

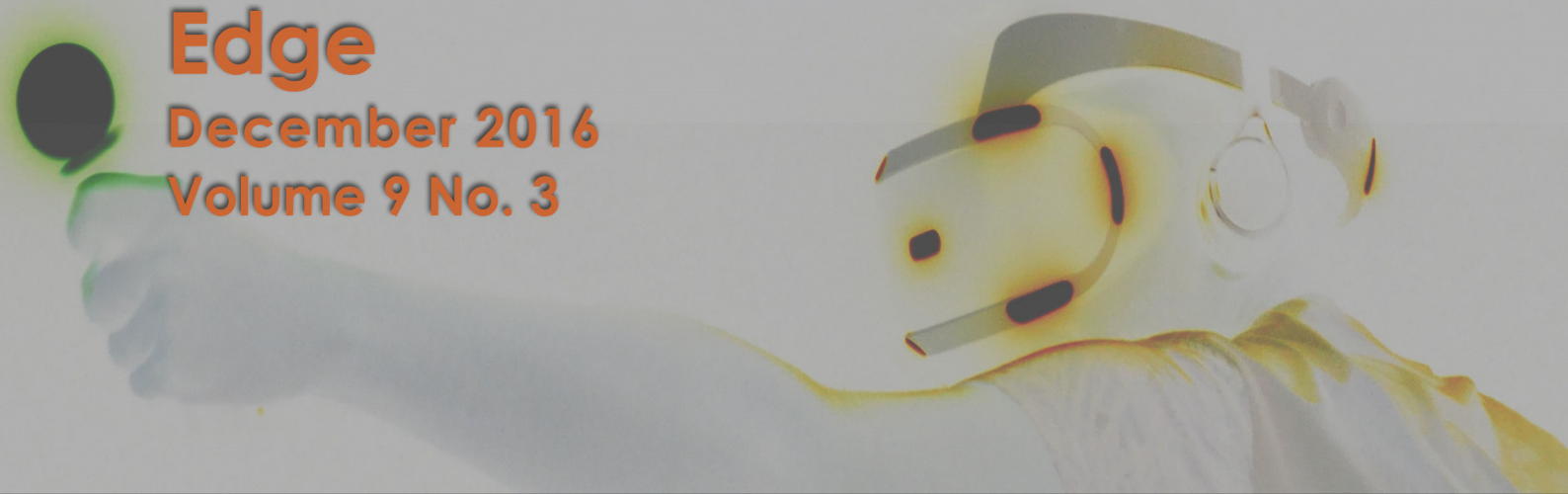
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## Flow in Virtual Worlds: The Interplay of Community and Site Features as Predictors of Involvement

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### Abstract

Cultivating involvement within virtual worlds, where interactivity and community are salient, represents a key goal for virtual world leaders. This online survey of virtual world visitors conducted in 2013 (N = 244; 37% of whom use *Second Life*) assessed whether the interplay of community and site features facilitates a form of intense involvement known as flow. Flow is an affect-based response to types of pursuit that involve intense enjoyment and high psychological engagement. *Prior research shows that flow often leads to positive outcomes for virtual world visitors, including learning, satisfaction and loyalty.* Therefore, it is important to understand more about potential antecedents to the reported flow experience in virtual worlds. The study findings showed that site features such a level of interactivity mediate the relationship between sense of community and reported flow experience among virtual world visitors. This suggests that site designers can intensify involvement by encouraging community spirit via interactivity, feedback, content variety and ease of use.

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*Under ideal conditions, people use (cyberspace) as an opportunity to better understand themselves, as a path for exploring their identity as it engages the identity of other people. The psychological qualities of cyberspace are determined by the hardware and software that constitute computers and the online world. An Op has the power to throw you off an IRC channel; lag can destroy conversation in a chat group; the reply-to in a listserv group might send your e-mail to the whole list or just to the sender of the message. All of these factors affect the psychological "feel" of the environment. All of them are determined by the nuts and bolts and program code that comprise the internet infrastructure. As hardware and software change, so will the psychological aspects of cyberspace. Of particular interest is the expansion of the experiential dimensions of cyberspace by technological advances that allow more visual and auditory communication. How will the ability to see and hear other people on the internet change cyberspace? (Suler, 1996)*

## 1. Introduction

Suler's two decades old question still piques research interest because the goal of investigating the connections between identity, sense of belonging, cyber technology and psychological involvement is arguably more valid than ever. Cultivating involvement online is a key goal for media professionals, educators, and content generators because of the potential for positive outcomes for both individuals and organizations. Virtual worlds typically provide opportunities for escapism, entertainment and information sharing, but they also offer business and educational services (Cheng & Guo, 2015; Halvorson, Ewing & Windisch, 2011; Hew & Cheung, 2010).

Two salient attributes of virtual worlds are a sense of community (Huvila, Ek & Widden, 2014) and interactivity (Nah, Eschenbrenner & DeWester, 2011; Sundar, 2008; Yilmaz, Baydas, Karakus & Goktas, 2015). For the sake of this paper, a sense of community is defined as a feeling of camaraderie with others, as a result of sharing common attitudes, interests, and goals. Interactivity is defined as the communication process that takes place between humans and computer software. In this case, it is typically found in virtual worlds, which often require a continuous form of interactivity with the virtual world visitor.

Arguably, regardless of the type of virtual community, these attributes are most likely to contribute to involvement, cognitive engagement, and enjoyment among virtual world visitors. The current study investigated if sense of community and virtual world features contribute to the experience of flow (Csikszentmihalyi, 1977). Flow comprises more than just involvement and engagement. Flow is said to occur when "the experience is so enjoyable that people will continue to do it [...] for the sheer sake of doing it." (Csikszentmihalyi, 1990, p. 4). In its original conceptualization, flow comprised six dimensions: Concentration (focused attention); perceived control; spontaneity; distorted sense of time; loss of self; and autotelic experience (an end in itself). Prior research confirms reports of the flow experience in virtual worlds (Faiola, Newton, Pfaff & Symyslova, 2011; Inal & Cagiltray, 2007; Nah et al., 2011) and also that virtual world patronage and the flow experience facilitate a variety of positive outcomes such as learning (Baydas, Karakus, Topu, Yilmaz, Ozturk & Goktas, 2015), business successes (Zhou, Jin, Vogel, Fang & Chen, 2011), and stickiness (Andersen, 2005). It is important, then, to understand the processes leading to flow, especially in light of the continued growth in the availability, scale and types of virtual worlds.

Several models examining antecedents to online flow have been proposed (e.g., Finneran & Zhang, 2002; Ghani, 1995; Skadberg & Kimmel, 2004). Finneran and Zhang (2003) offered the PAT model integrating characteristics of *person* (user trait or state attributes), *artifact* (online genre) and *task* (goal), and the relationships between them which they considered contribute to flow. PAT suggests that flow is preceded by a person state that is conducive to absorption, time distortion, and loss of self-consciousness; the online genre has characteristics of vividness and responsiveness; the task is goal-oriented, autonomous, enables variety; and there is a clear fit

between task and the online genre. These components interact when people operate in virtual worlds. In this study, perceptions about community belonging in virtual worlds are of interest as a person state and antecedent to flow. Logically, if a user feels affinity with others in a virtual world then he or she is more likely to experience flow as the epitome of attention, involvement, and engagement. Also, the interaction of sense of community and appreciation of the site features available (as virtual world artifacts) will likely heighten the flow experience as users go about their business in their chosen virtual world. These concepts and potential interrelationships are discussed in more detail next.

### 1.1 Community and Sense of Belonging

While describing the *Blarney Stone*, an Irish-themed bar located in virtual Dublin, Halvorson (2011) stated that "...it became clear that the real drawing power of the venue was not the promoted activity but the strength of informal community that it hosted" (p. 9). He further speculated that the activities among avatars were secondary to social interaction with other community members. In other words, a virtual context provides a Third Space (Kendall, 2002; Oldenburg & Brissett, 1982) where a community is developed and maintained. Such informal virtual communities exist alongside offline communities involving work place, family, or hobbies. Halvorson suggested that this community space dimension fosters site stickiness – frequency and duration of visits to virtual worlds -- because people enjoy the positive interactions experienced there.

Huvila et al. (2009) investigated social capital in *Second Life*. Social capital comprises the network of a person's social relationships. Social capital involves an element of camaraderie obtained from interacting and identifying with others. People obtain social capital both on and offline, including those who are regarded as very close and those who, although valued, are essentially loose ties (Granovetter, 1973) or bridging social capital. Based on survey data of participants who visited *Second Life* for either productive or entertainment reasons, Huvila et al. confirmed that *Second Life* fosters a form of social capital unrelated to offline social capital that can be a source of community building and collective action. The two most important characteristics reported by the participants were engagement and interactivity. Learning, fun, and inspiration were common motivations while random wandering and meeting new people were the most popular activities for both producers and entertainment seekers. These results highlight the importance of loose community, but also suggest that the features available there facilitate socializing among community members. These findings were confirmed by a larger survey (N = 258), conducted by Partala (2011) examining psychological needs among *Second Life* users. Analyzing quantitative and qualitative data, socializing was the most commonly reported activity and autonomy, competence and relatedness were the most frequently occurring psychological needs. One respondent commented that: "I have discovered things about myself in relating to others which I had only vaguely suspected in real life. I feel I can be myself far more easily in relationships in *Second Life*" (Partala, 2011, p. 793). Participants also emphasized the importance of play, pleasure, fun and entertainment in their visits to *Second Life*.

Halvorson et al. (2011) used *Second Life* to teach about marketing and in so doing employed semi-structured (open-ended) interviews to collect qualitative data from the students. As in other studies, participants reported a strong sense of engagement, enjoyment in belonging to a virtual group, and interacting as a team. As well, play and playing recurred in the qualitative responses with a marked appreciation of the ability to play with the technology during the learning process again suggesting that technical features can enhance the communal experience. Similarly, Barnes and Pressey (2011) examined belongingness and love, esteem and self-actualization via a survey of 404 *Second Life* users. They found that, in addition to arousal, pleasure, individualism, affinity for technology drove "belongingness needs" (p. 243).

## 1.2 Site Features

Sundar and Limperos (2013) proposed that new media affordances such as modality (means of presentation), agency (contribution, community building), interactivity (e.g., content generation) and navigability (technical support, exploration) cue types of gratifications. In an early study examining source orientation in human-computer interaction, Sundar and Nass (2000) argued that human-computer interaction is “directly social” (p. 687), in that people respond to computers in the way that they respond to people, with many of the social rules pertaining offline being respected during interaction with computers (e.g., politeness norms). Social responses to online contexts are influenced by the attributes associated with such contexts. One of the most important attributes is interactivity meaning that feedback from a site is contingent upon the user’s actions, comments, or queries. Sundar (2007) operationalized interactivity as the number of functions on a site that provide the ability to experience content via audio, text, video, or live chat. High levels of interactivity potentially facilitate a perception that a site is a source rather than a medium and also a sense of engagement, belonging, and stickiness (Bucy, 2003; Fogg, 2003; Rafaeli & Sudweeks, 1997).

In a later experiment, Sundar, Kalyanaraman, and Brown (2003) examined impression formation in political campaign sites and determined that site interactivity influenced perceptions of both the candidate and levels of agreement with policy statements. The most important aspects of interactivity were relatedness of the links and associated pages which formed the overall navigational structure of the site. However, the findings indicated that moderate interactivity seemed to enhance a candidate’s appeal and perceptions of character while high interactivity could diminish such perceptions. Similarly, Nah et al. (2011) showed that although 3D virtual worlds offer a more immersive and enjoyable experience when compared to 2D worlds, the rich environment in 3D worlds might provide a distraction from the brands placed there. Also, Sundar and Kim (2005) discovered that interactivity may work with other site features such as animation to affect involvement so that although people are impressed by the flashiness of a site, they are less likely to be involved with it. This again underscores that there may be a threshold for various site features’ effectiveness. Judiciously applied though, such features may initially attract users with likeable formatting and engage them sufficiently as to encourage loyalty and positive emotion. For example, Guillory and Sundar (2014) found that interactivity was a positive inclusion on organizational websites as a tool for organizations to maintain relationships with their publics. In their study, higher interactivity in an organization’s website resulted in more positive perceptions of organizational reputation. Also, interactivity encouraged involvement with and liking for organizational websites which, in turn, translated into positive evaluations of the underlying site content.

Thus, based on prior research, it appears likely that site features such as interactivity, feedback, and ease of use/navigation may facilitate the flow experience.

## 1.3 Flow Theory and Research

As part of the positive psychology movement, Csikszentmihalyi (1977) introduced flow theory to explain why people engage in actions that do not appear to have specified outcomes other than aesthetic ones. Flow, more recently conceptualized, is an affect-based response to types of pursuit that involve intense engagement, enjoyment, and high psychological arousal (Mauri, Cipresso, Balgera, Villamira, & Riva, 2011). Flow occurs when a clear goal and feedback is involved, and when the challenge provided by the activity is balanced with the skill to accomplish it (Mauri et al.). Flow is associated with an array of online activities. Early studies investigated flow experiences in online consumer behavior and marketing (Hoffman & Novak, 1996), computer mediated communication (Trevino & Webster, 1992), interest, curiosity, and attention (Webster, Trevino & Ryan, 1993). In the virtual worlds domain, Faiola et al. (2013) found a significant incidence of reported flow and telepresence (sense of reality and naturalness) among 115 Second Life users, as

well as a high correlation between the two concepts. This led the authors to conclude that flow is a salient cognitive state in online activities, which can potentially lead to positive outcomes such as exploration and learning. The authors also speculated that learning about the antecedents to flow could garner advances in virtual world design, ultimately resulting in greater involvement and enjoyment. Choi and Baek (2011) investigated factors that influenced flow and learning among sixth grade students. Students were asked to undertake self-directed and cooperative activities in *BKworld*, a learning environment based on Second Life. Factor analysis revealed that two of the most telling characteristics of virtual worlds reported by students were interactivity and representational fidelity. These were also the most significant predictors of flow and learning. According to Inal and Caliltay (2007), students in a virtual learning community may also experience social flow while playing computer games that require interaction with one another. Students develop affiliation for each other, and create a sense of presence. Relatedly, Baydas et al. (2015) compared avatar guided learning vs. experiential learning among undergraduates in Second Life. The results indicated that the students retained more information and reported similar levels of flow in the experiential (unguided) learning condition compared to the guided condition. Navigating through Second Life to seek information was both productive and enjoyable.

Based on prior research relating to sense of community and salience of site features such as interactivity and feedback, in the present study it was expected that both sense of community in virtual worlds and perceptions about site features would facilitate a reported flow experience; however, as prior research has indicated that sense of community and aspects of site features are interrelated, the role of site features was assessed as a mediating variable between sense of community and flow among virtual world visitors. The resulting hypotheses were proposed:

H1: A strong sense of community among virtual world visitors will increase the likelihood of reported flow experience.

H2: A strong sense of community will be associated with virtual world site features such as interactivity, feedback, content variety, and ease of use.

H3: Virtual world site features such as interactivity, feedback, content variety, and ease of use will be associated with reported flow experience.

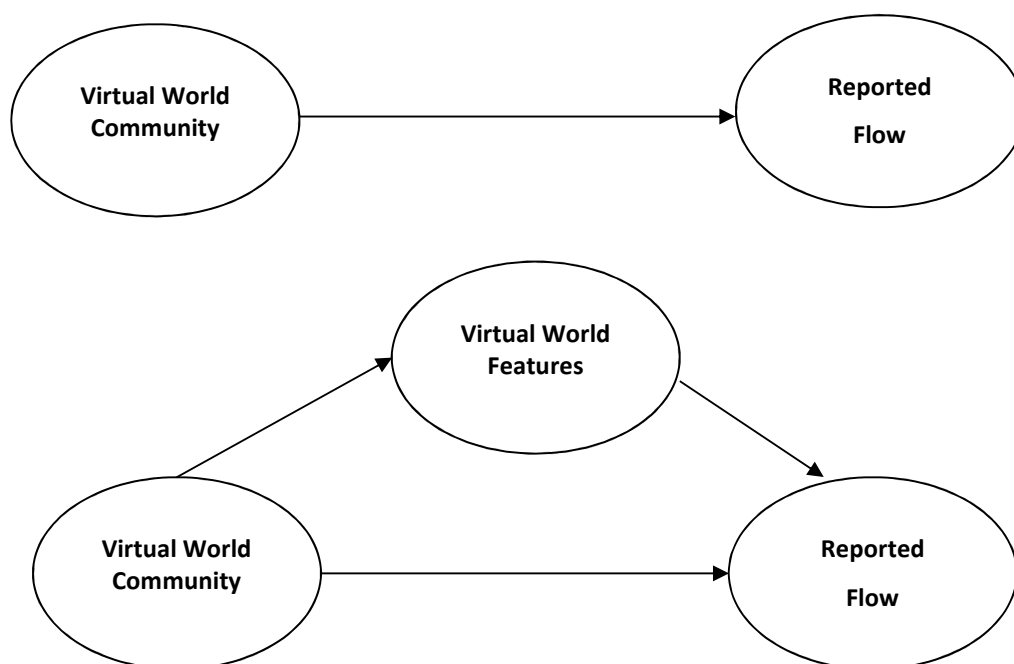


Figure 1: Mediation Model

## 2. Method

The data points for this survey were collected via the crowd-sourcing tool, Amazon Mechanical Turk (AMT) in 2013. Studies indicate that AMT is approximately representative of U.S. Internet users (who tend to be younger when compared to the general population), generally exceeding the representative properties of convenience (student) samples (e.g., Berinsky, Huber, & Lenz, 2012; Paolacci & Chandler, 2014; Paolacci, Chandler, & Ipeirotis, 2010). Several studies have described the advantages of AMT in recruiting participants. Shapiro, Chandler, Mueller and Paolacci (2013) conducted a study using AMT, partly to assess the reliability and validity of participant reports about psychiatric disorders. The authors found that respondents provided largely honest answers and criterion validity was demonstrated by replicating associations between psychopathology and established demographic predictors such as unemployment. Chandler, Mueller and Paolacci (2013) determined that the quality of the data produced by AMT workers is high, with convincing internal and test-retest reliability. Huff and Tingley (2015) compared AMT workers within the United States with Cooperative Congressional Election Survey participants (CCES -- a yearly, national stratified sample survey) with regard to distributions of age, gender, and race. There was a preponderance of younger participants in the AMT sample, but the authors noted that the CCES typically weights the responses from younger cohorts in such a way that it is comparable with an AMT sample. Both samples were approximately 75% white, AMT was more adept at attracting Hispanic and Asian participants, while CCES attracted more African Americans. The percentages of respondents employed in certain domains were very similar, showing a difference of less than 7%. The number of respondents living in rural vs. urban areas was almost identical in MTurk and CCES. Both MTurk and CCES drew approximately 90% of their samples from urban areas.

Several filters qualified participants for this survey. They had to be at least 18 years old, living in the U.S., access the Internet each day, and also access their *favorite* virtual world at least sometimes. One potential problem with AMT workers is the possibility of repeat participation. However, respondents were compensated only 25 cents for a completed survey, meaning that the remuneration was less attractive than other more lucrative activities. As well, participants were informed prior to entering the questionnaire that they would be paid only once. It was doubtful that participants in the current research had encountered similar studies, (unlike those described by Chandler et al. where experimental designs were used), and, thus, could not be aware of its intent a priori. The sample size was 244. The age range was 18-73;  $M = 29.12$ ,  $SD = 8.79$ ; 43% female. Second Life and *3D Chat* were chosen as the most popular virtual worlds (37% and 15% of participants respectively). See Table 1 for demographic information.



**Table 1: Demographics (N = 244)**

What is your favorite virtual world?	
Second Life	37.3%
3D Chat	15.2%
Free Realms	11.1%
IMVU	10.2%
Habbo Hotel	4.5%
EntropiaUniverse	3.3%
Smeet	2.0%
Other (Respectively: World of Warcraft, Sims, Minecraft, Runescape, Twinity, Eve Online, Marvel Heroes, Ultima Online, Maple Story, Maid Marion, Gaia Online, There.com, Shards of Dalaya)	16.4.0%
Gender Identification	Female 43%
Reported Age	Range 18-73; M = 29.12, SD = 8.79
(18-34)	79%
(35-49)	18%
(50-64)	2%
65+	1%
Race Identification (n)	173 Caucasian 42 African-American 38 Hispanic 29 Asian 7 Native American 2 Pacific Islander

## 2.1 Research Design

**Survey and measures.** In addition to demographic variables: e.g., age, sex, and race, three scales were used to measure the variables of interest: sense of community, virtual world site features, and flow. All scale items were closed-ended and participants responded on a 5-point range (e.g., 1 = strongly disagree; 5 = strongly agree). The scale scores were calculated by summing the average score on each of the measures (i.e., answers to the questions). The questions about each concept are detailed below and also shown in Table 4. Each scale was tested for internal consistency using Cronbach alpha (a measure of the association of the questions used to assess a concept: e.g., community) and composite reliability (a measure of the reliability of all the questions used to assess a concept). Discriminant validity was assessed using the square root of the average variance extracted. The scales were pilot-tested with 465 undergraduates; some item modifications improved reliability.

*Flow.* Involvement/engagement are major dimensions of flow; however, the concept contains other facets such as concentration, autotelic experience, and perceived control. Taking into account the confines of the methodology, and form of analysis, the flow scale approximated these dimensions as far as possible. Eight items were chosen based on Jackson and March's (1996) flow scale. The items showed high reliability, with a Cronbach's alpha of .90 (M = 3.78; SD = .72). The items were:

*I feel completely involved; I am able to block out distractions; I really enjoy the experience; I feel comfortably challenged; I am focused on what I am doing; I usually know how well I'm doing; I feel like I am in total control; I feel highly engaged.*

*Virtual world community.* Based on Halvorson’s (2011) factor structure of the Third Place dimension of virtual worlds, five items were used to measure virtual world community. This scale was intended as a measure of participants’ perceptions about the positive aspects of the loose community experienced via their favorite virtual world. This scale posted a high reliability of .85 (M = 3.70; SD = .78). The items were: *Visiting this virtual world has become a habit so I can hang out with others; The atmosphere while visiting this virtual world is very social; Visiting this virtual world feels party-like; Regular visitors provide an infectious style of interactions; There is always a playful mood among visitors.*

*Virtual world features.* Four items were adapted from Chiang and Su (2011) to measure participants’ perceptions about virtual world features. Together these items showed acceptable reliability (alpha = .77; M = 3.95; SD = .71). Participants were asked how much they agreed that their social networking site: *is highly interactive; gives me access to a variety of content; easy to find the way around; and gives immediate feedback.*

To show a level of parallelism and criterion validity, tests were conducted to assess relationships between the study scales and another potential correlate - attention to virtual worlds (Laczniak, Muehling, & Grossbart, 1989; alpha = .93; M = 3.40, SD = .95). This is because attention is one of several components of flow; thus, it is reasonable to expect attention to post a strong correlation with the flow scale, but remain distinct from it. Attention was strongly related to flow ( $r = .65, p < .001$ ) with all the flow indicators related to the indicators of attention. However, the square root of the average variance extracted was considerably higher for attention than any of the correlations between the scales. See Table 2.

**Table 2: Bi-variate Correlations: Scales and Discriminant Validity**

Measures	1	2	3	4
1. Reported Attention to VW	<b>.92</b>			
2. Perceptions VW Features	.44**	<b>.83</b>		
3. Perceptions VW Community	.38**	.51**	<b>.85</b>	
4. Reported Flow	.65**	.64**	.53**	<b>.85</b>

(Note: Diagonal elements represent the square roots of average variance extracted; VW = Virtual World) \*\* $p < .01$

Additionally, Table 3 summarizes the bi-variate correlations between reported flow and perceptions about virtual world community and *each of the virtual world site attributes* comprising the overall site features scale. All of these items were either moderately or strongly correlated.

**Table 3: Bi-Variate Correlations: Flow and Community with Virtual World Site Features**

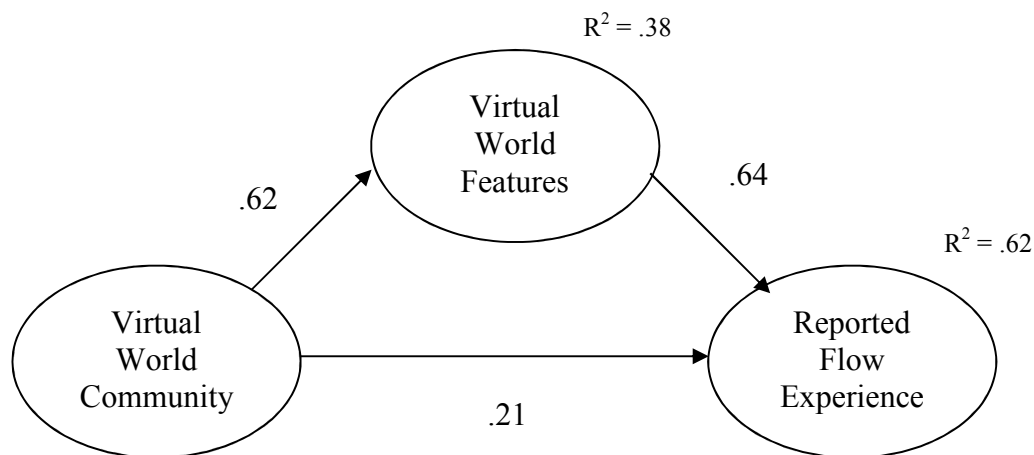
Measures	1	2	3	4	5
Reported Flow					
Perceptions VW community	.53**				
Interactivity	.55**	.39**			
Variety	.51**	.39**	.59**		
Feedback	.44**	.45**	.42**	.33**	
Navigate easily	.46**	.34**	.50**	.45**	.49**

(Note: VW = Virtual World) \*\* $p < .01$

### 3. Results

The proposed model was tested using structural equation modeling (see Appendix for details). The results from the hypothesis testing are illustrated in Figure 2.

**Figure 2: Structural Model**



All paths:  $p < .001$

All of the hypothesized relationships were statistically significant. There was a strong relationship between virtual world community and virtual world features ( $\beta = .62$ ;  $p < .001$ ) as well as virtual world features and flow ( $\beta = .64$ ;  $p < .001$ ). The direct path between virtual world community and flow also posted a moderate to low relationship ( $\beta = .21$ ;  $p < .01$ ). However, this was a considerable reduction on the bivariate relationship ( $r = .53$ ) between virtual world community and flow.

### 4. Discussion

This study assessed sense of community and perceptions about site features (i.e., interactivity, feedback, ease of navigation, and varied content) as potential correlates of reported flow experience

among virtual world visitors. As well, based on prior research suggesting that site features can often facilitate community development, positive perceptions about site features were predicted to mediate the relationship between sense of community and reported flow. These hypothesized relationships were strongly confirmed. As Third Places, virtual worlds provide destinations for escape, entertainment and relationship development. Therefore, it is likely that virtual world visitors find the process of interacting with content and with others particularly enjoyable and, often, an end in itself. However, virtual world interaction is not simply habitual in nature. There are salient instrumental reasons for involvement with virtual worlds such as learning and ecommerce. Approximately, one third of the participants in this study chose Second Life as their favorite. Clearly, there are now many more sophisticated platforms with much better graphics, but the site still prevails. It appears that its unique user-generated content is the thing that keeps it going, some of which is pretty unusual (<http://nwn.blogs.com/nwn/2016/01/vr-art-project-government-grant.html>). As well, companies and not-for-profits (<http://www.nonprofitcommons.org/>) host meetings in Second Life, where people can meet when other tools like Skype are impractical. Texas A&M University (<http://its.tamu.edu/Systems-Software/Second-Life>) has hosted lectures in Second Life that anybody can attend and the Institute of Electrical and Electronics (IEEE) (<http://secondlife.com/destination/1159>) maintains an island there. Also, although the number of users has declined since 2013 (about 900,000 users log into Second Life every month -- 600,000 monthly active users, and 300,000 first-time visitors), according to Linden Lab CEO, Ebbe Altberg (<http://motherboard.vice.com/read/why-is-second-life-still-a-thing-gaming-virtual-reality>), in 2015, users redeemed \$60 million (USD) from their Second Life businesses, and the virtual world's GDP is about \$500 million.

Those tasked with digital and media management roles typically employ tactics intended as calls to action to new site visitors and existing leads. These tactics involve developments in site design and content construction that are used to attract attention, and to encourage engagement, loyalty, word-of-mouth recommendations, and, ultimately, brand changes or purchases. The findings from the current study suggest that site managers need to further understand *how* visitors to virtual worlds come to develop a sense of belonging and identification with others who are almost certainly unknown to them offline. What does community mean in such contexts? And is it comparable to the experience of community offline?

The findings suggest that sense of community evidently interacts with perceptions about site features to produce what is the ultimate form of involvement – flow. Examining the bivariate relationships between flow, sense of community and each of the items comprising the site features scale, it is noted that flow was highly correlated with all the items, but especially with perceived level of interactivity ( $r = .55, p < .0001$ ). Also, in addition to the other features variables, sense of community was strongly correlated with feedback ( $r = .44, p < .0001$ ). This underscores the importance of understanding the most telling dimensions of site design when it comes to involvement and community development in virtual worlds. When social and digital media analysts speak of engagement, it is often in terms of frequencies of interacting with content, downloading or sharing content, or the numbers of returning visitors. This is an *interpretation* of engagement, but tracking visitors this way does not get at what people think when they visit social spaces. Importantly, little is understood about the intensity of the engagement. Flow is essentially an experience whereby individuals get “carried away” by participation in an activity. Indeed, the participatory process becomes the focus. Prior research shows that flow often leads to positive outcomes for virtual world visitors. The more involved visitors become, the more learning, the more satisfaction and loyalty they report. Thus, it makes sense for individuals interested in facilitating any of these outcomes to understand more about what helps the flow experience based on levels of interactivity and/or feedback, variety of content, and ease of use. Sundar and Kim (2005) suggested that more is not always better. Future research might address the issue of thresholds and quality of

experience with regard to virtual world affordances (Nah et al., 2011) Also, media professionals operating in social spaces should regularly conduct research involving truly empirical methods (i.e., surveys, content analysis, experiments) in addition to using social media analytics to assess impact.

Linden Lab, owners of Second Life are currently moving forward with plans to develop expertise in immersive, functional virtual worlds where it will be even easier to share experiences (Truong, 2015. <https://qz.com/472008/so-meta-the-creator-of-second-life-wants-to-make-a-real-life-version-using-vr-headsets/>). Their Project Sansar is intended as a metaverse, -- an extensive virtual world that users can access via virtual reality headsets, PCs and mobile phones (McAdory, 2015). More people will be able to “attend” events and this, in turn, will provide more commercial revenue. No doubt other virtual worlds and social spaces will follow suit (including Facebook (<https://techcrunch.com/2014/03/28/facebook-bought-oculus-vr-to-create-the-metaverse-or-why-angry-kickstarter-backers-need-to-chill/>), Eadicicco, 2016; Ohanessian, 2016). This means increased opportunities for more realistic interactions and virtual affinities. These developments will offer fruitful domains to assess the flow experience, as well as positive outcomes emanating from it. Collateral impact offline will also be worthy of investigation. All that said, CEO, Altberg (<http://motherboard.vice.com/read/why-is-second-life-still-a-thing-gaming-virtual-reality>) has said that he sees Project Sansar running parallel with Second Life, not replacing it. Some Second Life users are expected to be Sansar users also, meaning that members of thriving Second Life communities can maintain their relationships and creations. Perhaps sometimes established virtual communities are more important than more sophisticated graphics and features.

*Limitations and further research.* The data for this study came from a survey of Amazon Mechanical Turk workers who are also virtual world visitors. As such, the findings cannot be taken as representative of American virtual world visitors. According to KZERO Research (<http://www.kzero.co.uk/blog/age-ranges-and-gender-analysis/>), a consulting company for companies operating in virtual worlds, the majority of Second Life visitors are in the 18-24 and 25-34 age-brackets, accounting for 60% of visitors and 42% of visitors are female. This finding is broadly in line with the current sample. However, Pearce, Blackburn, and Symborski (2015) conducted a survey involving 858 virtual world visitors where the largest demographic fell into the 29-47 age range at 45% of the sample. The second largest age segment was 48-66 at 36%. The 18-28 age range represented approximately 18% of respondents. One percent of participants were over 67, and 60% of the participants identified as female. Since neither of these surveys used representative samples, it is not truly possible to determine realistic demographic estimates for virtual world users at this point. However, as mentioned earlier, Amazon Turk samples have been found to be consistent in other contexts, it is likely that this sample is, at least, comparable to other studies of virtual world visitors. As well, the robust effect sizes can be interpreted as indicators of validity as opposed to simply relying on the statistical significance of the paths in the model tests. That said, other studies should obtain more representative samples with participants from a broader range of virtual worlds.

Another cause for concern is the measurement of site features, which was somewhat narrow for the purposes. And also, although it did show an acceptable level of reliability in the study, it certainly could have been better. This is especially desirable because site features play a pivotal role in this study. Future research should employ a multi-dimensional measure of site features with interactivity and feedback taking center stage.

## 5. Conclusion

Globally, an ever-expanding age cohort has grown up with the Internet, with members spending large proportions of time using digital and social media both inside and outside of the work/school environment. An existing body of research shows that virtual worlds already play a significant role in achieving educational and commercial goals. The current study indicates that the

interplay between sense of community and site features may be highly influential in terms of intense involvement with both activities and other virtual world visitors. This suggests that, as Third Places, virtual worlds may become increasingly important to participants as sources of entertainment and social interaction. Technological developments will likely heighten such gratifications and facilitate an array of organizational, institutional, and educational goals. Future research should document and explain how this process unfolds.

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## Appendix

Latent variable analyses were conducted using Amos Graphics. First, the latent variables were subject to a confirmatory factor analysis for the purposes of assessing measurement properties. All of the scales were tested in one over-all model. The measurement model generally showed good fit to the data ( $\chi^2 = 246.29$ ,  $df = 116$ ,  $p < .01$ ;  $\chi^2/df = 2.12$ ,  $RMSEA = .068$ ,  $TLI = .93$ ,  $ILI = .93$ , Parsimony-adjusted  $NFI = .76$ ). However, the Chi-Square statistic was significant. This was attributed to the sample size. In larger samples even small differences between the model and the data result in statistical significance. Next convergent validity was examined for each latent item. According to Fornell and Larcker (1981), convergent validity is shown when all item indicators possess a significant t-value, demonstrate robust factor loadings (i.e.  $> .50$ ), show an average variance extracted (AVE) coefficient in excess of  $.50$ , and have a composite reliability in excess of  $.70$ . The current data broadly indicated convergent validity. Factor loadings for all the scale items, means, standard deviations, and composite reliabilities are shown in Table 4.

**Table 4: Measurement Model: Item Loadings**

	Loading	Mean	SD
Perceptions about Virtual World Community			
Composite Reliability = .85			
Visiting this virtual world has become a habit so I can hang out with others	.58	3.52	1.10
The atmosphere while visiting this virtual world is very social	.76	3.88	.85
Visiting this virtual world feels party-like	.76	3.65	1.02
Regular visitors provide an infectious style of interactions	.83	3.69	1.02
There is always a playful mood among visitors	.73	3.73	.97
Reported Flow			
Composite Reliability = .90			
In this Virtual World:			
I feel completely involved	.74	3.87	.99
I am able to block out distractions	.70	3.72	.97
I really enjoy the experience	.74	4.11	.82
I feel comfortably challenged	.68	3.67	1.03
I am focused on what I am doing	.80	3.88	.94
I usually know how well I'm doing	.73	3.93	.92
I feel like I am in total control	.65	3.84	.98
I feel highly engaged	.81	4.01	.90

/Cont. Table 4

	Loading	Mean	SD
Perceptions about Virtual World Features			
Composite Reliability = .78			
This virtual world is highly interactive	.77	4.14	.85
This virtual world features a variety of content	.71	4.14	.88
I can find my way around easily in this virtual world	.66	3.95	.98
I get immediate feedback from this virtual world	.59	3.59	.99

The proposed model showed good fit to the data ( $\chi^2 = 246.29$ ,  $df = 116$ ,  $p < .01$ ;  $\chi^2/df = 2.12$ ,  $RMSEA = .068$ ,  $TLI = .93$ ,  $ILI = .93$ , Parsimony-adjusted  $NFI = .76$ ).

The Sobel test for the hypothesized mediation was statistically significant (Sobel test = 4.47,  $SE = .09$ ,  $p < .0001$ ), confirming that site features acted as a partial mediator between community and flow. Sobel test calculated as follows:

$$z = \frac{ab}{\sqrt{(b^2SE_a^2) + (a^2SE_b^2)}}$$

Note: *a* represents the unstandardized path coefficient between community and features and *b* represents the unstandardized path coefficient between features and flow. SE represents standard error for *a* and *b*.