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RESEARCH ARTICLE

Towards an understanding of assimilation in virtual worlds: the 3C approach

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Abstract
Virtual worlds are increasing in importance as more multi-national firms are investing heavily in these emerging communities. Although much excitement has surrounded the idea of virtual worlds, a gap exists between those who register and those who engage in virtual worlds. Our analysis of the gap between those who merely register to join a virtual world and those who ultimately engage the community on a regular basis derives from a lack of assimilation. We present the 3C approach, a high-level theoretical framework delineating the relationship between three classes of factors (namely the technology class of factors; the community class of factors; and the user class of factors) that we posit explain virtual world assimilation and employ theories to represent these classes of factors and the interaction between them. After discussing and integrating these three classes of factors, we test our model through a study of 223 new users of Second Life. The results provide empirical support for the 3C framework; specifically, our analysis indicates that the technology and community classes of factors in exert a direct influence upon a user's attitude towards the virtual world, and this relationship is moderated by the user class of factors.
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Introduction

Interest in virtual worlds continues to escalate across the globe. The most recent statistics indicate that over 800 million users worldwide have registered for an account within a virtual world (KZero, 2010). The increase in interest has caused the virtual world market to segment and specialize, with worlds focused on areas such as children, education, adults, and special interests. It has even been declared that virtual worlds have become a necessity for organizations with multiple offices, scattered vendors, or large numbers of telecommuters (Daley, 2010).

As a category, virtual worlds fall under the umbrella of virtual communities. Rheingold (1993) defines virtual communities as 'social aggregations that emerge from the Net when enough people carry on those pubic discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace'. Other researchers have sought to expound upon Rheingold's conceptualization to specify the elements that constitute a virtual community. For example, Preece (2000) argues that virtual communities consist of four components: *people*, *a shared purpose*, *policies*, and *computer systems*. *People* interact socially to satisfy their own needs or perform special roles, such as leading or moderating. *A shared purpose*, such as an interest, need, information exchange,

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or service, provides a reason for the community. *Policies*, in the form of tacit assumptions, protocols, rules and laws, guide people's interactions. Finally, *computer systems* support and mediate social interaction and facilitate a sense of togetherness. These four elements compose the backbone of virtual communities.

In contrast to the definition of a virtual community, the term *virtual world* depicts a computer-simulated spatial persistent environment supporting synchronous communication among avatars, or virtual persona, which represents the users in these worlds (Jakobsson, 2006; Davis *et al*, 2009). It is the spatial metaphor (or three-dimensional interface) and avatars that are the technologies that support the interaction and communication among users. Through these interactions among avatars, a community is built.

Despite the emergence of the interest in virtual worlds, a troubling trend has emerged. In the same report that described that over 800 million users have created an active account for a virtual world, it was found (KZero, 2010) that only 136 million users define themselves as active users of a virtual world. This gap between the decision to register for the virtual world (which we view as the adoption decision) and the decision to remain active in the world (which we view as a decision to assimilate) motivates the current study.

Within the virtual world market, the most high-profile community has been Second Life. Within Second Life, 'residents now exchange about $1.8 million per week for digital cash – a number that's growing up to twenty percent a month' (ALSTRALCOM, 2007). Multi-national firms have responded by constructing various entities within Second Life including hotels and meeting facilities (Enright, 2007); buildings based on television shows, such as CSI: NY (Rizzo, 2007); separate news divisions (Fruhlinger, 2007); churches; and sales floors to view organizations' products (e.g., Cisco, American Apparel, Disney, American Cancer Society, Avnet Technology Museum, Coca Cola, Wells Fargo, and Dell). However, just as virtual worlds in general have experienced problems with assimilation, Second Life has encountered similar issues; whereas IBM still hosts virtual business meetings, other companies such as Coca-Cola and Reuters have pulled out of Second Life's virtual world. Researchers in business and business ethics have found similarities with some of the recent occurrences in the real world companies and virtual world economies. For example, in Second Life, a nice stretch of mainland coastal property that would have fetched around $65 in 2007, as of 24 June 2010 now sells for $16 (Robinson, 2010). Robinson contends that this decrease in value has occurred partly because the effects of the real world financial crisis that has crimped spending outside the virtual world has begun to affect the users, known as residents, within the virtual world.

Similar to virtual worlds in general, Second Life has also struggled with the assimilation gap. Estimates are that around 50 million people have signed up for Second Life (Bennett, 2008); however, only approximately 800,000 average monthly users used the virtual world in 2010 (Linden, 2011). Thus, a gap clearly exists between those who register and those who engage in (or assimilate into) Second Life. Furthermore, it is reported that 80% of users drop out within 2 months of registering with Second Life (Platoni, 2008). We posit that the lack of continuance can be attributed to a lack of assimilation – that the individual has not routinized the virtual world into their daily life. With success of a virtual world dependent upon people actually visiting their sites (Ahn *et al*, 2004; Lin, 2008), it is questionable whether virtual worlds can actually ever provide the potential benefits they promise unless initial users of virtual worlds continue to engage with the technology. This research will address this issue to increase our understanding of the assimilation process in virtual worlds.

Although previous IS research (Atkinson & Kydd, 1997; Van der Heijden, 2004; Sun & Zhang, 2006) has empirically investigated the impact of behavioral intention within hedonic systems broadly (or a system deployed with the primary use of enjoyment) from the perspective of adoption, we posit that prior research has neglected the topic of virtual world *assimilation*, or the extent to which the use of the virtual world has become routinized in the daily activities of the users. We assert that the virtual world assimilation gap represents a significant problem facing the future of immersive environments. We therefore propose that this research will increase our understanding of the assimilation process regarding an individual who has an initial experience with a virtual world and their future intent to continue utilizing the technology.

Virtual worlds provide users with an opportunity to become exponentially immersive with the technology to receive greater fulfillment from it. As users increase their involvement in virtual worlds, they develop more of an insatiable desire to use the technology. Essentially, as the user invests in and engages with the technology more frequently and to a greater depth, their commitment level to the technology will increase. This occurs as the user develops a relationship with the technology and other users and beings in the virtual world.

We posit, however, that the type of relationship a user builds with a virtual world represents a unique phenomenon different from the traditional information systems that adoption theorists have addressed. Previous academic work within virtual worlds has relied upon traditional theories of adoption (e.g., Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh *et al* (2003); Technology Acceptance Model (TAM) (Davis, 1986, 1989; Davis *et al*, 1989); and Perceived Characteristics of Innovations (PCI) by Moore & Benbasat (1991)). Whereas the focus of previous adoption research involved use, the focus of this research on virtual worlds involves explaining assimilation, which we describe as the decision of whether or not to continue using the technology after initial exposure

(which is a reflection of its routinization into the daily life of the user). Given the previously discussed problems with assimilation in virtual worlds, we seek to understand whether the virtual world was routinized into the daily life of the individual rather than explaining the adoption decision (the decision of whether or not to use a particular technology). Paradigmatically, therefore, the assimilation lens provides us with a useful perspective for understanding this process in virtual worlds.

As we searched for an approach to better understand a user's assimilation into Virtual Worlds, our examination of the literature brought us to the continuance/discontinuance research stream (e.g., Bhattacherjee, 2001). Specifically, the variable of continuance intent appropriately captures the assimilation concept. We therefore adopted the variable of continuance intent as the dependent variable and our surrogate for assimilation, positing that this intent reflects the overall degree of assimilation. Moreover, we selected the Theory of Reasoned Action (TRA) as a starting point to build a theoretical model of virtual world assimilation. We postulate that three classes of factors exist that drive assimilation, which we term the 3C's.

Theoretical development

Traditional explanations for understanding technology adoption are derived from the 'proxy view' of technology (Orlikowski & Iacono, 2001). According to this perspective, understanding how an individual perceives a technology will explain the degree to which the technology is adopted. Within this view, different models exist to facilitate a better understanding of the different perceptions towards technology (e.g., UTAUT by Venkatesh *et al* (2003); TAM (Davis, 1986; Davis, 1989; Davis *et al*, 1989); and PCI by Moore & Benbasat (1991)), with each perspective seeking to understand the salient beliefs that drive individuals to adopt a particular technology. Although some researchers have begun to propose broadening the scope of salient perceptions related to the adoption decision (e.g., Schwarz & Chin (2007)), each of these sets of perceptions omit certain influences that are unique to the virtual world context. Although these extant theories have been found to exhibit significant explanatory power, their focus involves the decision of whether or not to use the technology, or adoption; however, they do not address assimilation – a factor that we propose represents an important factor for the study of virtual worlds.

We advance this critique by postulating that a distinction exists between adoption and assimilation. As the individual has already made the decision to use the immersive environment technology by registering for the virtual world, studying the issue through the lens of adoption does not sufficiently address the problem. However, assimilation provides us with a lens with which we can gain insight into a user's attitude after they register for the virtual world. Thus, we posit that the gap between those who sign up (or the behavior of deciding to adopt or use the technology) and those who use it on a continual basis by routinely engaging in the virtual world is due to a problem of assimilation.

Assimilation is traditionally viewed as the extent to which the use of the technology has diffused across organizational projects or work processes and become routinized in the activities of those projects and processes (Tornatzky & Klein, 1982; Cooper & Zmud, 1990; Fichman & Kemerer, 1997) as well as those of individuals. Adapting the previous definition to virtual worlds, we define virtual world assimilation as the *extent to which the use of the virtual world has become routinized in the daily activities of the users*. Assimilation is therefore a process that begins after adoption (or initial use). It does not constitute a one-time decision but instead involves a process of routinization. To our knowledge, this is the first article to examine virtual world assimilation, which is vital to many technologies, but especially to virtual worlds where increased use can exponentially impact a user's commitment and full immersion with the technology. To understand assimilation, we posit that the continuance decision reflects the routinization. A user who has assimilated into the world will make a decision to continue using the technology, which is in contrast to a non-assimilated user who may initially use the technology but does not continue.

To begin developing a theoretical framework for how a user assimilates into a virtual world, we began with a prevalent theory in IS – the TRA (Fishbein, 1967; Ajzen & Fishbein, 1973; Fishbein & Ajzen, 1975). According to TRA, the intention to engage in a behavior is predicted by his/her attitude toward that behavior (an evaluative component) and how he/she thinks other people would view them if he/she performed the behavior (a normative component). TRA focuses on volitional activities (Hale *et al*, 2003) where the individual has a choice of whether or not to engage in a behavior, and this theory is therefore well suited for the case of virtual worlds, which represents a volitional, hedonic system. TRA theorizes that intention is based upon an evaluative component and a normative component.

In the traditional expression of TRA, a researcher selects a specific *construct* to reflect each *component*. Alternatively, we propose that each component reflects a *class* of factors. We posit that each class can be represented by a set of factors that fall under an overarching definition. Our intent in building a high-level theoretical framework is to provide an understanding of the interaction between the classes at a high level and then display this framework for others to examine more specific factors within the classes. We will next review each component of TRA and integrate it into our theoretical framework of virtual world assimilation. This process will lead to the development of the 3C's: the Technology Class, the Community Class, and the User Class.

(1) The Technology Class – Evaluative Component of TRA

Within TRA, the evaluative component refers to the attitude of the individual towards a behavior. Adapted to

our context, we postulate that the evaluative component refers to the perceptions of the user towards the virtual world technology. We therefore term the evaluative component as *the technology class* of factors and define the technology class as the set of perceptions towards the technology.

Theoretically, the technology class exhibits consistency with prior research in adoption, such as the UTAUT, TAM, and PCI. Drawing from these theories and the TRA, we posit that perceptions of a virtual world will contribute to the explanation of the assimilation process. Most research on user acceptance of virtual worlds encompasses constructs rooted in technological environments of virtual worlds, or the technology class. For example, perceived ease of use has been regarded as a critical factor influencing user acceptance of virtual worlds in previous literature (e.g., Fetscherin & Lattemann, 2008; Shin, 2008). Moreover, research has demonstrated that some factors derived from technological interfaces exhibit a significant influence on user acceptance of virtual worlds; for example, visual attractiveness (Verhagen *et al*, 2009), the perception of three-dimensional realism (Phang & Kankanhalli, 2009), and telepresence (Jung, 2008; Phang & Kankanhalli, 2009) significantly impact acceptance. In the context of virtual worlds, the perception of playfulness or enjoyment can be considered mainly as an outcome of advanced interfaces such as 3D settings or avatar-mediated activities. Thus, we consider playfulness to also belong to the technology class. Prior research demonstrates that playfulness or enjoyment represent constructs that also influence user acceptance of virtual worlds (Phang & Kankanhalli, 2009; Verhagen *et al*, 2009) .

However, the perceptions of the virtual world cannot solely explain assimilation, as they account for only a portion of the uniqueness of the inter-world effects in virtual worlds. Therefore, while the technology class represents important factors, they are certainly not the only salient factors.

(2) The Community Class – Normative Component of TRA

Within TRA, the normative component refers to how an individual believes other people would view them if they perform a particular behavior. Adapted to our context, we suggest that the normative component refers to the social relationships within the virtual world community, or how others in the virtual world view their behavior. We therefore term the normative component *the community class* of factors.

Although some adoption models include 'facilitating conditions' (i.e., UTAUT) and externalities that facilitate the adoption decision, these contextual variables are largely *external* to the use of the specific technology being studied. In contrast, the community class centers upon the inter-world relationships. Consider the following examples of constructs that are viewed as contextual variables:

- In subjective norm (from TRA, (Fishbein, 1967; Ajzen & Fishbein, 1973; Fishbein & Ajzen, 1975)), the pressure to adopt derives from those who are important to the individual; and, although it has not been specifically delineated, we would argue that the traditional understanding of the concept involves pressure that develops outside of the boundaries of the technology (as opposed to pressure to adopt occurring within the technology itself).
- Facilitating conditions (from UTAUT) is defined as objective factors in the environment that observers agree make an act easy to do, including the provision of computer support, and it is operationalized as a person in the organizational environment being available for support. We contend that there is no parallel for facilitating conditions within a virtual world environment.
- Perceived behavioral control (from Theory of Planned Behavior (Ajzen, 1985; Ajzen, 1991)) reflects perceptions of internal and external constraints on behavior and is operationalized as having the resources available from the environment to successfully use the system. Similarly, this construct does not theorize the effects from within the technology from the user base.

We postulate that unlike the technologies studied in the development of the extant adoption models, a virtual community has embedded groups that exert pressure *within* the technology. An individual using a virtual world might befriend another avatar or form a social group within the technology and, through the use of that technology, be motivated (or, in some cases, decide not) to adopt the technology.

Some factors reflecting the nature of community, namely the community class of factors, have been examined in research on user acceptance of virtual worlds. Research demonstrates that social presence (i.e., being there together), which is an effect of interaction with other users, represents an important construct in understanding user acceptance of virtual worlds (Jung, 2008; Phang & Kankanhalli, 2009). Furthermore, although lacking an explicit description of the relationship between social factors in virtual worlds and user acceptance of virtual worlds, some studies found that social needs represent an important motivator for users to enter virtual worlds. For example, Yee (2006) and Williams *et al* (2008) revealed that socialization, including chats, helping others, and making friends, is one of the main motivations for utilizing virtual worlds. Furthermore, Jung & Kang (2010) discovered that building social relations represents a central goal for a virtual world.

The community class of factors concerns the social needs and interactions that occur *within* the virtual world. Therefore, if an individual connects socially with others in the community, we theorize that the individual is more likely to assimilate into the world. However, this connection does not occur in isolation from the assessment of the technology; instead, we suggest that a user who is connected virtually might still opt to not

assimilate into the world if the technology is not perceived positively, or a technology that is easy to use might not be assimilated if the user does not experience a connection inside the virtual world. Therefore, these two classes of factors are jointly necessary to understand the phenomenon. However, in isolation they cannot fully explain assimilation.

(3) The User Class – Extension of TRA

Adapting TRA, our initial model posits that the technology class and the community class directly influence virtual world assimilation. However, we suggest that there are two limitations to TRA that prevent the theory from directly being adapted to studying virtual world assimilation: (a) a lack of explicitly theorizing the role of individual differences and (b) the exclusion of attitude. We will extend TRA by including a third class in our theoretical framework: the user class and attitude.

Previous research has recognized the limitation of not including individual differences by including individual differences as a moderating influence. In summarizing prior literature on adoption, UTAUT does include individual differences (e.g., gender and age), arguing that prior literature has discovered the moderating influence of these differences. Jasperson *et al* (2005, p. 538) argue that 'following the logic of UTAUT, the individual cognition model of post-adoptive behavior includes such individual differences as moderators of the relationship between an individual's IT application feature cognitions and the individual's post-adoptive intentions'.

Based upon this, the last class of factors that we theorize as salient to the virtual world assimilation process is *the user class*. The user class is defined as the emotional and thought processes that differ between individuals. Although subsequent work on the UTAUT has included individual differences, these factors have not explicitly been theorized, thus leading us to include the user class as the third class. Factors expressing individual differences have been rarely examined in research on user acceptance of virtual worlds, except for the examination of users' demographic information (e.g., (Yee, 2006; Williams *et al*, 2008)). We, however, postulate that individual users' characteristics beyond demographic differences will affect their assimilation into virtual worlds. Therefore, we contend that the user class interacts with the technology class and community class to explain the assimilation process.

The second limitation of TRA involves the exclusion of attitude. We argue that the role of attitude has been under-examined, and we extend the work of TRA by elucidating the role of attitude in explicating behavior. Whether or not attitude plays an important role in explaining intention has been a source of debate. The literature has been split on this issue: (a) The original TAM (Davis *et al*, 1989) excludes attitude in order to better explain intention parsimoniously; (b) The combined TAM and TPB (Taylor & Todd, 1995a) include attitude, as it was derived from TPB; (c) Karahanna & Straub (1999) found that attitude was more important with increasing experience; (d) Venkatesh & Davis (2000) found that attitude was more salient for men: (e) Morris & Venkatesh (2000) found that attitude was more salient for younger workers; and (f) In excluding attitude from the UTAUT, Venkatesh *et al* (2003, p. 455) noted that 'we consider any observed relationship between attitude and intention to be spurious and resulting from the omission of the other key predictors'. We postulate that this 'spurious' relationship needs further investigation, and the variability of findings may be due to the time of adoption. Psychological research suggests that temporal ordering occurs in the effects of attitude, proposing the affective primacy hypothesis (Zajonc, 1980), which states that affect has primary influence on behavior with initial exposures to objects and that evaluations emerge only after the novelty of the stimuli has worn off. Thus, this discussion provides a theoretical reason to propose that attitude exhibits a differential impact upon usage intentions depending upon the time of adoption. Extending the work of Zajonc (1980), we place attitude back into our model of virtual world assimilation, positing that attitude towards the behavior directly influences the intention to assimilate and that the evaluative component and normative components will predict attitude.

Resulting framework

Our high level theoretical framework will serve as the guiding research model for our study. Our next step involves examining prior research to determine the extent to which previous studies have investigated these three classes. The results of our analysis of the extant literature (depicted in Table 1) demonstrate that a well-established framework for investigating users of virtual worlds has not yet been developed. Most of the previous studies have not examined all three of the classes that we have theorized to explain end-user assimilation.

A few studies encompass all three of the classes. For example, Yee (2006) classified user goals for virtual worlds as consisting of three overarching goals: achievement (*user class* in our study), socializing (*community class* in our study), and immersion (*technology class* in our study). Williams *et al* (2008) re-examined Yee's framework and also analyzed users' demographics and usage style. Both studies confirm our three-class framework, but they also omit elucidation on how the three classes are related. The nature of the interaction between the three classes and the user assimilation decision as we have theoretically developed is depicted in Figure 1.

We have proposed that each of the classes refer to a broad set of factors that can be included in the overarching umbrella. To demonstrate how the framework can be utilized by virtual world researchers, we conducted an empirical study that highlights how future research can be guided using the 3Cs as a starting point. Next, we will select representative theories for each class and then utilize our framework and the theorized

Table 1 Previous literature in virtual worlds

Authors	*Objective*	*Theoretical underpinnings*	*Technology, User, and/or Community*	*Samples*	*Key findings*
Whang & Chang (2004)	Exploring the lifestyles of online game players		Community	4786 Lineage players	• Game players have developed their own distinctive lifestyles, and their lifestyles were a strong criterion for explaining behavior patterns and desires in the virtual world
Chang *et al* (2006)	Investigating the differences in game adoption (1) between adopters and non-adopters, (2) between continuers and discontinuers, and (3) between potentials and resistors of online games	Uses and gratifications Perspective, Diffusion of innovation theory	Technology, Community	201 undergraduate students (Diverse types of online games)	• Online game adopters have stronger personal needs for passing time and a higher perception of relative advantage in playing online games, whereas they perceive the risks in terms of time spent in playing online games as less significant • Among non-adopters, potentials and resistors were significantly different in terms of personal needs for passing time and perceived characteristics of online games in terms of relative advantage and complexity
Yee (2006)	Exploring players' motivations in online games		User, Technology, Community	3000 MMORPG players (EverQuest, Dark Age of Camelot, Ultima Online, and Star Wars Galaxies)	• Players' motivations are classified into three broad types: Achievement component (Advancement, Mechanics, and Competition), Social component (Socializing, Relationship, and Teamwork), and Immersion component (Discovery, Role-Playing, Customization)
Fetscherin & Lattemann (2008)	Exploring user adoption of virtual worlds	Technology acceptance model	Technology,	249 Second Life users	• Community factors such as communication, collaboration, and cooperation play a pivotal role in user adoption of virtual worlds
Jung (2008)	Investigating an impact of advanced interfaces to encourage user adoption of a virtual world	Telepresence theory, Social presence theory	Technology, Community	207 Second Life users	• Telepresence and social presence have a significant influence on users' continuance intention to use a virtual world
Shin (2008)	Investigating user behavior to purchase virtual items in Web 2.0 communities	Technology acceptance model	Technology	312 Web 2.0 users (Second Life, Cyworld, There)	• Subjective norm has a much stronger impact on users' intention to buy virtual items, implying that Web 2.0 users are more influenced by their peers
Williams *et al* (2008)	Reporting massively multiplayer online game (MMO) players' offline characteristics, motivations, physical and mental health, and actual in-game play behaviors		User, Technology, Community	7000 EverQuest 2 players	• Players were found to be physically more healthy than the general population, but mentally less healthy • Players were motivated to play for achievement, immersion and social reasons, with achievement as the strongest predictor of playing time
Phang & Kankanhalli (2009)	Examining how the individual and technology-related perceptions influence learning outcomes in virtual worlds	Flow theory, Social translucence of technology, Telepresence, Social presence,	Technology, Community	236 undergraduate students (Second Life)	• In virtual worlds, learning is associated with learners' flow experience variables as well as a sense of presence • Further, the three-dimensional realism experienced by learners is important in shaping their presence perceptions
Verhagen *et al* (2009)	Examining an influence of intrinsic and extrinsic motivations on user adoption of virtual worlds	Motivation theory, Technology acceptance model	Technology	1627 Second Life users	• The extrinsic belief, including perceived usefulness, and the intrinsic beliefs, enjoyment, entertainment value and visual attractiveness, have significant impact on the attitude towards virtual world usage
Jung & Kang (2010)	Exploring users' purposes for social virtual worlds	Means-end chain approach	Technology, Community	54 There users	• Various technical features (e.g., voice chatting, avatar interaction) help users expend social relations, which subsequently lead to amusement • Creating purpose has an important intermediary role that supports other purposes

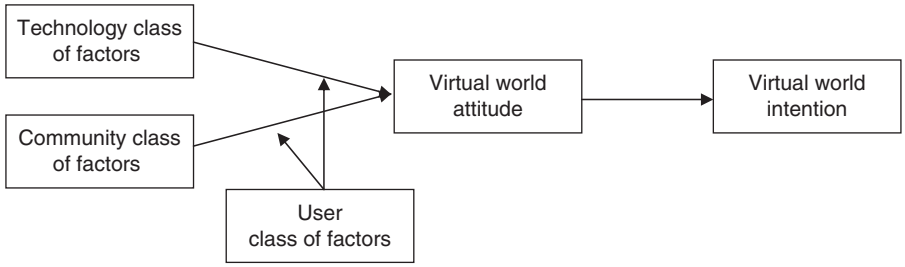

Figure 1 Guiding theoretical framework.

relationships among the *classes* to explicate the nature of the relationships between the *constructs*.

Representative theories

Based upon our literature review, we selected two of the most commonly utilized theories within the technology and community classes of factors. Specifically, for the technology class we selected the hedonistic IS theory, and for the community class we chose the Social Presence Theory. Given the lack of consensus in previous literature about a relevant user particular, our analysis of the practitioner literature displayed the presence of a need to escape from a 'first' world. We therefore selected Escape Theory as a representative theory for the user class of factors.

Technology class of factors

The technology class of factors is defined as a user's positive or negative perceptions of the virtual world. Based upon our literature review, two technology classes emerged as the most salient factors that could explain virtual world assimilation: ease of use and playfulness. In this study, perceived playfulness is regarded as a construct of the technology class. In the virtual world context, we believe that the perception of playfulness depends mainly on technology usage rather than interaction with other users (community class in the study) or individual characteristics (user class in the study), such as demographics, personal innovativeness, or inclination for self-distraction. These factors are drawn from hedonistic IS theory. We will next discuss this theory and its application to virtual worlds.

Merriam-Webster (2008) defines hedonism as a derivative of the word *hedonic*, having to do with pleasure. Hedonics stem from the branch of psychology dealing with pleasant and unpleasant feelings. Its most commonly recognized doctrine is that pleasure and/or happiness in terms of the individual represents the principal good and the proper direction of action. Thus, hedonistic theory explains that a person always behaves in such a way as to seek pleasure rather than pain. Hedonistic information systems fulfill the self-indulgent pursuit of pleasure as a way of life by individuals using such information systems. Examples of such systems include computer-based gaming, computer-based gambling, computer-based dating, the World Wide Web, online social networking, and virtual worlds.

Previous research explains the importance of perceived enjoyment, hence hedonism, for the acceptance and usage of information systems (Loeber & Cristea, 2003; Van der Heijden, 2004; Ayyagari, 2006). An example involves website design. The value of a website can be utilitarian or hedonistic. Hedonic systems aim to provide self-fulfilling value to the user in contrast to utilitarian systems, which aim to provide instrumental value to the user. The consumer behavior literature demonstrates that what specifically determines intention to consume depends on the utilitarian or hedonic nature of the product (Venkatraman & MacInnis, 1985; Babin *et al*, 1994; Holt, 1995). The objective of a utilitarian information system is to increase the end-user's productivity and encourage efficiency. The dominant design objective involves productive use. In contrast, the value of the hedonic system involves having a pleasurable experience when using the system. Prolonged use is encouraged as the dominant design objective.

Within the context of motivational theory (Deci, 1975), user acceptance of an information system is determined by two fundamental types of motivation: extrinsic and intrinsic. Extrinsic motivation is driven by the expectation of some reward or benefit external to the system-user interaction, whereas intrinsic motivation is driven by benefits derived from the mere interaction with the system. Although extrinsic motivation, such as perceived usefulness, has been influential in determining utilitarian IT usage, it is less likely to be relevant with hedonistic IT. Instead, intrinsic motivation represents a more salient factor influencing the use of this kind of IT (Lin & Bhattacherjee, 2010), and previous research on virtual world adoption has highlighted the importance of intrinsic motivation in explaining virtual world adoption.

Because virtual worlds are cyberspaces where the hedonistic nature exhibits significant impact on use, this study focuses on the hedonistic factor, and retains perceived ease of use which has been demonstrated as a significant factor influencing hedonistic IT usage (Van der Heijden, 2004). We define *perceived ease of use* as the degree to which a person believes that using a virtual world would be free from effort (Davis, 1989). We

postulate that the more a user perceives a virtual world as being free from effort, the more that the person will routinize the technology into their daily lives. Therefore, if an individual views the technology as free from effort in its use, the user will be more likely to assimilate into the virtual world. This logic leads us to propose the following hypothesis:

H1: *Higher degrees of perceived ease of use will lead to a more positive attitude toward the virtual world*

The second construct that we theorize will explain virtual world assimilation is perceived playfulness. Previous research has suggested that the extent to which a hedonic system is fun to play with (i.e., perceived playfulness) assists in explaining the adoption of the technology (Moon & Kim, 2001; Huang, 2005). Previous work has found that users who perceive a technology as more playful exercise and develop skills through exploratory behaviors (Miller, 1973), resulting in improved performance or increased learning (Martocchio & Webster, 1992). Based upon this previous research, we define perceived playfulness as the degree to which a current user believes that the virtual world will bring him/her a sense of enjoyment and pleasure. The more pleasure the individual derives from the virtual world, the more that user will seek that pleasure and incorporate the virtual world into their daily life. In short, the more playful the virtual world is to a user, the more assimilation will occur. Extending prior work leads us to propose the following hypothesis:

H2: *Higher degrees of perceived playfulness will lead to a more positive attitude toward the virtual world*

In addition to the technology class of factors, our high level framework theorizes that another class of factors influences virtual world assimilation: the community class. We will explore these factors next.

Community class of factors

We define the community class of factors as *the nature of the social relationships between users in a virtual world*. In analyzing the previous research on virtual world adoption, we posit that social presence theory can facilitate our understanding of virtual world assimilation. We will next discuss this theory and the application to virtual worlds.

Short *et al* (1976) investigated a sense of being together with others in a mediated environment and termed it social presence. More specifically, based upon the work of Short *et al* (1976) we define social presence as the degree of salience of the other people in the interaction. Essentially, social presence delineates a sense stemming from human interaction. This sense of being together with someone may be affected by the quality of human interaction in a mediated environment. Persistent group interaction can increase the level of social presence (Carlson & Zmud, 1999), and the quality of other people's feedback can also affect the level of social presence (Jung, 2008).

Social presence regularly appears in research that deals with computer-mediated communication (CMC) environments. Several studies have found that the level of social presence is significantly associated with group polarization (Sia *et al*, 2002) and majority influence (Zhang *et al*, 2007). Social presence is particularly relevant to the context of virtual communities in that social interaction among users is the foundation of virtual worlds. Rich and rapid responses among members creates a high-trust atmosphere that enhances the perception of human connection (Ridings *et al*, 2002). Currently, supporting avatar-based communication and a three-dimensional interface, many virtual worlds offer a better technological environment to increase social presence than traditional virtual communities like electronic bulletin boards. Social presence can be enhanced by a visible manifestation of the communication partner so that non-verbal cues, such as facial expression, gesture, and clothing can be included in the communication process (Short *et al*, 1976; Sia *et al*, 2002). Thus, avatars, even if limited, can provide these non-verbal cues. Furthermore, some studies have demonstrated that avatars significantly effect social presence in a mediated environment (Bente *et al*, 2004; Kang, 2006).

We believe that an important measure of the social relationships between avatars in a virtual world involves the sense that *somebody is there* (in the virtual world). A one-time meeting with others is less likely to provide social presence. Instead, the accumulation of experiences interacting with other avatars leads to a psychological state of being there with others.

Social presence has been established as an important factor in explaining web users' adoption behavior. For example, Fortin & Dholakia (2005) found that social presence effects consumers' arousal and involvement in web advertisements, purchase consideration, and attitude toward the advertisement and the brand. In addition, social presence has been found to influence perceptions of trust (e.g., Gefen & Straub (2004) and Hassanein & Head (2007)). Moreover, Hassanein and Head confirm the critical role of social presence in online shopping by demonstrating its effect on perceived usefulness and enjoyment. Social presence has also been considered a factor influencing users' behavior in social cyberspaces such as virtual communities, social network sites, and virtual worlds (Jung, 2008; Shen & Khalifa, 2008; Hossain & Silva, 2009). Hossain & Silva (2009) found a significant relationship between social ties and attitude towards use of a social network site, whereas Jung (2008) and Shen & Khalifa (2008) demonstrated that a stronger social presence leads to a more positive response from users in social cyberspaces.

Although few empirical studies have been conducted examining a direct relationship between social presence and attitude or intention, some studies propose a direct

connection. Simon (2000) found that rich information on websites that induces social presence encourages consumer purchases, and Cyr *et al* (2007) empirically demonstrated that social presence directly affects consumers' loyalty in e-service environments. In the context of virtual worlds, Jung (2008) displays the direct influence of social presence on users' logging-in intention. As social interaction among users is prominent in virtual worlds, we posit that high social presence facilitates a user's assimilation into a virtual world. Shen & Khalifa (2008) support this argument by demonstrating a significant influence of social presence on motivational factors to attract users to virtual communities. Given that a virtual world is basically a 'social' cyberspace, users who perceive a richer human connection in a virtual world may develop more favorable attitudes toward the virtual universe. This social presence will lead an individual to assimilate the technology into their lives. We therefore propose the following hypothesis:

H3: *Higher degrees of social presence will lead to a more positive attitude toward the virtual world*

User class of factors

The user class of factors is defined as *the emotional and thought processes that differ between individuals*. Based upon the analysis of experts in the field of virtual worlds, we suggest that one reason users decide to engage in virtual worlds involves escape. The extent to which individuals possess this motivation will vary, as it constitutes an individual difference. Thus, we will employ Escape Theory in our discussion of the need to escape.

Drawing upon theories of self-awareness, Heatherton & Baumeister (1991) proposed Escape Theory. Escape Theory posits that an individual who has perfectionist standards for himself/herself and becomes aware that he/she is failing to meet those ideals is likely to experience a negative affect (or a negative view of him/herself) (Duval & Wicklund, 1972). In an attempt to reduce this negative affect, this individual will engage in behaviors designed to escape from reality in order to raise their affect. Escape Theory has been applied to a variety of behaviors, including binge eating (Baumeister & Scher, 1988; Heatherton & Baumeister, 1991), sexual masochism (Baumeister, 1990), and suicide (Heatherton & Baumeister, 1991).

Extant research demonstrates that each element of Escape Theory is not an independent driver of the behavior. For example, perfectionist standards themselves or even a negative affect will not solely lead an individual to escape. Rather, the escape represents a method of an individual engaging in cognitive narrowing, or focusing attention on specific behaviors that are likely to raise their negative affect.

Thus, we postulate that an individual who has a negative affect (e.g., a negative view toward the current state of their life) will seek to focus on behaviors that will reduce this affect (which we support as a basic tenant of Escape Theory from Heatherton & Baumeister, 1991). Although multiple options exist to reduce this affect (denial, self-distraction, behavioral disengagement, or substance use), we theorize that one option involves escape into a virtual world where the individual can become anonymous and evade the negative confines of their 'first' life as a form of self-distraction. Therefore, it is theoretically plausible that self-distraction as an escape from the first life will directly influence virtual world assimilation; however, based upon our theoretical framework, we propose that an individual who engages in self-distraction will view both the technology and community classes differently.

First, we posit that an individual who engages in self-distraction will view the technology class differently. Specifically, we postulate that a user who seeks various stimuli as an attempt to escape will assess the technology as easier to use more often than individuals who do not engage in self-distraction, such that it moderates the ease of use – attitude and playfulness – attitude relationships. Self-awareness is painful for an individual engaged in a desire to escape (Heatherton & Baumeister, 1991) thus leading the individual to focus on immediate tasks. However, this cognitive narrowing leads to a heightened focus on their immediate environment (O'Guinn & Faber, 1989; Faber *et al*, 1994; Schlosser *et al*, 1994) and will block out anything leading to negative self-awareness. This cognitive narrowing will lead them to block out negative perceptions of the technology and the community, as these negative views will increase self-awareness and decrease the attractiveness of this method of escape. Specifically, an individual engaged in escape behavior will downplay a negative perception of ease of use in order to amplify their positive views of the technology in order to escape negative views of self-awareness (which is an act of cognitive narrowing). This logic leads us to hypothesize the following:

H4: *Self-distraction as an escape mechanism moderates the relationship between ease of use and the attitude toward the virtual world*

Extending our previous arguments, an individual seeking to escape will also amplify their perceptions of the playfulness of the technology. Previous research on escape theory has found that compulsive buyers who engage in escape theory are more likely to experience irrational and magical thinking (Haugtvedt & Kasmer, 2008). This logic leads us to argue that a user needing to escape (and therefore engaged in cognitive narrowing) will experience heightened views of the playfulness of the technology, as there exists a need for the technology in order to reduce self-awareness. Negative views of playfulness will be suppressed and will therefore moderate the playfulness – attitude relationship. This logic leads us to hypothesize the following:

H5: *Self-distraction as an escape mechanism moderates the relationship between playfulness and the attitude toward the virtual world*

We theorize that an individual who engages in self-distraction will view the community class, or the social presence of the virtual world, differently. Although H4 and H5 have suggested that cognitive narrowing leads to an amplified view of the technology, the effects of Escape Theory are manifested differently socially. As the user enters the social world and engages in interactions with other users, the individual compares himself/herself to his/her counterparts. Escape theory suggests that the behavior in question stems from the desire to resort to a 'cognitive shift designed to remove the troublesome thoughts and meanings from awareness' (p 89). This shift means that the user has transitioned from the social presence of the first world to the social presence of the virtual world as a means to deflate negative self-awareness. Furthermore, previous research on Escape Theory has discovered that individuals who engage in escape behavior are more focused on self-awareness (Heatherton & Baumeister, 1991); so as a result, we suggest that this user enters the world with an altered view of themselves and others, due to their increased focus on self-awareness. On the basis of one's own mental events, one can infer the existence of similar experiences in others (Gallup & Platek, 2002) and develop a mental model of other people's inner lives. We therefore extend this logic to argue that the increased level of self-awareness that derives from the need to escape will amplify the social presence – attitude relationship, as individuals who seek to escape are more likely to view their interactions with the other users that they interact with more positively. This logic leads us to hypothesize the following:

H6: *Self-distraction as an escape mechanism moderates the relationship between social presence and the attitude toward the virtual world*

In addition to the six hypotheses presented above, we offer one final hypotheses, stemming from our theoretical framework. Our seventh hypothesis formalizes the attitude – intention link and derives from the theoretical logic of the TRA/Theory of Planned Behavior.

The TRA postulates that beliefs about the outcome of a behavior develop attitude toward the behavior, which in turn affects intention to perform the behavior (Fishbein & Ajzen, 1975). The relation of attitude and intention has been extensively validated in various IT contexts, including adoption of personal computers (Davis *et al*, 1989), e-mail (Straub *et al*, 1997), database software (Wixom & Todd, 2005), and protective technology (Dinev & Hu, 2007). This study explores assimilation of a technology, which indicates continued use of the technology after initial exposure, with continuance intention employed as our dependent variable. Continuance intention is the measure of a user's intention to continue using a virtual world. On the basis of the supporting literature introduced above, a user's judgment of whether using a virtual world is positive is likely to affect their decision of whether they continue to use a virtual world. Therefore, we hypothesize:

H7: *A more positive attitude toward the virtual world will lead to a greater intention to continue using the virtual world*

Based upon our discussion of each of the 3C's and the theories corresponding to the classes of factors, we propose the integrated research model presented in Figure 2. Our integrated model will serve as the basis for our empirical study and represents a theoretically-grounded model of virtual world assimilation. We will now discuss the data collection approach.

Methodology

With the proposed research model in mind, we clarified the definition of the constructs. We summarize each of our proposed constructs in Table 2. To measure the constructs, we generated items that correspond to the definitions and reflect the proposed theoretical model. For each construct, we selected items previously validated within the literature, simply altering the wording to reflect a virtual world environment.

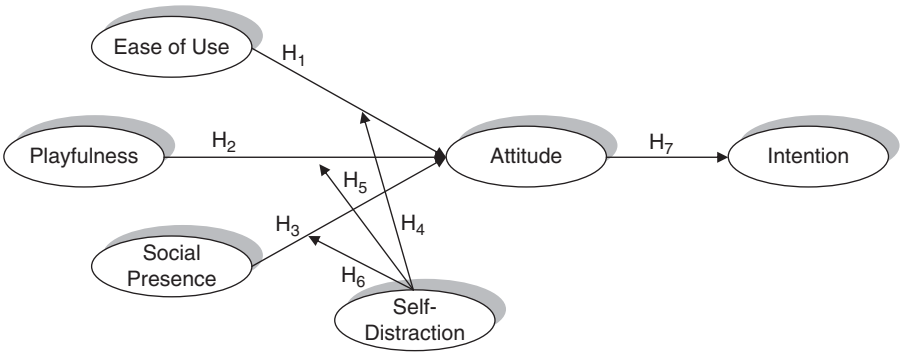

Figure 2 Proposed research model.

Table 2 Measurement items

Construct	*Item code*	*Item*	*Source*
PEOU	PEOU1	Learning to operate Second Life was easy for me	Davis (1989)
	PEOU2	I found it easy to get Second Life to do what I wanted it to do	
	PEOU3	My interaction with Second Life was clear and understandable.	
	PEOU4	I found Second Life to be flexible to interact with	
	PEOU5	It was easy for me to become skillful at using Second Life	
	PEOU6	I found Second Life easy to use	
Playfulness	CPS1	When using Second Life I am Spontaneous	Agarwal & Prasad (1998)
	CPS2	When using Second Life I am Imaginative	
	CPS3	When using Second Life I am Flexible	
	CPS4	When using Second Life I am Creative	
	CPS5	When using Second Life I am Playful	
	CPS6	When using Second Life I am Original	
	CPS7	When using Second Life I am Inventive	
Social presence	While visiting Second Life, my interaction with the other users was:		Short *et al* (1976)
	SP1	Personal	
	SP2	Warm	
	SP3	Close	
	SP4	Humanizing	
Cognitive Narrowing – Self Distraction	In general, when you are faced with stressful events…		Carver (1997)
	CNSD1	I turn to work or other activities to take my mind off of things	
	CNSD2	I do something to think about it less, such as going to the movies, watching TV, reading, daydreaming, sleeping, or shopping	
Attitude	ATT1	Using Second Life is a good idea	Davis *et al* (1989), Fishbein & Ajzen (1975), Taylor & Todd (1995a), Taylor & Todd (1995b)
	ATT2	Using Second Life is a wise idea	
	ATT3	I like the idea of using Second Life.	
	ATT4	Using Second Life is pleasant	
Intent	INT1	I intend to continue using Second Life rather than discontinue its use	Bhattacherjee (2001)
	INT2	My intentions are to continue using Second Life	
	INT3	If I could, I would like to discontinue my use of Second Life [R]	

Pilot study

Our research objective involves understanding the users' assimilation process after an initial period of use. To meet this objective, we needed (a) a research context and (b) individuals who had never used a virtual world before. As our research context, we selected Second Life, the most popular online virtual world, and we used students as our research subjects.

We employed convenience sampling, a non-probability process of case selections also referred to as accessible, volunteer, or expedient sampling. Non-probability sampling is prevalent in socio-behavioral research (Pedhazur & Schmelkin, 1991). Although convenience samples lack the virtue of generalizability (Kerlinger, 1970), this sampling technique was selected on the basis of considerations of economic and feasibility constraints (Pedhazur & Schmelkin, 1991).

After selecting our context and our population, we conducted a pilot study to determine how long it takes for an individual to make the assimilation decision. We commenced the pilot study in the Fall of 2007 with 104 undergraduate students enrolled in a junior-level Introduction to MIS course at a university in the southeastern United States. The subjects were required as part of the course to participate in the research project and to interact with the Second Life environment for at least 1 h per week. After each week, students completed a short survey about their experience and completed informal interviews with the first researcher. The pilot study found that after 4 weeks the student's attitudes about assimilation had solidified. Examples of quotations from students who decided to not continue using the technology include:

- I hated almost everything about Second Life. I find it to be a nuisance and quite boring... I would never download Second Life to another computer. I don't understand why this is even in existence because it is very similar to SIMS, just with creepy real people.
- I personally find it kind of pointless and lame. I'm not a big virtual world type of person
- I just don't enjoy anything about it. I'm not very interested

Alternatively, those who were open to continuing to use the technology made comments such as:

- [My favorite part was] by far the amount of freedom. I have always thought it would be cool to have a video game where you can interact with almost everything imaginable, and in Second Life this is almost true – at least the closest I have ever seen.
- I liked how many different things there were to do. It took a while to realize all the events, etc., going on, but there are endless things to do in Second Life.
- [I enjoyed] the interaction I had with people and learning how to use new technology in a fun and interesting way. The overall experience was a good one.
- It was fun to become another 'person' through Second Life. I didn't ever really get into communicating with others, but I think if I would have, then I would've enjoyed that. I think it's neat that businesses are thinking about going on there in the future.
- I like the community that is based around it.
- [I liked] being able to talk to people all around the world. I also enjoyed the flexibility of what your SL [avatar] could look like and where he could go.
- [I enjoyed] all the fun activities you can participate in (outdoors)… and hanging out with the other people and friends on Second Life
- The thing I enjoyed most about it was being surprised about the amount and degree of things a user can do. I liked interacting with others and trying out things from the companies in the virtual world.

The quotations also provide a validation of the 3C model, as each of the quotations reflects one of the class of factors included in our study.

Assimilation study in Second Life

In Spring 2008, 91 students who were enrolled in an Introduction to MIS course at a university in the southeastern United States were required as part of the course to participate in the assimilation study inside Second Life. The students were required to either download Second Life to their home computer, or, if their home computer was unable to accommodate the software, a Second Life lab was available, which provided them with the use of a PC to enter Second Life for at least 1 h per week. Similar protocols used in the pilot study from the Fall 2007 semester were employed, with one exception. We utilized the snowball sampling technique, a process of chain referral: when members of the target population are located, they are asked to provide names and address of other members of the target population. Each student was offered extra credit to recruit additional study participants (with a maximum of five friends per individual). A basic assumption of the snowball technique is that members of the target population often know each other (Singleton *et al*, 1999). The requirements for the additional participants were as follows: each participant (a) could have no prior experience with Second Life; (b) was a student at the university (ensuring homogeneity of the sample); (c) had to participate in all study requirements (i.e., spend 1 h in Second Life per week and complete all of the surveys); and (d) had to complete a human subjects waiver for the research study. This technique has been used to create sampling frames (Sudman & Kalton, 1986), and most applications involve non-probability methods of selection (Biernacki & D., 1981). Therefore, the snowball technique fits our sampling approach. The students in this study recruited an additional 186 potential users for an initial sample size of 277. A total of 223 users completed all of the required surveys, giving us our final sample size.

Each week the students answered a series of qualitative questions about their experiences with Second Life during that week, and at the end of the 4 weeks the subjects completed the quantitative survey. Each student was given a random five digit research identification number, ensuring anonymity of their responses and enabling us to aggregate their answers across all four data collection points. Table 3 contains an outline of the questions asked, including both the qualitative and quantitative questions. The repetition of the qualitative questions allowed us to ensure that the participants were engaging in new behaviors within Second Life and to track their progress. However, the measures used in this study were those collected at the end of the virtual world experience. Next, we will turn to an analysis of our quantitative research model.

Analysis

We analyzed the data using structural equation modeling. Under the umbrella of structural equation modeling

Table 3 Research question schedule

Week	*Qualitative question*	*Quantitative construct*
1	• What avatar name have you selected?	None
	• What are your initial impressions of Second Life?	
	• How long did you spend in Second Life this week?	
	• What did you do in Second Life this week?	
	• What did you find in Second Life this week that you thought was interesting?	
2	• How long did you spend in Second Life this week?	
3	• What did you do in Second Life this week?	
4	• What did you find in Second Life this week that you thought was interesting?	All quantitative elements

there are two main approaches: covariance-based (which is found in software such as LISREL, AMOS, and EQS), and partial least squares (PLS, which is found in software such as PLS-Graph). We selected the PLS approach (PLS-Graph, version 3.00 build 1126) for two main reasons: Given the number of indicators in our model, we were unable to utilize a covariance-based approach (MacCallum & Browne, 1993). Furthermore, whereas Anderson & Gerbing (1988) and Gerbing & Anderson (1985) suggest a two-step process and analysis of sample size for covariance-based approaches, we were unable to use this approach given our data size and complex structural model.

Measurement model results

The first step in a PLS analysis involves the analysis of the measurement (or outer) model. First, we examined the adequacy of the measures to ensure that the items measure the constructs as they were designed. As a guideline, Chin (1998, p. 325) states, 'Standardized loadings should be greater than 0.707'. On the basis of our analysis of the measurement model, all of the loadings were above 0.80 except for two items (CPS1 with a loading of 0.783 and INT3 with a loading of 0.481), which was eliminated. All of the remaining elements met the requirements as Chin (1998) prescribed, which indicates that the measures are adequate in their individual reliabilities. In addition to the weights and loadings, we also present descriptive statistics for each item in the Table 4.

Second, to determine whether the items loaded on other constructs, as well as on their theorized construct, we computed cross-loadings (see Table 5). Items included in the finalized data set did not have higher loadings in any other construct than their intended one.

Using the loadings from the constructs in the model, we created composite reliabilities for the constructs in the model. Table 6 shows the composite reliabilities for each construct. The results indicate that all the constructs met the recommended value of 0.80 and thus are reliable. Table 6 also presents average variance extracted and the correlations between the constructs. A comparison of the square root of the average variance extracted (i.e., the diagonals in Table 6 representing the overlap of each construct with its measures) with the correlations among constructs (i.e., the off-diagonal elements in Table 6 representing the overlap among constructs) indicates that, on average, each construct is more highly related to its own measures than to other constructs (Chin, 1998). This is also consistent with Fornell & Larcker's (1981) recommendation that the average variance extracted should be larger than the square of the correlations (i.e., equivalent to a monotonic power transform of numbers in the table). Moreover, all average variances extracted were well above the 0.50 recommended level (Fornell & Larcker, 1981; Chin, 1998;). In summary, these results support the convergent and discriminant validity of our constructs.

Table 4 Item loadings and weights

Variable	*Weight*	*Loading*	*Mean*	*SD*
		Playfulness		
CPS2	0.176	0.8497	4.44	1.387
CPS3	0.219	0.8966	4.27	1.375
CPS4	0.2143	0.8714	4.42	1.369
CPS5	0.1932	0.8641	4.55	1.445
CPS6	0.1754	0.814	4.37	1.392
CPS7	0.1856	0.8497	4.27	1.465
		Perceived ease of use		
PEOU1	0.124	0.8646	4.30	1.648
PEOU2	0.1837	0.9408	4.16	1.599
PEOU3	0.1764	0.9391	4.17	1.522
PEOU4	0.2109	0.9241	4.26	1.604
PEOU5	0.1843	0.8941	4.32	1.583
PEOU6	0.2092	0.9298	4.22	1.499
		Self-distraction		
CNSD1	0.6459	0.9308	4.36	1.385
CNSD2	0.4634	0.8605	4.50	1.388
		Social presence		
SP1	0.2078	0.8718	3.88	1.565
SP2	0.2789	0.9512	3.89	1.586
SP3	0.2745	0.9157	3.64	1.521
SP4	0.3289	0.9186	3.91	1.590
		Intention		
INT1	0.5055	0.9851	3.04	1.660
INT2	0.5095	0.9854	3.04	1.645
		Attitude		
ATT1	0.2522	0.907	3.64	1.448
ATT2	0.2664	0.9225	3.57	1.419
ATT3	0.2979	0.9355	3.50	1.610
ATT4	0.2728	0.9049	3.70	1.639

In order to detect the presence of a common method effect, Harman's one-factor test was conducted. The objective of Harman's one-factor test involves determining if either (a) a single factor will emerge from the factor analysis or (b) if one factor will explain a majority of the covariance of the variables (Podsakoff *et al*, 2003). All of the variables were entered into an exploratory factor analysis, using unrotated principal components factor analysis and principal component analysis with varimax rotation. The two approaches did not reveal that a single factor explained a majority of the total variance [In both cases, the total variance of the first factor was 47%, with five factors containing an eigenvalue over 1]. The results from this analysis demonstrate that the single-factor model does not fit the data well, thus suggesting that common method variance is not likely to confound our results.

Figure 3 presents the results of the data analysis using PLS-Graph. The results indicate that the strongest driver of attitude is playfulness (0.329), followed by Social Presence (0.230) and Ease of Use (0.177). Two of the three moderator influences are significant – playfulness (0.422), and social presence (−0.382). The resulting r^2

Table 5 Cross loading analysis

	Playfulness	*Perceived ease of use*	*Social presence*	*Self-distraction*	*Attitude*	*Intent*
CPS2	**0.850**	0.433	0.470	0.045	0.424	0.409
CPS3	**0.897**	0.592	0.529	0.107	0.528	0.489
CPS4	**0.871**	0.532	0.464	0.082	0.516	0.436
CPS5	**0.864**	0.469	0.422	−0.041	0.465	0.382
CPS6	**0.814**	0.459	0.362	−0.040	0.423	0.375
CPS7	**0.850**	0.490	0.374	−0.027	0.447	0.422
PEOU1	0.475	**0.865**	0.410	−0.109	0.293	0.300
PEOU2	0.526	**0.941**	0.444	−0.090	0.434	0.429
PEOU3	0.532	**0.939**	0.457	−0.101	0.417	0.389
PEOU4	0.550	**0.924**	0.450	−0.051	0.499	0.460
PEOU5	0.557	**0.894**	0.433	−0.070	0.436	0.389
PEOU6	0.546	**0.930**	0.442	−0.087	0.494	0.435
SP1	0.424	0.351	**0.872**	0.045	0.339	0.397
SP2	0.499	0.446	**0.951**	0.046	0.454	0.507
SP3	0.437	0.429	**0.916**	−0.007	0.447	0.500
SP4	0.502	0.502	**0.919**	0.107	0.536	0.515
CNSD1	0.037	−0.115	0.072	**0.931**	0.148	0.090
CNSD2	0.011	−0.034	0.018	**0.861**	0.106	0.041
ATT1	0.465	0.394	0.402	0.152	**0.907**	0.692
ATT2	0.505	0.440	0.452	0.118	**0.923**	0.722
ATT3	0.541	0.454	0.498	0.108	**0.936**	0.830
ATT4	0.494	0.465	0.463	0.158	**0.905**	0.743
INT1	0.470	0.433	0.511	0.079	0.801	**0.985**
INT2	0.497	0.443	0.534	0.073	0.808	**0.985**

Table 6 Discriminant validity analysis

	Composite reliability	*AVE*	*Playfulness*	*PEOU*	*SD*	*SP*	*Intent*	*Attitude*
Playfulness	0.944	0.736	0.858					
PEOU	0.969	0.839	0.582	0.916				
SD	0.891	0.803	0.029	−0.090	0.896			
SP	0.953	0.837	0.512	0.480	0.055	0.915		
Intent	0.985	0.971	0.490	0.445	0.077	0.530	0.985	
Attitude	0.955	0.842	0.548	0.479	0.145	0.496	0.817	0.918

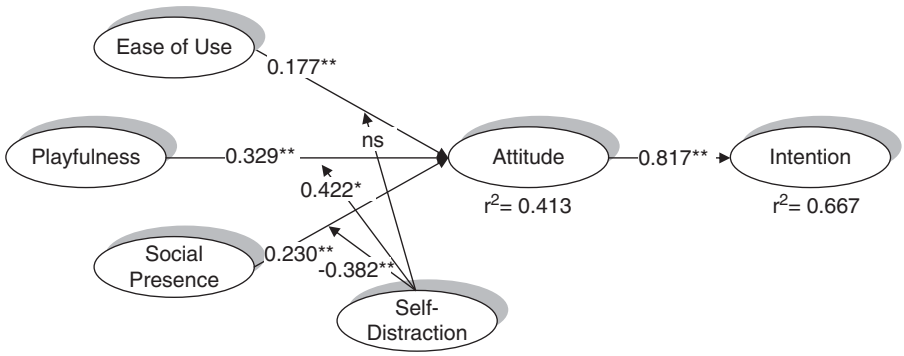

Figure 3 Research results.

for attitude is 0.413. The attitude – intention link is strong (0.817) with a final r^2 for intention of 0.667. The results will be discussed next.

Discussion

The premise of our research is that there are currently no studies on virtual world assimilation that have explained the convergence of three classes of factors. We proposed a theoretical framework that, we posit, should be utilized to guide future work in virtual worlds. The results of our study provide empirical support for the framework – the user class of factors moderates the relationship between the technology and community class of factors on the attitude towards the virtual world. This finding increases our understanding of individual differences and the role of the user class of factors in moderating these relationships in virtual worlds.

Of our seven hypotheses, six were supported (albeit one in the opposite direction). The moderating influence of self-distraction upon ease of use was borderline significant, but not strong enough for us to argue that this relationship exists. Further, the negative relationship suggests that those individuals who engage in self-distraction view the social presence as less important than their counterparts. Utilizing Escape Theory, we proposed that an individual engaged in high levels of self-awareness would amplify their perceptions of the social presence of the technology and view their interactions with other avatars more positively. We found, however, that instead of amplifying the views, it had a negative influence and that the cognitive narrowing led to a negative view of others. We suggest that the cognitive narrowing deflated (instead of amplified) how the user viewed others and that, perhaps, the need for escape tainted the views of the relationships discovered in the virtual world. We urge other researchers to further examine this relationship.

This study, however, does not come without limitations. We relied upon a subject pool that was required to adopt the technology initially, and therefore the initial adoption decision was not volitional. Second, we focused on one virtual community: Second Life. Whether these results can be generalized to other virtual worlds warrants subsequent investigation. Third, the technology class of factors, the community class of factors, and the user class of factors that define the interactions within virtual worlds may not be similar to that of other immersive environments, thus limiting the generalizability of the results outside of the context of virtual worlds alone. Another limitation of this study is that we examined single constructs of the community, technology, and user classes. The fundamental objective of the current study involves the development of a *high-level framework* for investigating users of virtual worlds rather than the examination of specific constructs itself. In order to validate the high-level framework consisting of three classes, more constructs of each class needs to be examined in future research as well as the interactions between these constructs. Finally, our focus in this study was on volitional assimilation into a virtual world. As part of our theoretical development, we hypothesized the use of escape theory as a user class; however, there are other motivations for an individual to try and then assimilate into the world. We recognize that this need does not represent the only motivation for assimilation and urge others to examine other motivations and individual differences associated with the assimilation of individuals into virtual worlds.

Implications for research

This study provides a theoretical framework to understand assimilation in virtual worlds. In this paper, we outlined a 3C approach for understanding virtual world assimilation. We then selected representative theories for each of the classes to demonstrate the value of examining assimilation through multiple lenses. In the future, we urge researchers to examine other theories, utilizing our high-level theoretical framework as their guide. In this study, we extended TRA to create a high-level approach suitable for future investigations. Although we utilized one set of factors to represent each class, a different subset of theories may have yielded different results and insights into virtual world assimilation.

Underlying the high-level framework is the recognition that individual differences influence technology assimilation behavior. Although work has begun to understand how these differences manifest themselves, we urge researchers to continue in this pursuit. Furthermore, additional studies should examine whether trait or state differences moderate the relationships differentially.

We understand that our study focuses on a mandatory, consumer-oriented application of a virtual world. We selected constructs that could explain why an individual outside of a corporate environment would interact with and assimilate into a virtual world. However, with the broadening use of these environments inside corporations, we implore other researchers to expand our framework to understand how firms can achieve their corporate goals using virtual worlds, in an optional or a non-mandatory environment as well as in an optional consumer-oriented context.

Conclusions

The topic of assimilation into virtual worlds merits attention from the academic community. The 3C approach to virtual world assimilation closes the assimilation gap and improves our understanding of the decisions people make about whether to continue using the virtual world technologies. As stated in the introduction, virtual world technology, even at its genesis, is experiencing a crisis. Although approximately 50 million people have registered for Second Life (Bennett, 2008) only approximately 800,000 used the virtual community on an average monthly basis in 2010 (Linden, 2011). If this trend continues, then the viability of the virtual world model may be called into question, and the

potential for this technology may never be realized. According to Raz Schionning, the Web director of the first real-world clothing retailer to establish a shop in Second Life, 'we haven't quite figured out how to make good use of [Second Life], and I'm not sure anybody has' (Enright, 2007). At this point, even the Second Life businesses are unsure of how to leverage this new phenomenon and convince users to continue utilizing the technology. By applying the findings from the rich research area of adoption in combination with our high level framework of assimilation, we have sought to increase our understanding of adoption in a virtual world environment. This research enables us to better comprehend an individual's decision to assimilate into virtual worlds, so that there will be no pause when you are next asked, 'When was the last time *you* logged onto Second Life?'

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