Sense of Virtual Place (SOVP): Conceptual Exploration and Initial Empirical Validation

Full Paper

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Abstract

In this article, we introduce the notion of "Sense of Virtual Place" (SOVP) and explore the factors affecting it. We argue that SOVP can act as a surrogate for user engagement in virtual environments. We develop and validate a SOVP measure, adapting from a widely used measure of Sense of Place (SOP) in the academic disciplines of environmental and social psychology.

Keywords

Sense of Virtual Place, Virtual World, Virtual Learning Environment

Introduction

IS researchers have argued for sites designed in virtual worlds (VWs) where users can have meaningful experiences to be conceived as "places" (Goel, Johnson, Junglas, & Ives, 2011; Saunders, Rutkowski, van Genuchten, Vogel, & Orrego, 2011; Kaapu, Tiainen, & Ellman, 2013; Fominykh, 2014).

Recent empirical research on VWs has shown that visitors perceive "cognitive absorption", "telepresence" and a state of "flow" while visiting specific sites in VWs (Goel et al., 2013; Goel et al., 2011; Nah, Eschenbrenner & DeWester, 2011). Other researchers have argued that VWs engage the users by providing a "sense of place" and "sense of presence" (Clark & Maher, 2003; Minocha & Reeves, 2010; Arora & Khazanchi, 2010). While, there has been a considerable amount of research centered on the meaning of sense of presence and its measurement in virtual environments (Lombart & Ditton, 1997; Whitelock, Romano, Jelfs & Brna, 2000; Tu, 2002; Hassell, Goyal, Limayem, & Boughzala, 2009; Riva, 2014), the term sense of place has not been clearly defined within the literature. "If researchers in the IS field want to understand more about VWs, there is need for us to consider the notion of place. But as far as we are aware, place has not received its deserved attention. Researchers have stopped short of looking at it (Goel et al., 2011, p. 750)." It is unclear what factors are important in studying users' perceived sense of place in virtual environments (Champion, 2005). In addition, there is no standard instrument for measuring the users' perceived sense of place in virtual environments. Thus, most of the prior studies on sense of place in virtual environments have been either conceptual or relied on qualitative data (Arora & Khazanchi, 2014a).

Given the above background and our previous conceptualization of this concept (Arora & Khazanchi, 2014a and 2014b), the objective of this paper is to enhance existing knowledge about sense of place by introducing a new construct, "*Sense of Virtual Place" (SOVP)*. We contend that the users' perceived SOVP while present in a VW setting could potentially act as a surrogate for the ability of the setting to involve and engage the user. We draw upon relevant prior research to develop a scale to measure SOVP.

Thus, the specific research question addressed by this paper is: *How can Sense of Virtual Place (SOVP) be theoretically and operationally described?*

Place and Virtual Place

In our previous work, we concluded that there are important similarities among the various theoretical models of place and most place researchers agree on the basic elements or constituents of "place." (Arora

& Khazanchi, 2014a). In essence, *a place is made up of not just the physical environment but also the activities, and the social interactions among the people who occupy the place.*

A VW is a persistent computer mediated environment in which many users can interact synchronously (Bell, 2008). These social spaces can be used on ordinary home computers without the need for any "virtual reality" equipment like goggles and gloves (Dodge, 1998). VWs are unique and distinct from other types of virtual environments in at least two ways. First, they attempt to provide a tangible and persistent 'physical' environment comprised of cities, homes, parks, and universities (Dodge, 1998; Davis et al., 2009). Elements like sky, ground, streets, trees, furniture, and other artifacts can easily be built and included to give a realistic look to the environment. Second, the participants can be "present" in the VW in the form of an "avatar" through which they interact with other participants, represented by other avatars, and with artifacts present in the environment (Nah et al., 2011). Real-world place attributes can easily be simulated in VWs by designing different types of "places" to suit the needs of the users.

For the purpose of this research, adapting definitions provided by Relph (1976), Relph (1997), and Brandenburg and Caroll (1995), we define a *virtual place* as *"a virtual setting along with the activities, and human social and psychological processes rooted in the setting."*

Sense of Place (SOP) and Sense of Virtual Place (SOVP)

Sense of Place (SOP) is the way in which people experience, use and engage with the places they occupy. The term sense of place is often used in relation to those characteristics of a place that make it special or unique, as well as those that foster a sense of belonging and authentic human attachment with the place (Relph, 2007). Researchers have defined SOP as the combined set of the place meanings and place attachments that a person or a group develops for a place (Brandenburg & Carroll, 1995; Williams & Stewart, 1998). Sense of place, therefore, encompasses the cognitive and affective domains (Semken & Butler Freeman, 2008). Sense of Place has also been referred to as an over-arching concept which subsumes other place concepts (like place attachment and place identity) describing relationships between human beings and spatial settings (Shamai, 1991), and is one of the most general among the several concepts that are used to describe the people-environment relationship (Jorgensen & Stedman, 2001). The concept of SOVP is, therefore, useful in understanding people's engagement with virtual places.

For the purpose of this research, we define Sense of Virtual Place (SOVP) as "*an individual's perception of the capability of a virtual place to actively engage the individual by supporting a set of well-defined place-specific functional and socio-emotional needs of the individual."*

Elements of a Virtual Place

A virtual place includes not just the physical characteristics of the virtual setting but also the activities, and social interactions among the people "present" in the setting.

Physical Characteristics

Situated cognition theory and Socio-cognitive theory emphasize the importance of context in the learning process (Lave and Wenger, 1991). Jonassen (1994) identified context, construction (of knowledge), collaboration and conversation (between student and teacher and among students) as four key processes fundamental to a constructivist learning environment. According to Clark and Maher (2001), the role of place in a virtual learning environment is to provide the basis for these processes. A 3D VW provides the designers with many options and a lot of flexibility to design different types of "places." Several artifacts can be designed which may provide the real life like context necessary for the completion of an activity. Additionally, users can build their own artifacts using the tools available in the VW. Similarly, different kinds of formal and informal settings can be designed to facilitate virtual meetings for users.

Activities

The design of a virtual place by virtue of the overall appearance and the placement of different objects can potentially make it favorable for carrying out a particular task. The visual cues, such as pictures, and virtual objects that are perceived to be relevant for a task may not only draw users' attention to the task but may also help in the accomplishment of the task. In addition, 3D virtual environments can enable

people to learn by exploiting aspects of immersion, and the students through their avatars, can feel social and cognitive presence in such environments. Therefore, these environments can provide excellent support for such educational purposes as virtual laboratories, field trips and problem based learning, and synchronous group discussions.

Social Interactions

Learning is usually an interactive and dynamic process consisting of a series of social interactions that occur in an environment (Laurillard, 2002). It is driven as much by social and situational factors as by cognitive ones. An important part of designing learning environments is to design for participation and engagement of the learners (Ponti and Ryberg, 2004). In a VLE designed in a 3D VW, excellent support for synchronous group discussions, and design team work can be provided. Additionally, specific 'places' can be designed for both formal and informal interaction among students and instructors. This social context can make the students' learning experience engaging and satisfying. In a 3D VW, the campus like design may provide learners with different formal and informal "meeting places" like library, professor's office, lawn, cafeteria etc. Learners may like to visit these "places" per their needs (e.g. for socializing, one may visit a lawn or a cafeteria and for a serious discussion on a topic one may visit a professor's office or library). Table 1 represents the manifestation of the three elements of virtual place in a VW.

Place Attributes	Virtual World Affordance
Physical characteristics	Simulate characteristics of real-world places Ex. A co-located setting designed in a synthetic environment that provides artifacts and a social context for remote participants where they can work together on shared artifacts.
Social Interaction	Synchronous interaction between users personified as avatars Ex. Real time Text/Voice chat supported by embodied avatar gestures
Afforded Activities	Shared viewing, creation and manipulation of artifacts Ex. Virtual experiments, design team work, group projects, role plays etc.

Table 1: Three Elements of Place in Virtual Worlds

Measuring Sense of Virtual Place (SOVP)

Place identity (Proshansky et al., 1983), place attachment (Moore and Graefe, 1994; Riley, 1992), and place dependence (Stokols and Shumaker, 1981) are three constructs that most often appear in the literature concerning place related research. Researchers have described the multidimensionality of the construct of SOP in emotional, cognitive, and behavioral terms (Altman and Low 1992). Following the empirical work of Jorgenson and Stedman (2001 and 2006), we conceptualize sense of virtual place (SOVP) as a three dimensional construct comprising of **virtual place identity**, **virtual place dependence**, and **virtual place attachment**. (Refer Table 2).

Dimension	Definition
Virtual Place Identity	The conscious and unconscious ideals, beliefs, preferences, values, goals, and behavioral tendencies of an individual about where, when, and why to use a particular virtual place.
Virtual Place Dependence	The ways in which a virtual place facilitates the achievement of desired goals or execution of specific activities.
Virtual Place Attachment	The emotional bond to a virtual place that develops over a period of working or experimenting in the virtual place.

Table 2: Three Dimensions of Sense of Virtual Place (SOVP)

Scale Development

The SOVP scale has been designed following the scale development paradigm proposed by MacKenzie et al. (2011) and guidelines set forth by DeVellis (2012), Nunnally (1978) and Hair et al. (2006).

Item Generation

The SOVP construct was specified and defined based on existing theory and prior research. The existing scales for sense of place were used as a good starting point for measuring sense of virtual place (Shemken, Neakrase and Dial, 2009). Multiple items were generated for each hypothesized dimension of the SOVP construct. Based upon the definitions of the three dimensions of SOVP, most items for the Virtual Place Identity dimension were adapted from Usoh et al. (2000) while the items for Virtual Place Dependence and Virtual Place Attachment dimensions were adapted from Williams (2000) and Jorgensen & Stedman (2006). According to Nunnally (1978) and Churchill (1979), multiple items tend to reduce measurement error by averaging out item specificity. A total of 17 items were generated.

Content Validity

The 17 items were evaluated for content validity using a focus group. The focus group members were provided with the definition of the construct and its dimensions and the list of scale items already produced. The members were asked to review the items for clarity, conciseness and utility for the specified domain of a VW learning environment. The discussion was guided by a semi-structured set of questions. Based upon the feedback provided by members, 6 of the 17 items were dropped and 5 other items were reworded. A questionnaire using the revised list of 11 items to further test the SOVP scale.

Data Collection and Sample

Research participants were undergraduate and graduate students at a Midwestern university. The students received extra credit for participating in the study. Each subject was randomly assigned an avatar (of the same gender as the subject) from pre-selected 6 representative avatars (3 female and 3 male).

A virtual Audio and Video laboratory (See Fig. 1) designed for e-Learning activities was used as the setting for testing the SOVP scale. The laboratory is part of the University of West England's island in Second Life and is available to the public for observation. The look and feel of the laboratory matches the definition of a place used in this research.

Fig. 1 Virtual Telecommunications Lab

A total of 97 subjects were recruited and worked in a physical lab using Second Life (SL) as the VW for the study. Subjects were given 15 minutes to get comfortable with in-world behaviors, such as moving around, communicating via chat and to familiarize themselves with the other subjects in world. Subjects could use the chat box in the SL application to communicate with other avatars. Subjects' avatars were led by the researcher's avatar to the Audio and Video laboratory mentioned above. Subjects were given 10 minutes to explore the audio/video equipment and the other artifacts like pictures and posters present in the virtual lab. Subsequently, they were given the SOVP questionnaire and asked to respond to it based upon their perception of the virtual lab and how it compared with their perception of a similar place in the physical world. Data collection yielded 94 usable responses. The respondents were 70.2% male and 29.8% female. The age breakdown of the sample was 39.4% between 18 and 21 years, 44.7% 19 to 25 years and 15.9% over 25 years old.

Item Purification, Validity and Reliability

An Exploratory Factor Analysis (EFA) using Principal Components with Varimax rotation was used to explore the hypothesized dimensions of the SOVP scale. Examination of loadings of individual items indicated that all but 1 item loaded very well on their hypothesized individual components. After deleting that item, three factors were extracted. Convergent validity specifies that items that are used as indicators of a construct should share a high proportion of variance (Hair el al. 2006). All factor loadings were found be greater than .50, the cutoff proposed by Hair et al. (2006), with most loadings exceeding .75. The factor loadings revealed support for convergent validity for the three dimensions of the SOVP construct. Also, all

items loaded on the specified dimensions as hypothesized. The observed factor loadings ranged from .53 to .89. The high factor loadings indicate that the measures had convergent validity.

Discriminant validity reveals the extent to which each dimension of the construct is unique and not simply a reflection of other variables. Each dimension of SOVP should be unique and different from the others even though each contributes a portion in the measurement. There are several ways to evaluate discriminant validity. Average variance extracted (AVE) is a commonly used method for testing discriminant validity. The average variance extracted for all factors should be above the recommended cutoff of .50. Although the dimensions of Place Identity and Place Dependence exceeded the .50 cutoff, the Place Attachment dimension had an AVE of.32. This was expected given the relatively lower factor loadings observed for this dimension of the construct.

The final step in investigating construct validity is to determine the reliability of the scale items using Cronbach's alpha. Construct reliability coefficients should all exceed the .70 lower limit (Hair et al. 2006). The alpha for the three dimensions of SOVP ranged from .69 to .91 indicating strong construct validity.

Concluding Remarks

An important aspect of evaluating different types of settings designed and developed in VWs is to understand the various psychological and physical factors that influence the delivery of the purpose for which the setting is designed. The notion of place can help researchers better understand VWs in terms of what users come across, observe, and perceive while visiting a site. Drawing upon existing research on the notions of place and sense of place, we propose the notion of sense of virtual place (SOVP) that is useful as a holistic measure of an individual's perception of the manifold qualities of a virtual place. Our definition of virtual place includes the components of physical characteristics, afforded activities, and social interactions. We define Virtual Place Identity, Virtual Place Dependence, and Virtual Place Attachment as the three important dimensions to measure users' perceived SOVP while interacting in a virtual setting. We believe that the multidimensional conceptualization of SOVP helps capturing users' perceptions of the manifold qualities of a virtual place regarding its capability to engage the user. We provide initial empirical validation of the SOVP construct as conceptualized.

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