

The Impact of Community Computer Networks on Social Capital and Community Involvement

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This article adds to the debate over whether easy access to the Internet is the only outcome of community computer network projects or if there are tangible impacts to these initiatives. Building from Putnam's links between quality of life, community involvement, and social capital, the authors provide evidence as to the quality-of-life implications of the community computer network known as the Blacksburg Electronic Village (BEV). The results of the longitudinal study indicate frequent and increasing use of the BEV and the Internet for local, social-capital-building activities. However, there is no trend toward an increase in community involvement or attachment except in a subset of the population that scores high on measures of preexisting community involvement. The results offer Putnam justification for his claims about the Internet's role in social capital formation.

Let us find ways to ensure that by 2010 the level of civic engagement among Americans then coming of age in all parts of our society will match that of their grandparents when they were that same age.

—Robert Putnam

When computer networks link people as well as machines, they become social networks.

—Barry Wellman

Authors' Note: *This research was supported by grants from the National Science Foundation, the U.S. Department of Commerce, San Francisco State University, and the University of Pennsylvania. We would like to thank Armando Borja, Daniel Eno, Robert Noble, and Kimberly Kirm for help in the data analyses for this article. Early versions of this article were presented to the National Communication Association. We thank Barry Wellman, Caroline Haythornthwaite, and several anonymous reviewers for their helpful comments. Authorship is listed in alphabetical order.*

AMERICAN BEHAVIORAL SCIENTIST, Vol. 45 No. 3, November 2001 496-509
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When the communication patterns of a geographic community are bolstered by the addition of a universally available community-based computer network, are there implications for the quality of life in that community? This becomes a central question for the information society. One significant impact of a community computer network is a decrease in the digital divide and an increase in access to the information society among members of the community (Patterson, 2000; Patterson & Kavanaugh, in press). This article presents an additional picture of the case study developed in Blacksburg, Virginia, surrounding the Blacksburg Electronic Village (BEV) (see www.bev.net for background materials).¹ This community computer network project began in 1993 and in 7 years enabled more than 80% of the community residents to gain access to the Internet and the information society. In this article, we extend a debate over whether access to the Internet is the only outcome of community computer networking projects or if there are tangible quality-of-life impacts to these networking initiatives. We begin with a case for the importance of a link between communication and quality of life, follow with evidence from the BEV case, and finish with a discussion of the role of the Internet in the quality of communal life.

QUALITY OF LIFE IN COMMUNITIES

One approach to issues surrounding quality of life in our local communities is to focus on the amount and quality of communication that occurs within those communities. This link between communication and quality of life is elegantly postulated by Robert Putnam (1993, 1995a, 1995b, 2000). Putnam (1993) attributed variation in the quality of life among geographic communities to different levels of social capital and corresponding civic engagement within those communities. Putnam defined social capital as the “features of social organization, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions” (p. 167). Social capital, in part, refers to the amount and quality of communication about a community that takes place among its members within their social networks. One outcome of this participation and talk is the development of social trust that facilitates collective social action toward achieving common social goals (i.e., civic engagement). Thus, civic engagement is a function of communication among members via their social networks, and as civic engagement increases, so does quality of life in the community. Thus, communities with vibrant communication networks are likely to have a preferable quality of life.

Putnam (2000) argued that a variety of macro-level social conditions served to decrease the amount of social capital in U.S. communities during the past century. Primary among these conditions is a generational shift that began in the 1960s, when individuals no longer devoted time to running the voluntary associations (like the Parent-Teacher Association [PTA] and bowling leagues) necessary to build social capital and its corresponding social networks and social

trust. These voluntary organizations gave their members the opportunity to develop self-government skills of organization, teamwork, and relationship building essential to increase the quality of life in their local communities. Putnam's central claim was that communities that exhibit high levels of social capital exhibit a higher quality of life, and that quality of life decreases with reductions in social capital. Or stated another way, communities that exhibit high levels of interpersonal, vibrant, face-to-face communication have corresponding high qualities of life (Ryan, 2000). The question for media scholars and especially Internet scholars is, What is the role of mediated communication in the quality of life in our local communities?

COMMUNITY COMPUTER NETWORKS AND QUALITY OF LIFE

Research about the role of media in the quality of life of local communities indicates general support for a link between media use and community involvement. Whereas Putnam (1995a, 1995b) argued that increased television use is a symptom of decreasing social capital, others argued that frequent newspaper readers are more attached to their local communities (Stamm, 1985), involved in their local communities (Rothenbuhler, 1991), and exhibit higher levels of social trust (Cappella, Lee, & Southwell, 1997) than infrequent readers. Dimmick, Patterson, and Sikand (1996) argued for the role of the traditional telephone in developing and maintaining strong interpersonal communication patterns in the local community.

Tomita (1980) and Neuman (1991) provided a starting point for the examination of the role of interactive media in building social capital. Tomita, anticipating the advent of e-mail, chat, and so forth, juxtaposed the variables of audience size and speed of communication and posited the existence of a media gap where no technology exists to facilitate communication that would normally be considered small group communication. We agree with Neuman, who posited that the advent of computer networks and applications such as e-mail, chat, and so forth could be successful in filling the gap in media communication technologies described by Tomita. Several scholars viewed the computer network of the Internet as especially well suited to communication activities that lead to community building, virtual or otherwise (Jones, 1994; Rheingold, 2000; Wellman, 1997).

Some researchers argue that the Internet can be seen as a social-capital-building technology because existing social networks can take advantage of the information distribution aspects of the network to become more effective and connected communicators (Wellman, Carrington, & Hall, 1988; Wellman et al., 1996; Wellman & Gulia, 1999). Bonchak (1996) argued that Internet users are active consumers of political information and participate in a variety of online

political activities. Kohut (1999) indicated that early adopters of the Internet are more politically active and civic minded than later adopters, and that whereas early adopters of the Internet are interested in news and political information, later adopters are more interested in commercial services such as shopping or games (see also Patterson & Kavanaugh, 1994). The important implication of the Kohut finding is that if the critical mass of early Internet adopters are more civic minded and active in communication, they might encourage new adopters to also engage in talk about community—a social-capital-building activity. This conclusion seems confirmed by a recent study that found that Internet users are vibrant socialites who spend lots of time with family and friends and have a wide range of outside interests (Cole, 2000). Finally, perhaps most convincingly, Hampton and Wellman (1999) argued that within a community computer network, “Online activity led to increased local awareness, high rates of in-person activity, and to rapid political mobilization” (p. 490).

Others paint a bleak picture of the role of the Internet in fostering the communication behaviors that lead to building social capital. Kraut et al. (1998) found that Internet users tend to become more isolated and depressed over time. Others (see Walther, 1999) argue that Internet use is dysfunctional to traditional interpersonal relations and can lead to an “Internet Addiction Disorder.” Although these authors paint a picture that Internet use is anathema to social relations, Turkle (1995) argued that the communication that occurs on the Internet may be more gratifying for participants than traditional face-to-face communication. Internet users may spend their social-capital-building energies in developing placeless virtual communities rather than enhancing their local geographic communities. For Turkle, it is sufficient that people use the Internet for social-capital-building activities whether they are building that capital for offline or online communities.

In none of these studies were respondents asked specifically about the role of the Internet in building and maintaining their local communities. One important implication of the emerging literature on community computer networks is that these networks are particular uses of the Internet for the advantage and development of local communities (Acker & McCain, 2000; Patterson, 2000; Schmitz, in press). One specific purpose of the BEV was to encourage local community organizations (formal and informal) to take advantage of network resources to facilitate their agendas. The basic argument is that the BEV encourages the members of the community to become users of the Internet. Furthermore, the BEV provides structures such as listservs, grants for businesses to build online content, server space for local voluntary organizations to create a Web presence and help for building that presence, and even free high-speed access at community access points throughout the town. These are interventions (see Patterson & Kavanaugh, in press) designed to increase local content, community involvement, and attachment, and eventually affect the quality of life in Blacksburg.

EXPECTATIONS OF THE STUDY

It is important to reiterate that the BEV was not initially conceived as a social-capital-building technology (Cohill & Kavanaugh, 2000; Patterson & Kavanaugh, 2001). The initial purpose of the BEV was to increase access to the Internet in a digital-divide-spanning effort. Over time, as critical mass was achieved and near universal access to the Internet emerged among the residents of Blacksburg, the emphasis of network planners shifted from access to uses. Once they reach critical mass, community computer networks such as the BEV can become interventions by technology designers directly targeted at increasing the amount of communication within a community about that community. Whether that communication is an information provision function (like a Web site) or a discussion forum (like a listserv), the ultimate result is to add another means for members of the community to build social capital within the community. Indeed, the goal of community computer network designers is not to replace existing channels of social capital, but rather to facilitate these channels. Details about specific activities done by the BEV to increase social capital in the community can be found at the BEV Web site.

The claim made in this research is that one effect of community computer networks is to build social capital in the communities that host them. This claim is significant because of the implications drawn between social capital and quality of life in local communities. To summarize our expectations,

Hypothesis 1: As the number of community computer network users increases, the greater the community involvement and attachment within the community.

Hypothesis 2: As the number of community computer network users increases, the greater the use of the network to build social capital by communicating with other community members.

METHOD

The main source of data for this article comes from a 1999 telephone survey of the year-round (nonstudent) residents ($N = 320$) of Blacksburg, Virginia. The survey instrument employed in the 1999 survey was previously used in a 1996 telephone survey of the residents of Montgomery County, Virginia. Blacksburg is a town within Montgomery County, and in 1996, 156 year-round (nonstudent) residents of Blacksburg were interviewed as part of the larger survey project. In this article, we make comparisons between the 1999 ($N = 320$) and the 1996 ($N = 156$) data sets to address our research claims. For both samples, households were randomly selected using a random digit dialing selection procedure, and individual respondents were selected using the most recent birthday technique (Frey, 1989).

The telephone survey instrument operationalized key concepts related to Internet use, community attachment, and community involvement. Also included in the instrument were measures of a variety of demographic and mass media use variables. To measure community involvement we employed the Rothenbuhler (1991) Community Involvement Scale. Community attachment was measured, following Stamm (1985), by a single indicator asking how happy respondents would be if they had to leave the community. Several other correlates of community involvement and attachment were also measured including home ownership, length of time residing in the community, and mobility. Internet use measures focused on whether the respondents had access to the Internet and the extent to which they used the Internet to communicate with a variety of different social network partners. The 1996 surveys were completed by undergraduate students enrolled in a research methods course. Students conducted interviews in a telephone survey research facility supervised by the authors. In 1999, the surveys were completed by a professional telephone survey research firm after initial training by the authors.

RESULTS

Our first expectation was that as access to the BEV increased, so would community attachment and involvement. The data do not support this expectation. Comparisons between the 1996 and 1999 scores on the Community Involvement Scale and the community attachment indicator are not significantly different. Nonetheless, the general pattern of our data point to significant increases in the use of the Internet for social capital building activities during the study period. As we agree with Putnam, among others, that social capital and civic engagement (or community involvement) are linked, we offer two interpretations of the unexpected results. This section first describes the general characteristics of the persons interviewed for this project, then considers the relationship between increasing access to and use of the Internet and community involvement and attachment. The third section of the results focuses on the relationship between the length of time using the Internet and predisposition to use the network to build social capital.

Neither the 1996 nor the 1999 sample was significantly different from the other in terms of demographic variables (see Table 1). The majority of people in both samples were college graduates and were aged in their mid-40s. Income in the 1999 sample was reported as higher than in the 1996 sample, but this difference is not significantly different when we control for inflation. Both samples represented roughly equal amounts of males and females (51.3% female in 1996, 53.4% female in 1999). Cable television penetration and use of the newspaper were not significantly different.

TABLE 1: Descriptive Statistics and Tests for Differences Over Time: Demographic Variables for 1996 (N = 156) and 1999 (N = 343) Samples

Variable	1996		1999		Significance Test ^a
	M	SD	M	SD	
Frequently read paper	5.33	1.39	5.57	1.41	n.s.
Subscribe to cable television (%)	78.6		78.5		n.s.
Education	5.22	1.71	4.95	1.65	n.s.
Age	44.21	17.68	48.28	14.34	n.s.
Income	3.91	3.68	4.87	3.02	$F = 9.84, p < .01$

a. ANOVA for time by interval level data; chi-squared for time by nominal.

TABLE 2: Descriptive Statistics and Tests for Differences Over Time: Community Involvement and Internet Use Variables for 1996 (N = 156) and 1999 (N = 343) Samples

Variable	1996		1999		Significance Test ^a
	M	SD	M	SD	
Community involvement					
Community Involvement Scale	2.81	0.68	2.82	0.70	n.s.
Community attachment	3.46	1.09	3.29	1.03	n.s.
Years in community	14.61	16.17	19.54	13.89	$F = 12.20, p < .001$
Number of times moved	1.05	1.49	0.58	1.03	$F = 16.26, p < .001$
Number of meetings per week	1.45	0.64	1.32	0.66	$F = 4.24, p < .05$
Own home (%)	58.4		74.6		$\chi^2 = 20.43, p < .001$
Church members (%)	50.0		63.1		$\chi^2 = 8.54, p < .01$
Formal organization member (%)	37.2		26.2		$\chi^2 = 5.81, p < .05$
Informal organization member (%)	36.5		42.4		n.s.
Internet use					
Internet access (%)	69.2		80.1		$\chi^2 = 7.14, p < .01$
Years using Internet	—	—	3.43	1.18	n.s.
Use the Internet to communicate with					
Local family	2.20	1.64	2.89	1.67	$F = 13.35, p < .001$
Nonlocal family	3.28	1.66	3.48	1.58	n.s.
Local friends	3.27	1.67	3.38	1.60	n.s.
Nonlocal friends	3.68	1.52	3.58	1.51	n.s.
Coworkers	3.04	1.82	2.97	1.82	n.s.
Church members	1.71	0.80	2.05	1.32	$F = 16.21, p < .001$
Formal social groups	1.65	1.21	2.01	1.43	n.s.
Informal social groups	2.35	1.23	2.52	1.44	$F = 19.13, p < .001$

a. ANOVA for time by interval level data; chi-squared for time by nominal.

There was a significant increase in Internet access (see Table 2) among the residents of Blacksburg from 1996 to 1999, with more than 80% of the community reporting access to the Internet in 1999. Also, Patterson (2000)

reported that among people with Internet access in Blacksburg, virtually all (98%) were aware of the BEV presence as part of the Internet.

Although there were not significant differences in community involvement and attachment between 1996 and 1999, there were significant differences on associated measures of involvement and attachment, such as length of residence, home ownership, and number of times moved. Respondents in 1999 were more likely to have lived in the community longer, moved less frequently, and owned a home than respondents in 1996. Although it is difficult to link these activities to use of the Internet, they do provide evidence that the residents of Blacksburg were more predisposed to community involvement and attachment in 1999 than in 1996. However, in 1999, respondents were less likely to attend a meeting of a civic organization and belong to formal social organizations such as the PTA or the Lions Club. This lack of participation in social-capital-building activities should point to a decrease in overall community involvement and attachment; however, there were no differences over time. Perhaps the presence of the Internet and the BEV contributed to social capital formation in new ways?

Residents of Blacksburg were significantly more likely in 1999 to use the Internet to communicate with local family members, church members, and members of informal social groups (such as babysitting circles and sports clubs) than in 1996. And although not statistically significant, Internet use also increased communicating among members of formal social groups (the PTA or service organizations like the Rotary) and with local friends. In the aggregate, although there were no appreciable differences in community involvement and attachment over time, there were significant differences in the use of the Internet for social-capital- and community-building activities.

To investigate this pattern, we examined questions from the 1999 data set about the length of time (in years) people had been users of the Internet. Table 3 presents the correlations between length of Internet use and community involvement, attachment, and social capital variables.

Again, the community involvement and attachment variables are not significantly associated with Internet use. However, the longer people are users of the Internet, the more likely they are to use the Internet for a variety of social-capital-building activities (all but communication with local family). We also took a cue from the Kohut (1999) findings about community involvement and Internet adoption patterns and asked, What is the relationship between community involvement and length of Internet use? Table 4 summarizes the answers to that question.

There appears to be a significant relationship between community involvement and predisposition to use the Internet for social-capital-building activities. In 1996, people who used the Internet to communicate with members of formal and informal social groups exhibited high levels of involvement in their communities, as evidenced by the significant correlation between the scores on the Community Involvement Scale and reported use of the Internet to communicate with members of formal and informal social groups. In 1999, this trend

TABLE 3: Pearson Product-Moment Correlations: Length of Time Using the Internet in 1999

	<i>Length of Internet Use</i>
Community Involvement Scale	.041
Community attachment	.051
Years in community	-.032
Number of times moved	-.059
Number of meetings a week	.021
Use the Internet to communicate with	
Local family	.097
Nonlocal family	.199**
Local friends	.336***
Nonlocal friends	.361***
Coworkers	.410***
Church members	.140*
Formal social groups	.192***
Informal social groups	.195***

* $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

TABLE 4: Pearson Product-Moment Correlations for Internet Users: Community Involvement Scale by Internet Communication Activities for 1996 and 1999 Samples

	<i>Community Involvement Scale</i>	
	<i>1996</i>	<i>1999</i>
Community attachment	.135	.035
Years in community	.156*	.103*
Number of times moved	-.107	-.073
Number of meetings a week	.145	.248***
Use the Internet to communicate with		
Local family	-.077	.236***
Nonlocal family	-.039	.139**
Local friends	-.039	.233***
Nonlocal friends	-.158	.138*
Coworkers	-.012	.095
Church members	.061	.198***
Formal social groups	.334***	.312***
Informal social groups	.244**	.328***

* $p < .05$. ** $p < .01$. *** $p < .001$ (one-tailed).

strengthens: People who used the Internet for a variety of interpersonal and small group communication activities were also likely to report high levels of community involvement.

These results suggest a strong relationship between community involvement and the use of the Internet for social-capital-building activities. Why, then, was there no increase in community involvement, attachment, or participation as the

TABLE 5: Comparison of Self-Perception of Change in Involvement by Time: 1996 and 1999 Samples

Variable	1996		1999		Significance Test
	M	SD	M	SD	
Involved with issues	2.36	0.55	2.26	0.57	n.s.
Connected with people	2.47	0.60	2.18	0.65	$F = 16.06, p < .001$
Involved with community	2.22	0.55	1.99	0.57	$F = 13.54, p < .001$
Attended meetings	1.99	0.47	1.91	0.44	n.s.
<i>Length of Internet Use</i>					
Involved with issues					.329***
Connected with people					.301***
Involved with community					.181**
Attended meetings					.062

a. Pearson product-moment correlations between length of time using the Internet and self-perception of change in involvement (for the 1999 sample only).

** $p < .01$. *** $p < .001$ (two-tailed).

number of Internet users in the community increased? In the 1996 and 1999 surveys, respondents were asked,

Since getting on the Net do you think you have become more, equally, or less involved with issues that interest you; become more, equally, or less connected with people like you; become more, equally, or less involved with the community; and attended more, equal, or fewer meetings of local groups?

Table 5 presents the means and standard deviations and comparison tests between the 1996 and 1999 groups.

Significant differences in the means for self-perceptions of change in involvement (falling between 1996 and 1999) seem to confirm that people feel they have become less involved and attached to the community since beginning to use the Internet. However, the 1999 data reveal significant positive associations between the length of time people have been using the network and the extent to which they feel more involved and connected to their local communities. The longer people used the network, the more likely they were to use the Internet for social-capital-building activities that lead to increased community attachment and involvement. One interpretation is that late adopters report equal or less sense of involvement in the local community, and over time these late adopters may report a sense of increased involvement as a result of increasing use of the Internet for social-capital-building activities. Alternatively, the observed equal or decreasing involvement trend may persist among late adopters despite Internet use over time, as Kohut (1999) suggested. Either interpretation warrants continued investigation of the Blacksburg case study.

DISCUSSION

Our general expectation was that over time, the residents of Blacksburg would report higher levels of community involvement and community attachment. Furthermore, these higher levels of community involvement and attachment would be attributable in part to increasing use of the Internet and the local community computer network to facilitate the building of social capital within the community. Evidence from the Blacksburg case warrants support only for the claim that the longer people have been connected to the Internet, the more likely they are to use the network for social-capital-building activities. One logical extension of this conclusion is that if social-capital-building activities occur in the community, involvement and attachment should increase and quality of life should improve.

Although participation in social groups decreased over time, community involvement and attachment remained unchanged. There are two potential explanations for this finding. First, Putnam (2000) directly confronted the role of the BEV and other community computer networks in building social capital. His claim is perhaps that initiatives such as the BEV are an outcome of communities with already high levels of social capital, community involvement, and community attachment. Specifically, "Experience in Blacksburg suggests that . . . social capital may turn out to be a prerequisite for, rather than a consequence of, effective computer-mediated communication" (p. 177). These results offer Putnam justification for his claims about the relationship between the Internet and the processes of social capital.

Putnam holds out little hope for community computer networks in the building of social capital. It is a basic chicken-or-the-egg problem—which comes first, the community computer network or high social capital? Community computer networks may just be a voluntary organization for the information society. Just as the Lions Club or the PTA served to build social networks and social trust during the past century, it is possible that community computer networks may serve as a modern functional alternative. Perhaps people spent less time involved in traditional face-to-face meetings and more time building the BEV? The conclusion that community computer networks are more likely to succeed in communities with already high levels of social capital needs further research and testing. One means of answering this question would be to compare the Blacksburg experience to experiences in other communities with local computer networks.

There is another approach to explaining the Blacksburg data. The Internet and associated community computer networks may capitalize on existing social networks while at the same time bringing new participants to the dialog. This explanation hinges on the notion that it is easier to engage people on a listserv or via a Web site than it is to get them to attend a face-to-face meeting or event. The significant differences in community involvement between early versus late adopters in the results from the Blacksburg data clearly support the Kohut

(1999) finding that early adopters of the Internet were civically involved and active in community communication networks. The media, including the Internet, contribute to the political communication process, according to Norris (2000), by a virtuous circle of ratcheting up and reinforcing the participation of interested individuals. Over time, these people serve an opinion leadership function in the diffusion process. The longer people use the community computer network and the Internet, the greater they report feeling involved in the local community, feeling connected to people like them, and feeling involved with issues that interest them. They do not, however, report attending more face-to-face meetings. Furthermore, the longer people are on the Internet, the more likely they are to use the Internet to engage in social-capital-building activities.

Perhaps the most encouraging finding about the role of the Internet and community computer networks revolves around evidence indicating that people will use the Internet for social-capital-building activities. Whether the community computer network is a new kind of voluntary association or an efficient way of extending traditional associations to new audiences, network users are engaging in communication with their community members. It is this talk or social capital building among community members that builds the social networks and social trust on which community involvement and eventually quality of life thrive. It would be interesting to explore the extent to which people take community-building behaviors learned online into offline community realities. Perhaps, as Turkle (1997) suggested, we are capable of existing in multiple realities and each of our realities can learn and benefit from experiences in the others. Learning to build social capital online may transfer to offline social-capital-building behaviors. There is every reason to believe that the Americans coming of age in the year 2010 will have the opportunities to learn social-capital-building communication behaviors and that the Internet, especially community computer networks, will play an important role in that process.

NOTE

1. The fully realized URL for the research pages of the Blacksburg Electronic Village (BEV) is <http://www.bev.net/project/research/index.html>.

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