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USER ACCEPTANCE OF SECOND LIFE: AN EXTENDED TAM INCLUDING HEDONIC CONSUMPTION BEHAVIOURS

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Abstract

Second Life is a 3-D multi-user virtual environment which has gained wide spread popularity amongst academic community in the recent years. However, due to its infancy very little is known about the factors driving users' intention to use Second Life especially in the educational context. This paper presents findings from an ongoing study about the impacts of using multi-user virtual environments in higher education. In information systems research, several models and frameworks have attempted to predict the acceptance of new technology. However some recent studies suggest that the traditional technology acceptance approaches may not work well with today's entertainment-oriented technologies such as multi-user virtual environments. They also recommend exploring those facets of human behaviour that are likely to capture the hedonic consumption of such technologies. In this paper, we propose an extended technology acceptance model (TAM) including hedonic consumption behaviours in order to explain the usage and acceptance of Second Life in the educational context. The proposed model is empirically evaluated using survey data collected from 122 users about their perceptions of Second Life. Findings suggest that hedonic consumption behaviours are strong predictors of Second Life usage as compared to traditional motivational constructs of usefulness and ease-of-use.

Keywords: TAM, Second Life, education, hedonic consumption behaviours.

1 INTRODUCTION

Second Life is an emerging 3-D multi-user virtual environment (MUVE) which is increasingly gaining wide spread acceptance from educators and students. A large number of prominent educational institutions have established their virtual campuses in Second Life (a complete list of participating institutions is available at: http://simteach.com/wiki/index.php?title=Second_Life_Education_Wiki#Institutions_and_Organizations_in_SL/). Despite the fact that emerging Web technologies like Second Life are seen as a next-generation platform for Web users, their acceptance remains a big challenge in order to become mainstream (Shin & Kim, 2008). Also, due to its infancy, very little academic research is available on the usage and acceptance of Second Life. Therefore it is important to understand the significant predictors of Second Life usage in order to utilise it as an effective teaching and learning tool.

In information systems research, several theoretical models or frameworks attempted to explain the acceptance of new technology. Among these, technology acceptance model (TAM) is the most researched one. TAM is originally developed by Davis and his colleagues to explain or predict individuals' acceptance of computer based systems and underlying influencing factors (Davis, 1989). TAM has been validated for a number of productivity-oriented technologies like word processors, spread sheets, Web-based learning environments and multimedia application. However, some recent studies suggest that traditional technology acceptance approaches such as TAM may not work well for today's entertainment-oriented technologies like multi-player online games or MUVES (Heijden, 2004; Holsapple & Wu, 2007). They also recommend to consider those facets of human behaviour that are likely to capture the hedonic consumption of such technologies (Hsu & Lu, 2004). Since Second Life also inherits a large entertainment element, it is important to capture its hedonic consumption in order to explain its usage and acceptance. In this paper, we present an extended TAM including hedonic consumption behaviours in order to explain the user acceptance of Second Life. An online survey was developed using constructs from previously published research and participants were employed through various resources within Second Life as well as externally. A total of 122 participants including students, teachers, researchers and academic managers responded to our survey. The PLS (Partial Least Squares) approach was used for data validation and hypotheses / model testing. All of the hypothesised relationships formulated at the start were confirmed by the data. Findings suggest that hedonic consumption behaviours are strong predictors of Second Life usage than traditional motivational behaviours. Our model explains 51.4% of the users' intentions to use Second Life, which is a significant outcome when compared with similar studies of technology acceptance.

The rest of the paper is organised as follows. Section 2 presents an overview of Second Life and its applications in academia, technology acceptance model and the theory of hedonic consumption behaviours. The research hypotheses and the model are presented in Section 3. We present the research methodology in Section 4. Section 5 presents results of data validation and hypotheses / model testing. We discuss the study findings, implications and limitations in Section 6. Section 7 concludes the study and points out future work.

2 BACKGROUND

2.1 Second Life and education

Second Life is a 3-D multi-user virtual environment (MUVE) launched by Linden Labs in 2003. Second Life is a world solely created by its inhabitants, called 'residents'. Residents have the opportunities to create their digital proxies called 'avatars' and design their clothing, hair colour, dresses and even appearances (Coffman & Klinger, 2007). Avatars can walk, run, or even fly in the virtual environment. They can converse with other avatars using text, images, gestures or even voice.

Residents can move or ‘teleport’ from one location to another. Second Life provides enormous opportunities to imitate real world situations in a virtual environment, to name a few: reincarnation of ancient architecture and civilisations (Harrison, 2009); advertising and selling of real life commodities (Lui, Piccoli, & Ives, 2007); experiencing complex medical procedures discounting dangerous outcomes (Thompson & Hagstrom, 2008); library services (Bell, Peters, & Pope, 2007); conducting classes and labs (Holmberg & Huvila, 2008); and many more.

3-D MUVES like Second Life offer a variety of potential benefits for educational use including: collaboration and communication, engagement, conducting activities in a risk-free environment, alternative space for instruction and tasks, and visualisation of difficult content (Eschenbrenner, Nah, & Keng, 2009). (Richter, Anderson-Inman, & Frisbee, 2007) have identified at least five different types of learner engagement that are possible in Second Life: experiential, diagnostic, demonstrative, role-play and constructivist. Second Life has the potential to be a useful educational tool for teaching and learning by using a constructivist approach (Coffman & Klinger, 2007), which is the theory of knowledge acquisition obtained through interactions and building upon own knowledge and which produces the highest type of learning according to Bloom (Cheal, 2007). Following this approach, students can discover and create meaningful content and interactions (Stevens, 2006). Teachers in higher education have found Second Life a convenient place to conduct online classes, conferences, presentations, and meetings with students (Richter, et al., 2007). However, in order to explore the teaching and learning potential of Second Life, it is important to understand the factors that affect users’ intentions toward Second Life usage. In this paper, we aim to propose and evaluate a technology acceptance model to explain user acceptance of Second Life within educational domain.

2.2 Technology acceptance model (TAM)

TAM posits that user perceptions of usefulness and ease-of-use determine attitudes towards using a system or technology. An individual’s attitude is hypothesised to influence the behavioural intention to use a technology, which in turn leads to the actual use. In the follow-up model, TAM2 (Venkatesh & Davis, 2000), the attitude component was dropped and perceived technology characteristics directly influenced the individual’s intention to use the technology. Social influences (also referred as subjective norms) were also included in the follow-up model. Both TAM and TAM2 have established themselves as being robust and parsimonious for predicting user adoption of a variety of new technologies (Raaij & Schepers, 2008) and have been validated for a variety of productivity-oriented technologies including word processors, e-mail, spread-sheets, Web-based learning systems, and multimedia learning systems (Halawi & McCarthy, 2007; Lederer, Maupin, Sena, & Zhuang, 2000; Saade, Nebebe, & Tan, 2007). However, some previous studies suggest that traditional technology acceptance approaches like TAM may not work well with today’s entertainment-oriented technologies such as multi-player online games or MUVES (Heijden, 2004; Hsu & Lu, 2004; Koufaris, 2002). Because these technologies enable users to fantasise, role-play and be entertained, it is important to measure their hedonic consumption along with the traditional user acceptance behaviours, in order to better understand their usage patterns. In this paper, we present an extended TAM2 including hedonic consumption behaviours to predict the user intentions towards Second Life usage.

2.3 Theory of hedonic consumption behaviours

With its roots in marketing research, hedonic consumption designates those facets of user behaviour that relate to the multi-sensory, fantasy and emotional aspects of one’s experience with products (Hirschman & Holbrook, 1982). Hedonic perspective seeks not to replace traditional theories of consumption but rather to extend and enhance their applicability. The theory asserts that emotional and imaginative responses are the main drivers of hedonic consumption, which can be explained through the constructs of emotional involvement, enjoyment and role projection (Lacher & Mizerski, 1994). Several studies have reported significant impact of these constructs in explaining the consumption of entertainment-oriented technologies or systems: including online games, virtual

learning environments, online retail shopping, music, and gambling (Childers, Carr, Peck, & Carson, 2001; Lacher & Mizerski, 1994; Lee, Cheung, & Chen, 2005; Mun & Hwang, 2003; Shin & Kim, 2008; Titz, Andrus, & Miller, 2002). The traditional economic view of products as objects would seem inappropriate for products whose usage are based upon satisfying emotional desires rather than fulfilling utilitarian functions (Kim & Forsythe, 2007). Thus for the systems that are hedonic in nature, hedonic factors could be the dominant predictors of attitude towards their usage. Similarly, for MUVES (such as Second Life) that are largely hedonic in nature, we can expect hedonic behaviours to be a strong predictor of attitudes towards using these technologies. Therefore, in this paper, we aim to examine the impact of hedonic consumptions behaviours on user intentions toward Second Life usage.

3 RESEARCH HYPOTHESES AND MODEL

3.1 TAM2 hypotheses

Perceived usefulness and perceived ease-of-use are the basic TAM constructs. In general, perceived usefulness reflects an individual's subjective estimation of the job performance enhancement that is likely to result from the use of a new technology, whereas perceived ease-of-use refers to the degree to which he or she expects the use of the technology to be free of effort (Davis, Bagozzi, & Warshaw, 1989). Both of these constructs constitute a significant influence on an individual's intention to use a technology or system (Ma & Liu, 2004). Perceived ease-of-use is also reported a significant determinant of perceived usefulness (Davis, 1989). We follow this trend and hypothesise the following:

- H1. The perceived ease-of-use (PEU) of Second Life will have a positive impact on perceived usefulness (PU) of Second Life.
- H2. The perceived ease-of-use (PEU) of Second Life will have a positive impact on behavioural intention (BI) to use Second Life.
- H3. The perceived usefulness (PU) of Second Life will have a positive impact on behavioural intention (BI) to use Second Life.

Subjective norms refer to the degree to which a person believes that those who are important to him or her think that he or she should perform the behaviour in question (Fishbein & Ajzen, 1975). Previous studies have shown that both peers' and superiors' influences can affect a person's decision to accept a new technology (Mathieson, 1991; Taylor & Todd, 1995). Subjective norms can also influence technology acceptance via perceived usefulness, which is referred as 'internationalisation' mechanism (Venkatesh & Davis, 2000). On the basis of this, we hypothesise the following:

- H4. The subjective norms (SN) will have a positive impact on perceived usefulness (PU) of Second Life.
- H5. The subjective norms (SN) will have a positive impact on behavioural intention (BI) to use Second Life.

3.2 Influence of hedonic consumption behaviours

The hedonic consumption theory focuses on positive behavioural experience: emotional and imaginative responses, which are key human factors and are likely to capture the entertainment nature of the technology of interest (Holsapple & Wu, 2007). These responses can be explained through emotional involvement, enjoyment and role projection constructs. Emotional involvement is defined as the degree to which an individual is emotionally engaged in a behaviour; enjoyment is 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); and role projection involves the mental

activities whereby individuals project themselves into particular roles or characters (Holsapple & Wu, 2007). Some recent studies have shown the significant effect of these constructs on user acceptance of entertainment-oriented technologies (Depradine, 2007; Shin & Kim, 2008). We thus hypothesise the following:

- H6: The perceived emotional involvement (PEI) will have a positive impact on the behavioural intention (BI) to use Second Life.
- H7: The perceived enjoyment (PEN) will have a positive impact on the behavioural intention (BI) to use Second Life.
- H8: The perceived role projection (PRP) will have a positive impact on the behavioural intention (BI) to use Second Life.

3.3 Extended TAM2

On the basis of above hypotheses, we present an extended TAM2 including hedonic consumption behaviours (in terms of emotional involvement, enjoyment and role projection) as significant predictors of users intentions to use Second Life, as shown in Figure 1.

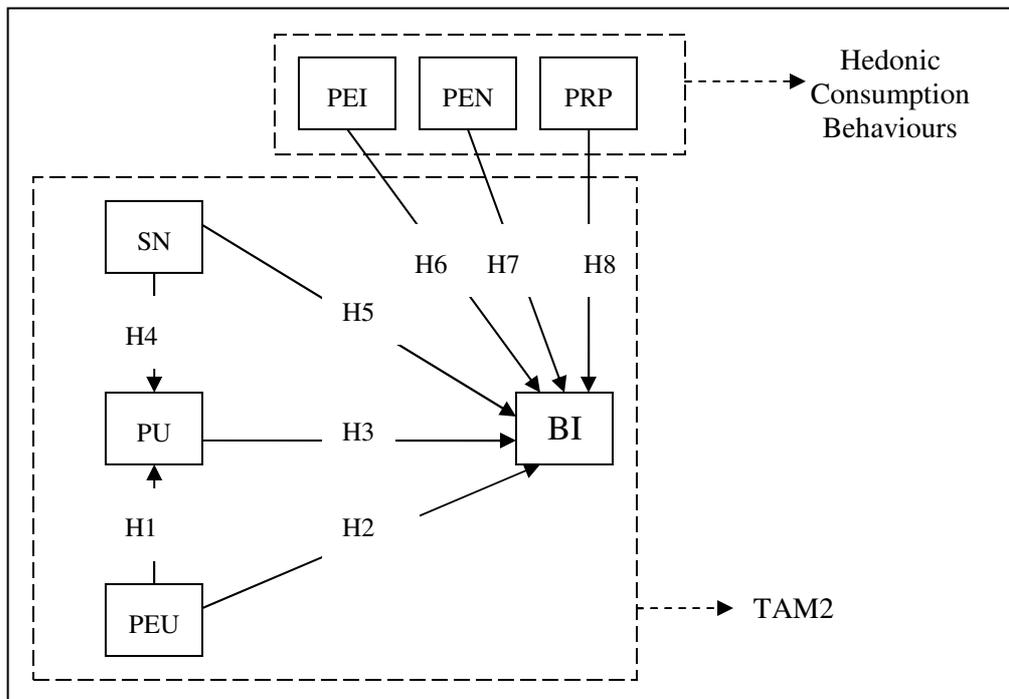


Figure 1. An extended TAM2 including hedonic consumption behaviours

4 METHODOLOGY

4.1 Participants and data collection

Since the aim of our study was to capture the user acceptance of Second Life in the educational context, our target subjects were academic-centric participants who either have attended, designed, conducted classes or involved in some form of educational activities in Second Life. Data for this research were collected through in-world (within Second Life) and external resources. First of all, the authors joined several educational and research groups within Second Life to get an insight of the

ongoing educational activities and to make social contacts with the community. We visited a large number of educational islands and personally invited the residents to take part in our online survey. We also sent invitations to various educational groups within Second Life. The external resources used for data collection were the two popular mailing lists; Second Life Educators mailing list (SLED) and Second Life Research Listserv (Slrl). These lists are populated by large number of geographically distributed and active academic-centric individuals and are considered a constant ground for data collection. Most of the data used in this study come from external resources. Some recent studies have adopted similar approaches in exploring this new technology (Second Life) within the education context (Alvarez, 2006; Boostrom, 2008; Richter, et al., 2007). The total number of valid responses we obtained from all above resources was 122, which sufficed to perform PLS analysis.

4.2 Measures

Multiple items were adopted from previously published scales for the constructs used in our model. All items were measured on a seven point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The scales for perceived ease-of-use (PEU), perceived usefulness (PU) and subjective norms (SN) were adopted from (Davis, et al., 1989) and (Igbaria, 1990). The scales for behavioural intention (BI) were adopted from (Venkatesh, Morris, Davis, & Davis, 2003). The scales to measure the perceived emotional involvement (PEI), perceived enjoyment (PEN) and perceived role projection (PRP) were adopted from (Hirschman, 1983) and (Hirschman & Holbrook, 1982). The complete list of measurement items is presented in the Appendix. Demographic items are not included due to space limit.

5 RESULTS

The research model was tested using the PLS approach. PLS is considered as a powerful tool in analysing structural models involving multiple constructs and multiple indicators. Previous research shows that PLS approach is more suitable for prediction as compared to other approaches like LISREL and EQs, because it assumes that all the measured variance in the study will be explained (Chin, 1998; Saade & Bahli, 2005). The PLS approach has been used in several other studies of technology acceptance such as (Raaij & Schepers, 2008), (Saade & Bahli, 2005) and (Mun & Hwang, 2003), thus deemed suitable for our study. After ensuring the reliability and validity of the scales, we tested the hypothesised relationships between hedonic consumption behaviours and TAM2 constructs using bootstrap re-sampling method (Cotterman & Senn, 1992). Unlike other structural equation modelling approaches such as LISREL, the primary objective of the PLS approach is the maximisation of variance explained, not the minimisation of the difference between the observed and the reproduced covariance matrices (Hulland, 1999). Thus the quality of the PLS approach can be determined by examining the R^2 values of the dependant constructs.

5.1 Demographics

Our sample included 79 females and 43 males. The mean age of the participants was 42, ranging from 17-65 years. Teachers (27%) and students (25%) constituted the larger groups while researchers the smallest (13%) group. The majority of participants appeared well educated as 67.2% of them held postgraduate qualifications. The survey results also showed that 82.8% of participants had Internet experience of more than 9 years, 94.3 % of them used the Internet several times a day and the primary access location of the Internet for 56.6% of participants was the home. In addition, the majority of participants (81.9%) had at least 6 months experience of using Second Life. About half of them admitted of accessing Second Life at least once a day and the primary access location for 72.1% of participants was the home. These results suggest that our participants were mature, well educated and geographically distributed. They had extensive experience of using Web-based applications with

adequate experience of using Second Life in the educational contexts. Thus they fit well into our target participants' profile.

5.2 Data validation and reliability

Table 1 presents the summary of all construct reliability measures including factor loadings, t-values, composite reliability (CR), and average variance extracted (AVE). The factor loadings provide evidence for convergent validity as all our constructs load greater than the threshold of 0.50 as suggested by (Peterson, 2000). The t-values derived from our analysis also provide evidence for convergent validity since all values exceed the threshold of 1.96 as suggested by (Gefen & Straub, 2005). Internal consistency appears significant for all of our constructs since the composite reliability values exceed the minimum of 0.70 as suggested by (Nunnally & Bernstein, 1994).

Construct Items	Factor loadings (> 0.5)	Item t-values (> 1.96)	CR (> 0.7)	AVE (> 0.5)
PEU(1-4)*	0.5; 0.92; 0.69	2.5; 15.4; 4.8	0.77	0.54
PU(1-6)	0.77; 0.85; 0.84; 0.7; 0.75; 0.71	17.9; 26.5; 29.5; 11.9; 14.0; 13.0	0.90	0.60
SN(1-4)	0.77; 0.86; 0.84; 0.82	11.4; 22.1; 18.6; 17.3	0.90	0.69
PEI(1-3)	0.77; 0.91; 0.87	12.68; 40.07; 21.9	0.89	0.73
PEN(1-3)	0.88; 0.94; 0.89	23.9; 74.5; 29.6	0.93	0.81
PRP(1-3)	0.65; 0.88; 0.65	4.2; 12.7; 4.2	0.79	0.57
BI(1-3)	0.92; 0.94; 0.88	38.0; 53.5; 34.3	0.94	0.83

Table 1. Construct reliability measures.

*PEU2 did not load significantly and hence removed.

Discriminant validity was met using the Fornell and Larcker test (Fornell & Larcker, 1981). The procedure involves computing the square root of the AVE of each construct, which should exceed the correlation shared between the construct and other constructs in the model. Table 2 shows that square roots (in bold) of all AVEs (on the diagonal) are greater than the cross-correlations of all other constructs. Thus all our constructs demonstrated a good degree of validity and reliability.

	PEU	PU	SN	PEI	PEN	PRP	BI
PEU	0.74						
PU	0.44	0.77					
SN	0.10	0.32	0.83				
PEI	0.22	0.47	0.25	0.85			
PEN	0.32	0.38	0.14	0.51	0.90		
PRP	0.15	0.24	0.25	0.48	0.28	0.75	
BI	0.14	0.41	0.30	0.58	0.59	0.41	0.91

Table 2. Discriminant validity of constructs.

5.3 Hypotheses and model testing

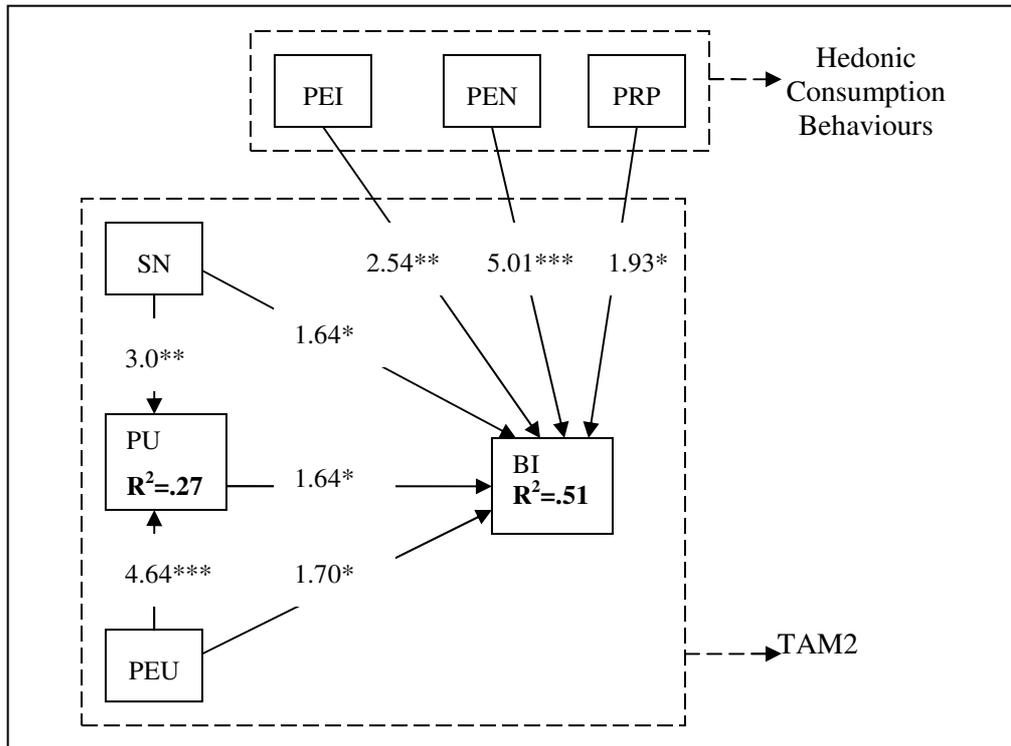


Figure 2. PLS results.

*Path coefficient significant at the 0.5 level; ** at the 0.01 level; *** at the 0.001 level

Figure 2 summarises the results of hypotheses testing. We found a direct positive impact of perceived ease-of-use (PEU) on perceived usefulness (PU) and behavioural intention (BI), thus supporting hypotheses H1 and H2 respectively. The perceived usefulness (PU) also had a direct positive impact on behavioural intention (BI), supporting hypothesis H3. Subjective norms (SN) exhibited direct positive impact on perceived usefulness (PU) and behavioural intention (BI), thus supporting hypotheses H4 and H5 respectively. The three relationships (H6, H7, and H8) between the hedonic constructs (PEI, PEN, PRP) and the behavioural intention (BI) also appeared significant, with perceived enjoyment (PEN) as the strongest predictor of users' intentions to use Second Life. Thus all hypothesised relationships formulated at the start were confirmed by the data. Our model explained 51.4% of the variance through user's intentions to use Second Life, which is a significant outcome when compared with similar studies of technology acceptance such as: (Mun & Hwang, 2003; Raaij & Schepers, 2008; Shin & Kim, 2008).

6 DISCUSSION

The study broadens our understanding of technology acceptance by including emotional and imaginative responses of hedonic consumption behaviours as key determinants of Second Life usage. All eight hypotheses postulated at the start were confirmed by the data. Several insightful results could be summarised from our research model as follows: First, perceived enjoyment was the most important predictor of users' intention to use Second Life. This is consistent with the findings of (Lee, et al., 2005), which have reported the direct and significant impact of perceived enjoyment on user intentions to use Internet-based learning medium (ILM). Similarly, (Childers, et al., 2001) have reported the strong impact of enjoyment on online retail shopping behaviour.

Second, the next strongest and direct impact on use intentions was of perceived emotional involvement followed by the perceived role projection. Thus, the hedonic consumption behaviours as a whole appeared as the strongest predictor of user intentions to use Second Life. This is consistent with the findings of (Kim & Forsythe, 2007), which have reported the stronger impact of hedonic motivations than functional motivations toward using product virtualisation technologies.

Third, TAM2 constructs of perceived ease-of-use, perceived usefulness and subjective norms also had significant impact on user intentions to use Second Life but with lesser significance than that of hedonic consumption behaviours. This is consistent with the findings of (Shin & Kim, 2008), which suggests that in case of Web 2.0 technologies users may need a clear motivations of usefulness and ease-of-use than those of traditional Web technologies. This is also in line with some recent studies which have predicted that the traditional technology acceptance approaches such as TAM may not work well with today's multi-user and entertainment-oriented technologies like Second Life (Heijden, 2004; Holsapple & Wu, 2007; Hsu & Lu, 2004).

The implications of our results for educators and researchers are multi-fold: The educators of Second Life should include elements of enjoyment, emotional involvement and role projection while designing academic activities as the findings suggest that the more the users enjoy, get emotionally involved and be able to project themselves in the virtual environment, the more likely they will use Second Life, thus enhance their learning. Similar trends are illustrated in practice by the more popular islands in Second Life such as the Genome Island (<http://connect.educause.edu/Library/EDUCAUSE+Review/GenomeIsland/47234?time=1226972674>) and others (see <http://sleducation.wikispaces.com/educationaluses>). Here, students are presented with opportunities to role play, co-create and get involved in real time educational process. This presents students a much more rich and rewarding learning experience. For researchers, the study offers a platform to further explore hedonic consumption of today's social and entertainment-oriented technologies like multiplayer online games, social networking Websites, Web authoring tools, and other emerging Web technologies. The study also suggests that hedonic behaviours should be given due consideration while measuring the user acceptance of entertainment-oriented technologies.

Like any other user study, our study also has limitations. First of all, our sample may be biased as our respondents were more likely to be engaged with the Second Life environment than non-respondents. Therefore, respondents could have been captured to the 'hedonic consumption behaviours'. Secondly, the study results cannot be generalised to other MUVES because our sample represents users of Second Life only. Another limitation of our study is the use of self-reported usage data which are often measured by log files. However, it was beyond our control to obtain such data as majority of the participants were employed through external resources and we had no means of maintaining their usage log files.

7 CONCLUSION AND FUTURE WORK

Our study provided a useful insight into the usage and acceptance of Second Life in the educational context. Instead of focusing on the traditional motivational and performance-based determinants of technology acceptance, the study focused on the hedonic consumption of technology because the targeted technology (Second Life) possessed a large entertainment element. Empirical findings provided support for our proposed model. Although hedonic consumption behaviours explained a significant amount of users' intentions toward Second Life usage, more research would be carried out in our future studies to explore other key usage predictors such as user involvement, presence, flow, critical mass, fantasy, escapism, arousal and social pressures. We would also consider conducting similar studies with other popular MUVES such as Haboo, There or Active Worlds to better understand user acceptance of MUVES in education and to utilise them as effective teaching and learning tools.

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Appendix – Measurement Items

PEU1	Learning to use Second Life is easy for me.
PEU2	I find it not difficult to get Second Life to do what I want it to do.
PEU3	I find Second Life to be flexible to interact with.
PEU4	It is easy for me to become skilful at using Second Life.
PU1	Using Second Life enables me to accomplish my tasks more quickly.
PU2	Using Second Life improves my class or work performance.
PU3	Using Second Life increases my productivity.
PU4	Using Second Life makes it easier for me to understand lecture.
PU5	Using Second Life makes it easier for me to communicate with lecturer/friends.
PU6	Overall, I find Second Life useful in my study/work.
SN1	People who influence my behaviour think that I should use Second Life.
SN2	People who are important to me would think that I should use Second Life.
SN3	People whose opinion I value would prefer me to use Second Life rather than other 3D MUVES.
SN4	I think that those people who are important to me would want me to use Second Life rather than other 3D MUVES.
PEI1	When I am using Second Life, I feel "carried off" by the 3D virtual environment.
PEI2	When I am using Second Life, I feel as if I am part of the 3D virtual environment.
PEI3	When I am using Second Life, I feel deeply about the 3D virtual environment.
PEN1	I have fun using Second Life.
PEN2	Using Second Life provides me with a lot of enjoyment.
PEN3	I enjoy using Second Life.
PRP1	Using Second Life enables me to project myself into a particular role.
PRP2	Using Second Life enables me to project myself into a particular character.
PRP3	Using Second Life enables me to project myself into a particular task.
BI1	Assuming I had access to Second Life, I intend to use it.
BI2	Given that I had access to Second Life, I predict that I would use it.
BI3	I will use Second Life frequently in the future.