

VIRTUAL COMMUNITIES ON THE WEB: FACILITATING AND HINDERING USERS' COGNITIVE MOVEMENT

Michael S. Nilan

*School of Information Studies, Syracuse University
4-214 Center for Science & Technology
Syracus, NY, USA 13244-4100
mnilan@syr.edu*

Norhayati Zakaria

*School of Information Studies, Syracuse University
4-211 Center for Science & Technology
Syracus, NY, USA 13244-4100
nzakar01@syr.edu*

Indira R. Guzman

*School of Information Studies, Syracuse University
4-211 Center for Science & Technology
Syracus, NY, USA 13244-4100
iguzmand@syr.edu*

Nasriah Zakaria

*School of Information Studies, Syracuse University
4-211 Center for Science & Technology
Syracus, NY, USA 13244-4100
nazakari@syr.edu*

ABSTRACT

The purpose of this study was to empirically examine users' behavior describing their cognitive movement in virtual communities (Nilan, et al., 2002). Our purpose is to illustrate an approach for understanding some of the more helpful aspects of the emerging global electronic networks - virtual communities. In this study we adopted a user-based perspective and employed modified timeline methods originally developed by Dervin (Dervin, 1983; Dervin & Frenette, 2001) in order to capture users' descriptions in the context of their own experiences during recent visits to and participation in virtual communities. We conducted a total of 139 open-ended interviews with virtual community users. Results include a user-based model of users' cognitive movement as they communicate and collaborate. The robust virtual community interaction model shows the dynamic sequence of steps that users take when interacting with virtual community web sites. The model is deceptively simple looking and in fact, accounts for very complex sequences of behavior in the form of two iterative "loops" that are repeated within the sequence to account for differences among individual users. Our findings on evaluation based upon users perceptions that web sites facilitate or hinder their movement show promise for this approach to web site design and use policy formation. This report concludes with calls for replications of this approach with different samples of users to test the model of interacting within virtual communities.

KEYWORDS

Cognitive behavior, virtual communities, user-based modeling.

1. INTRODUCTION

The Web is becoming a part of everyday life, most visibly through so-called "e-commerce," however, another growing yet less visible impact of the Web on everyday life is the formation of virtual communities and individuals' participation in these communities. Virtual communities were predicted at least ten years ago, well before the Web was made available to the public in April 1995 (Rheingold, 1993; Nilan, 1993) but today little is known of this phenomenon (Nilan et al., 2002). Virtual communities differ from physical communities because constraints such as geographical distance, space, and time are of less concern and as a result, virtual communities are emerging and flourishing. For example, a person in LA can communicate and collaborate with people s/he hasn't met in Malaysia and in the United Kingdom to discuss strategies to solve a problem. In today's information age, "communities abound in cyberspace" (Stevenson, 2002, p. 742) where the reliance on virtual interpersonal interaction becomes the culture and the Web becomes a virtual medium. Although there are important differences between geographically bound and virtual interactions, virtual communities have increased the potential for human collaboration both in terms of the amount of collaboration as well as in terms of the effectiveness of collaborative efforts. This study is an attempt to better understand the nature of the human behavior associated with virtual communities.

This study is a more generalized examination of cognitive movement than an earlier, preliminary study of digital imaging communities (Nilan et al., 2002). "Cognitive movement" as it is employed here is a metaphor for how people experience life - as a series of steps over time so that in communities, we have people taking steps (many of which are communicative) in concert with others addressing similar concerns or problems. One of the interesting findings of the earlier study indicated that the idea of community membership and a specific web site were not synonymous - that is, users tended to interact at a number of different sites so that community membership was defined more in terms of the affiliations perceived among users rather than in technological structures (i.e., web sites). This study showed that a user-based approach was valuable in generating insight about this emerging phenomenon. Similarly, Swain (1996) showed that they were able to get insightful data from respondents with a user-based approach in a comprehensive and in depth manner.

The purpose of this study is to empirically examine users' perceptions about their visits to and participation in virtual communities (Nilan, et al., 2002). Basically, we want to understand user's perceptions as they move through situations visiting and collaborating in virtual communities. We hope this study will provide a strategy for web site designers and virtual community managers to develop clear insight into web design supported by empirical evidence of this fast-changing information environment which is engendered by diverse cultural encounters and interactions (Ogan, 1993; Baym, 1995). Specifically, we are interested in describing patterns in users' cognitive movement where they perceive themselves to be either facilitated or hindered. Facilitated movement would indicate something that should be preserved in policy or design and hindered movement would indicate something that needs to be changed. Thus, this paper addresses the following research question:

What kinds of steps do users see themselves as facilitated or hindered by web sites? In other words, what is currently "working" and "not working" in current virtual community use policy and/or web site design?

2. METHODS

Our empirical approach to examining virtual communities, as briefly noted above, was to adopt a user based approach to understand users' perceptions as they interact with virtual community environments. We employed Dervin's (1983) notion of "cognitive movement" to guide our efforts. Cognitive movement is a metaphor for how people experience life - as a series of steps over time. By looking at the steps that users take as they interact in virtual communities and the concomitant perceptions they employ to describe conditions at specific steps, we hope to develop an understanding of useful ways of informing policy making and web site design. This strategy is derived from the logic that policy and more generally, system design, are ways of constraining users' step taking from any possible step to a step that has been shown to be effective in moving towards a particular goal - in this case, communicating and collaborating with each other. Since much (if not most) policies and systems are designed without consulting users in any

meaningful way, we wanted to help inform this nascent activity with actual user descriptions of step taking to guide subsequent policy and design efforts.

As briefly noted above, people experience life as movement through time and space. We organize experience in coherent, dynamic episodes we call situations (Dervin, 1983) or problems (Taylor, 1986; Nilan, 1992). A situation or problem can be seen as a "chunk" of time and space about which people communicate and collaborate. People do this in terms of specific moments in time and space (our "steps" here) in linear sequences. We seek to find patterns, hence similarities, in how people perceive, think about or communicate about their step taking.

We believe that by documenting patterns where people agree that their movement is being facilitated by policies, behavior, site layout, organization of resources, etc., we can generate some useful policy and site design generalizations. Of course, places where people see their movement as being hindered by policies, behavior, site layout, organization of resources, etc. will be valuable as well. We decided that university students would be appropriate for this study because they represent the Internet user population due to the following characteristics: age, accessibility to the computers, disposable income, and computer competency. We sent fourteen highly trained interviewers to conduct open-ended interviews with these students. A randomized sampling procedure was employed in order to get as wide a variety of experiences with virtual communities as we could get from university students.

The interviewers for this study were a diverse group of international and American undergraduate and graduate students, both males and females, in five different degree programs from four different colleges at the university. They were instructed to first interview two people that they knew in order to familiarize themselves with the interview questionnaire and its flow under non-threatening conditions. Then they were instructed to do eight more interviews with strangers, by visiting classrooms to ask for volunteers, by visiting computing clusters around campus, and by visiting socializing locations on campus. Given the diversity represented in the interviewer pool, we felt that these procedures would provide us with a wide range of different experiences with virtual communities.

The interviews were conducted between October 28, 2002 and November 3, 2002. We conducted a total of 139 interviews. On average the interviews took 25.43 minutes each. Our final sample had 56.20% (n = 78) female and 43.80% (n = 61) male respondents with an average age of 26.91 years old (range = 18 to 55). Fifty-three of our 139 respondents identified themselves as international students. Forty-nine of our respondents were undergraduate students, 73 were graduate students and 17 were "other" including staff and non-matriculated students. Seven of our respondents identified themselves as Black American, 46 as Asian, eleven as Native American, three as Hispanic, 61 as Caucasian and eleven as "other." We also asked respondents to rate their own Web expertise and computing expertise where a zero meant that they knew nothing and a 10 meant they were experts. Respondents had an average Web expertise rating of 7.32 and an average computing expertise rating of 6.62.

Our approach to understanding virtual communities in terms of what "steps" people make required us to adopt an open-ended approach because little was found in the literature about this kind of step taking. Respondents were asked to describe a recent visit to a virtual community web site as a series of steps where we recorded each step on a separate 3" X 5" card so that the entire experience could be reviewed adjusted for accuracy by the respondent. For the data reported here, we created an inductive content analysis scheme to describe the various kinds of steps on the 3" X 5" cards that respondents took as they interacted with a virtual community web site.

3. RESULTS

Table 1 reports the frequencies and percentages of all the steps that respondents reported taking as they interacted with virtual community web sites. Note that these steps are in time order and represent a generalized "model" of interacting with virtual community web sites (see Nilan, 1992 for a description of the inductive procedures employed to build this kind of model). Respondents reported a total of 770 steps across 139 descriptions of visits to virtual community web sites. [Note that of the seven categories for this variable, one, "Not associated with web site," does not fit into a strict ordinal time-order as do the first six steps. These steps were cognitive steps that the respondent reported that had nothing to do with interacting with the virtual community web site although some clearly had to do with a combination of face-to-face and virtual

collaboration. Examples included "talking with my friend," "thinking about what to say," answering the phone," etc.] The model of step taking associated with interacting in a virtual community included the following steps:

- **Accessing the site** (n = 107, 13.90% of all steps reported by respondents) indicated the respondent's initial contact with the site and included responses like "decided to visit the site," "did a search in my browser to find a site," "entered the site;"
- **Identifying self to site** (n = 55, 7.14%) involved the respondent creating or using an identity for interacting with the virtual community site although some respondents didn't mention this step (more on this below) and included responses like "I registered as a new member," and "I logged in as an old user;"
- **Searching within site** (n = 264, 34.29%) was the most frequently mentioned step, often repeated by respondents as they navigated around the virtual community site and included responses like "scanned topics/news items," "searched groups/rooms/games," "checked for other users," and "selecting/clicking on options."
- **Reading** (n = 118, 15.32%) dealt with existing content posted at the site AFTER the respondent had found what s/he was looking for and included responses like "reading posts," "reading announcements," "reading email," and "reading responses to my posting."
- **Writing/talking/playing** (n = 96, 12.47%) represented the respondent "saying" something or posting something to the site and included responses like "I posted my questions," "posted my comments/opinions," "chatted," and greeted my on-line buddies."
- **Leaving web site** (n = 87, 11.30%) included steps that indicated the respondent was through interacting with the virtual community and included responses like "left the web site," "saved my file and logged out," and "signed out."

Table 1. Frequencies and percentages of the kinds of steps respondents reported taking as they interacted with virtual community web sites.*

TYPE OF STEP	n	%
Accessing the site	107	13.90
Identifying self to site	55	7.14
Searching within site	264	34.29
Reading	118	15.32
Writing/talking/playing	96	12.47
Leaving web site	87	11.30
Not associated with web site	43	5.58
Grand Total	770	100.00

*The interjudge coding reliability coefficient for this variable was .91 or 91% agreement.

We also wanted to understand what facilitated and hindered respondents' step taking. Table 2 reports the frequencies and percentages of the steps that respondents indicated something associated with the web site facilitated their cognitive movement employing the same format as Table 1 but adding a column for the percentage of that kind of step where respondents reported their step taking was facilitated. For example, "accessing site" was mentioned by 15 respondents (10.79% of facilitating steps mentioned by respondents) which represented 14.02% of all the times that "accessing site" was reported as a step. Similarly, "identifying" was reported as a step where the web site facilitated the respondent's step-taking five times (representing 3.60% of the positive steps mentioned) which represents 9.09% of the times that "identifying" was mentioned.

Table 2. Frequencies and percentages of the steps where respondents reported something associated with the web site facilitated their step taking as well as the percentage of this type of step was reported as being facilitating.

TYPE OF STEP	n	%	% of this type of step
Accessing the site	15	10.79	14.02
Identifying self to site	5	3.60	9.09
Searching within site	56	40.29	21.21
Reading	31	22.30	26.27
Writing/talking/playing	26	18.71	27.08
Leaving web site	-	-	-
Not associated with web site	2	1.44	4.65
Missing data	4	2.88	
Grand Total	139	100.01*	

*Does not equal 100 percent due to rounding error.

In exactly the same format, Table 3 reports the frequencies and percentages of the steps that respondents indicated something associated with the web site hindered their cognitive movement. For example, "accessing site" was mentioned by 14 respondents (10.07% of hindering steps mentioned by respondents) which represented 13.08% of all the times that "accessing site" was reported as a step.

Table 3. Frequencies and percentages of the steps where respondents reported something associated with the web site hindered their step taking as well as the percentage of this type of step was reported as being hindering.

TYPE OF STEP	n	%	% of this type of step
Accessing the site	14	10.07	13.08
Identifying self to site	12	8.63	21.82
Searching within site	48	34.53	18.18
Reading	22	15.83	18.64
Writing/talking/playing	12	8.63	12.05
Leaving web site	2	1.44	2.30
Not associated with web site	14	10.07	32.56
Missing data	15	10.79	
Grand Total	139	99.99*	

*Does not equal 100 percent due to rounding error.

4. SUMMARY AND CONCLUSIONS

This study was primarily aimed at developing an approach to user-based web site design for virtual collaboration, teamwork, etc. appropriate for our emerging global electronic networks. We chose virtual communities because they represent a phenomenon that was foreseen before the Web was available to the public and because they represent a generalization of the unique "power" of the Web as distinct from mass communication or strictly interpersonal media like the telephone. We chose to employ Dervin's (1983) "cognitive movement" metaphor both because it has been successfully employed in many, many different communicating and informing contexts as well as because its emphasis on dynamic behavior (i.e., behavioral sequences over time) matched the way we ourselves have experienced life and the way that others talk to us about their own experiences in life. We saw this juxtaposition of technology, method and experience as extremely appropriate for our inquiry into dynamic virtual community collaborating phenomena.

Our research question essentially asked about evaluating the current state-of-the-art of virtual community web site design and use policy. Rather than evaluate practice based upon what we consider "ought" to be done or what some expert or aesthete determines is appropriate (like most web site design is currently evaluated), we feel that evaluation criteria for interactive sites should come from the virtual community members themselves. Our decision to employ a user-based perspective with descriptive elicitation methods consistent with the user perspective provided us with a means to describe the specific behavior we were interested in looking at, i.e., cognitive movement in communicating and collaborating on virtual community web sites.

We also shied away from "satisfaction" strategies because they rarely are sensitive enough to get at what is important to users (primarily because they focus on what is important to the designers - see Dervin & Nilan, 1986) and they do not provide specific insight into how to improve the site if the users are indeed dissatisfied. So, we employed the cognitive movement metaphor for evaluation in terms of how respondents perceived themselves as facilitated (Table 2) or hindered (Table 3) by the web sites as they stepped through their interaction with their virtual community web sites.

So, the first six categories in Table 1 represent a logical, time-based representation of the steps users take when they interact with a virtual community web site. What is profound about this model is that categories three through five (i.e., searching site, reading, writing/talking) represent an iterative "loop" that can be repeated many times for a typical visit to a community web site. Also note that categories three and four represent another iterative loop without the user responding to what he has read/heard. That is, this simple model actually represents a seemingly complex string of behaviors that accounts for the majority of differences among users' descriptions of their interactions with virtual community web sites. The similarities we noted in users' descriptions are strong and consistent across users.

Looking at Tables 2 and 3, especially the "% of this type of step" column, we see that, for example 14.02% (first row of Table 2) of respondents chose "accessing site" as their positive critical incident for the web site facilitating their interaction. The corresponding figure from Table 2 shows that 13.08% of respondents chose the same step as their hindering step. This means that these people had their most significant problems with the site at the outset. If this were an e-commerce site, that would clearly be unacceptable, potentially fatal! That leaves 82.90% of respondents who were not impressed one way or the other with the web site in its ability to access the site. Looking at the next step, "identifying," we see that 21.82% of all respondents who reported taking this step had significant problems with this step. Although we do not have the space here, our other descriptive results illuminate the details - some representative responses were: "why do I have to give all this information to them just to make a comment?" and "I can't even tell them they have a problem with their site without registering to become a member!" Clearly something considered reasonable (policy and/or design) by the site is not seen the same way by users. This indicates a "place" where improvements are clearly appropriate.

Since this was an initial attempt to get at a more comprehensive and human description of the use of global electronic networks, there is clearly a great deal of research to be done. We would call for replications of this study with different samples, e.g., get the AARP to sponsor a study of virtual community interaction with users over 50 years old. We believe that although the range of problems articulated by such a sample would be different (reflecting a different stage in life and therefore different problems and interests), we do not think that the cognitive movement description will deviate from our model at all (Table 1).

Employing the same or similar conceptual and methodological approaches, we call for empirical examinations of specific kinds of virtual communities so that descriptive and evaluative results can generate more specific advice for use policies and web site design. For example, medical and health information is a category of information that is seeing increasing use on the Web. Looking at the specific web site utility criteria and content evaluation criteria (e.g., source credibility, validity, etc.) would provide rich material for significant improvements in these communities.

We conclude that the initial configuration of the Web has not been well-developed and organized for collaboration among users. Modeling the use and configuration of emerging technologies on the behavior of users makes a great deal of sense, especially when we are talking about the emerging global electronic network technologies like the Web. We have been modeling the use and configuration of these technologies on the well-meaning but naive thinking of technology experts, management experts and content experts for too long now.

REFERENCES

- Baym, N.K. 1995. The emergence of community in computer-mediated communication. In S.G. Jones (Ed.), *CyberSociety: Computer-mediated communication and community*. Thousand Oaks, CA: Sage Publications, pp. 138-163.
- Dervin, B. 1983. An overview of Sense-Making research: Concepts, methods and results to date. *International Communication Association annual meeting*, Dallas, Texas, USA.
- Dervin, B. & Frenette, M. 2001. Sense-Making methodology: Communicating communicatively with campaign audiences. In Rice, R. & Atkin, C. K., (Eds.), *Public Communications Campaigns* (3rd edition). Thousand Oaks, CA: Sage, pp. 69-87.
- Dervin, B. & Nilan, M. S. 1986. Information Needs and Uses. *Annual Review of Information Science & Technology*, Vol. 21, pp. 3-33.
- Nilan, M.S. 1992. Cognitive space: Using virtual reality for large information resource management problems. *Journal of Communication*, vol. 42, No. 4, pp. 115-135.
- Nilan, M.S. 1993. Speculations on the impact of global electronic networks on human cognition and human organization. *Internet Research*, Vol. 3, No. 3, pp. 47-56.
- Nilan, M.S., Kongsmak, K., Mohd Yusof, S.A. & Annabi H. (2002). Internet-based virtual communities: An examination of digital imaging communities. *Paper presented at the 52nd International Conference of the International Communication Association*, Seoul, Korea.
- Ogan, C. 1993. Listserv communication during the Gulf War: What kind of medium is the electronic bulletin board? *Journal of Broadcasting and Electronic Media*, Vol. 37, pp.177-198.
- Rheingold, H. 1993. *The Virtual Community: Homesteading on the Electronic Frontier*. Reading, MA: Addison-Wesley.
- Stevenson, T. 2002. Communities of tomorrow. *Futures*, Vol. 34, pp. 735-744.
- Swain, D. 1996. Information search process model: How freshman begin research. *Proceedings of 59th Annual meeting of the American Society for Information Science*, Vol. 33, pp. 95-99.
- Taylor, R. S. 1986. *Value Added Processes in Information Systems*. Norwood, NJ: Ablex Publishing Corporation.