	0.10	0.10	0.49	0.41	**0.96**
PU3	0.75	0.15	0.13	0.16	0.49	0.48	**0.97**

Table 5: Discriminant Validity of Measurement Model

	Computer Anxiety	BI	PEOU	PU	Perceived Enjoyment	Computer Playfulness	Computer Self-Efficacy
CA	0.84						
BI	0.19	0.91					
PEOU	0.25	0.47	0.88				
PU	0.13	0.79	0.47	0.95			
PE	0.19	0.58	0.70	0.51	0.91		
CP	0.32	0.20	0.23	0.11	0.25	0.95	
CSE	0.51	0.21	0.29	0.14	0.33	0.04	0.89

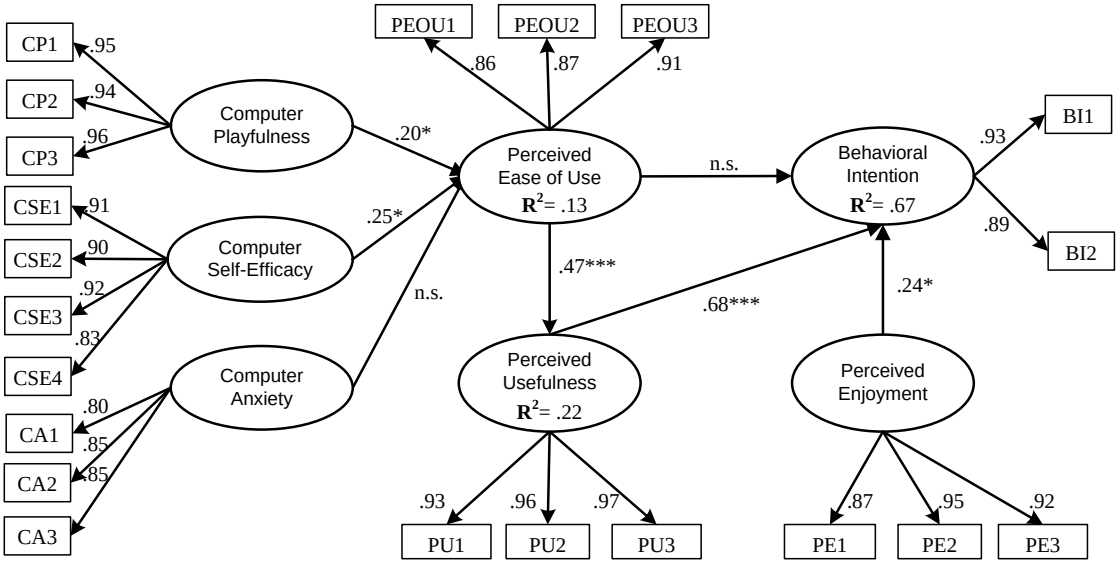
Table 4 reports the convergent validity using the factor loadings and cross loadings of the items to all the constructs. All items loaded on their respective constructs from a lower bound of .80 to a higher bound of .97, and they loaded more highly on their respective constructs than others. In addition, all of the items' loadings onto their respective constructs are significant at the .001 level, as indicated by the T-statistics of the outer model loadings ranging from 4.08 to 137.62. The result confirms the convergent validity of the indicators as representing distinct latent constructs.

Table 5 reports the discriminant validity of the measurement model. The elements in the matrix diagonals represent the square roots of the AVEs, and they are all greater than the off-diagonal elements in the corresponding rows and columns. This supports the discriminant validity of the scales.

5.3 Structural Model and Hypothesis Testing

Figure 3 shows the results of the structural model. The test yields results of path coefficients (β), which indicates the positive and negative relationships between the constructs, the strength of the relationships, and their statistical significance. The test also yields squared multiple correlations (R^2) values, which indicate the amount of variance of the dependent construct that can be explained by the independent constructs.

Overall the model accounts for 67% of variance in behavioral intention, 22% in PU, and 13% in PEOU. PEOU is a strong antecedent to PU (β= .47, p<.001). PU has a strong effect on BI (β= .68, p<.001). Contrary to the original TAM model, PEOU has no significant direct effect on BI. PE also affects BI significantly (β=.24, p<.05). Two strong antecedents to PEOU were found: computer playfulness (β= .20, p<.05), and computer self-efficacy (β=.25, p<.05). The impact of computer anxiety on PEOU was insignificant.



Note: Path Coefficients:
*** path is significant at the .001 level; *path is significant at the .05 level;
n.s. insignificant at the .05 level

Figure 3: Structural Model Results

Thus the hypotheses testing results are:

- H1. PU will positively affect BI to use SL *Supported*
- H2. PEOU will positively affect BI to use SL. *Not supported*
- H3. PEOU will positively affect PU of SL. *Supported*
- H4. Perceived Enjoyment will positively affect BI to use SL. *Supported*
- H5. Computer Playfulness will positively affect PEOU of SL. *Supported*
- H6. Computer Self-Efficacy will positively affect PEOU of SL. *Supported*
- H7. Computer Anxiety will negatively affect PEOU of SL. *Not Supported*

6. Discussion

This exploratory study examined factors associated with one's intention to use Second Life for business activities. With survey data from 77 respondents, our research model with seven factors was proposed and analyzed. Overall the model explained 67% of variance in BI, the intention to use Second Life for business. Using PLS, the results supported the causal path from PEOU to PU, PU to BI, and PE to BI. Two significant antecedents to PEOU were found: computer playfulness, and computer self-efficacy.

Of the two TAM constructs, PU holds as a significant predictor to BI. Interestingly, perceived ease of use does not affect behavioral intentions directly. Instead, the effect of PEOU is shown through PU. This result was also found in many other TAM studies [Keil, Truex, & Mixon 1995; Venkatesh 1994]. Davis himself once indicated that "ease of use operates through usefulness" [Davis 1989]. Gefen and Straub [2000] theorized that PEOU directly affects IT adoption only when the primary task is directly associated with intrinsic IT characteristics, i.e., when the task is an integral part of the IT. He conducted an experiment in the context of E-commerce, and showed that when a website was used to purchase products, PEOU did not affect IT adoption directly whereas a direct effect was found when the website was used to inquire about products. In business settings, our result implies that students perceive achieving job tasks as extrinsic to the use of virtual world. This suggests attentions should be placed on increasing the perceived values of virtual world in facilitating work-related activities.

Perceived enjoyment is also shown as a significant predictor to the intention to use SL. This suggests that providing an engaging experience is critical to the adoption of virtual worlds for business. In their responses to the open-ended questions, people reported that the most interesting aspects of using SL include being able to meet people around the world, teleport to various islands in SL, and do impossible things in real life, such as flying. They also reported that creating an avatar was fun. "The most interesting aspects of using SL are the ability to present a unique, personalized representation of one's self to interact in a collaborative environment. This may remove some of the 'loss of social skills' experienced by the computer generation, as etiquettes will still have to be adhered to in professional situations."

The results also reveal that computer self-efficacy is a strong antecedent to PEOU, followed by computer playfulness. Interestingly, computer anxiety is not significant to PEOU. This may be explained by the fact that with the increasing pervasive use of computer technology in every aspect of our lives, negative emotions associated with computer use are reduced in general. In fact, the mean score of computer anxiety in our sample is 6.16 on a 7 point scale (responses to negative statements were all converted to positives when calculating the mean) with a standard deviation of .83, suggesting very low levels of computer anxiety in general with little variance. Overall the results of the antecedents suggest that one's confidence in technology use and the feeling of control still plays a large role in their perceptions of how easy it is to use SL. Additionally, people who are more "playful" with technology perceive the use of SL to be easier, likely because they are more willing to invest more time for the sake of using new technology.

When asked about the potential of SL for business, participants discussed its potential to be used for a variety of business activities, such as product branding, marketing, recruiting, and team collaboration. For example, one student remarked, "It can be used for recruiting purposes and job fairs allowing more people to attend from all over the world. It can also be used by large companies for employees to meet without having to travel to a central location. It is also useful for training purposes because all employees can attend via their computer." Another respondent described how "Second Life would be beneficial to companies who are looking to market their goods to a different demographic. Also, companies have the ability to test out products that are not in the real world markets yet in their virtual world prior to putting them out on the buying market. " An addition participant commented on how "Businesses can provide shoppers with the social experience they can get at a store, but at the convenience of their computers." Consistent with the survey results, these comments suggest that the value of virtual worlds for business lie in its potentials to provide a truly engaging, collaborative, and enjoyable experience.

7. Limitations and Areas for Future Research

While organizations such as the Gartner Group and IBM are touting the benefits of the technology for business value, little has been done to empirically examine the perceptions of the primary target audience – those 20-35 years old. While ours is among the first to explore this target group, the study does have some limitations. First, the sample size (n=77), while sufficient for the exploratory nature of this project, may have limited the generalizability of the findings. Additional studies can confirm these initial results. Second, given our subjects were all college-level business school students enrolled in MIS and E-commerce classes, one could argue that the sample represents the more educated and technology-savvy type of users than the average. Thus the generalizability of the findings could be limited. Third, the network speed and restriction of the campus network through which many students used to connect to SL may have had a confounding effect on our results. The graphic-intensive nature of SL requires high-speed Internet access in order to have a reasonable experience interacting with the system. Many students used the wireless campus network to access SL, and often the connections were weak and slow. Some students also had problems creating accounts on SL due to the firewall restrictions on campus servers. These network difficulties may have discouraged students, and could have created negative perceptions of SL.

This is a fruitful area for additional research. First, additional studies can be conducted to examine the impacts of these same factors over time. Will people become more likely to use SL for business activities once they are more familiar with the system? Secondly, will the impact of PU, PE, PEOU, and the antecedents change over time? A longitudinal study with measures at different times will be helpful to answer these questions. Another area worthy of further exploration is the voluntary continued use of SL after the research studies are completed. While different from our focus on the business use of SL, Fetscherin and Lattemann [2008] studied the factors affecting SL users in their use of SL, and found that community features such as communication, collaboration, and cooperation were critical. It would be interesting to explore what motivates people to participate in virtual worlds for business-oriented activities, and the results may further provide lights on the factors that contribute to one's intention to use this technology. This information would be useful to management as well as to those that are involved in marketing products and services. Additionally, the flow theory applied in this study could be further examined and augmented with additional factors that are potentially critical in studying virtual worlds, such as the social context embedded in the three-dimensional world, and interactivity beyond traditional websites such as those between one's avatar and oneself, and among avatars.

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