Public Libraries and Networked Information Services in Low-Income Communities

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This article presents findings from an empirical study of community information exchange and computer access and use among low-income, predominantly African-American residents in one locale. Data were collected through household interviews, focus groups, and surveys. Results indicate that, while computer use is minimal, many low-income community members are poised to participate in the local development of networked information services. The article emphasizes appropriate roles for public libraries in community-wide efforts to bridge the digital divide that cuts computer use along socioeconomic lines.

With decreased costs of basic computing technology and recent federal emphasis on supporting universal telecommunications service, a growing number of public libraries can play a key role in addressing the "digital divide" that separates users of networked information services in their communities along socioeconomic lines. Primary components of networked information services that target disenfranchised local groups include the creation of online local content, the establishment of public access computing sites, and the delivery of outreach, training, and support. Libraries, however, are faced with entrenched difficulties in their attempts to reduce the access and use barriers associated with the provision of networked information services to disenfranchised groups. One difficulty lies in knowing how to collaborate effectively with other community-based institutions in developing digital information content and services. Another is achieving a rich understanding of the social context surrounding the use of networked information services, especially for traditionally underserved segments of society. This understanding is a necessary prelude to another critical form of collaboration for public libraries: working with members of target groups in the co-creation of networked information services at the local level.

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This article reports on an empirical study of the community information needs, communication channels, and computer experiences of people—predominantly African-American women—living in low-income neighborhoods. The research presented here was conducted throughout 1998 as part of the Community Networking Initiative (http://www.prairienet.org/cni), which seeks to increase participation of low-income residents in Prairienet (http://www.prairienet.org), a community network that has served the Champaign-Urbana, Illinois area since it began as a Free-Net in 1993. During the first year of the Community Networking Initiative (CNI), its primary research goal was to identify problems facing low-income residents of several neighborhoods in the Champaign-Urbana area, to learn what local information is useful in addressing these problems and how it is currently exchanged, and to explore attitudes and experiences related to computer use. This article provides a brief introduction to current knowledge in these areas, describes the study's research design, and offers selected results of data collected. Implications for the provision of networked information services to low-income communities are then discussed, with a focus on the role of public libraries.

NETWORKED INFORMATION SERVICES AND LOW-INCOME COMMUNITIES

Need for Community-Wide Collaborations

Public libraries across the country are adapting their services to better meet the needs of their communities in the 21st century. This includes consideration of enhancements to library services that are achievable through the effective application of information technology. With federal "E-rate" provisions to subsidize telecommunications services and decreasing costs associated with basic computing technology, an increasing number of public libraries—including those serving poverty areas—are able to offer computing and telecommunications services to their patrons (Bertot & McClure, 1998). Along with the basic establishment of public access sites, a number of libraries have developed innovative programs for fostering technology literacy, developing local online content, and presenting customized guides to networked information (Libraries for the Future and Benton Foundation, 1996; Libraries for the Future, 1999).

Nonetheless, the provision of networked information services for low-income communities brings a special set of problems in the form of the well-documented digital divide that cuts off some segments of the community from computer access and use. Recent studies demonstrate that computer use is related to race and ethnicity, educational attainment, gender, basic household composition, and, most dramatically, income. Although it is difficult to isolate the precise effect of individual variables, it is clear that lower socioeconomic status is associated with lower levels of access and use of computers and the Internet (Hoffman & Novak, 1998; Honan, 1999; Kraut, Scherlis, Mukhopadhyaya, Manning, & Kiesler, 1996; McConnaughey & Lader, 1998). The perceived danger of the digi-

tal divide is that lower socioeconomic status is both a cause and effect of limited access to information and technology. As pointed out by James Katz in the Benton Foundation (1998) report on low-income communities in the information age, "The information poor will become more impoverished because government bodies, community organizations, and corporations are displacing resources from their ordinary channels of communication onto the Internet" (p. 5). As they continue in their attempts to move their own information resources online, as well as improve access to all online information for their local communities, public libraries must consider ways to reduce barriers to access and use of networked information for those most threatened by the digital divide.

Effective collaboration with other community-based institutions in developing networked information services is called for on several grounds. Stated most simply, community-wide problems require community-wide solutions. In Dervin's (1973) view, a community information system is an organic whole, comprised of individuals, their information needs and problems, information sources, and solutions to needs and problems. She also identifies societal, institutional, physical, psychological, and intellectual barriers to access and use. The range of barriers demands that networked information services go beyond meeting physical demands—the creation of content and the provision of public access to needed computing equipment—to address other facets of access and use through, for example, appropriate outreach, training, and support services. Not only are a wide variety of interventions needed, but they are needed at different points throughout the system.

Recent reports from the Benton Foundation (1996; 1998) and Libraries for the Future (1999) contend that libraries must reinvent themselves and explore partnerships with other community institutions to promote online access to information resources throughout the community. Each community organization may have its own stake in the provision of networked information services; each may have something unique to contribute. But regardless of the mix of institutions engaged in providing them, ensuring that networked information services are used by and are of benefit to low-income communities is a particularly thorny problem (Jacobs, 1995; Klingenstein, 1995; Patrick & Black, 1995; Rogers, Collins-Jarvis, & Schmitz, 1994; Schön, Sanyal, and Mitchell, 1999).

Siegel (1997) proclaims that "libraries are moving beyond their traditional job as book repository and branching into electronic networks, family-service programs, literacy classes, and even cafes," while "still honing their traditional roles as educators and guides." Participation in the provision of networked information services can help public libraries pursue traditional roles in old and new guises by enhancing their ability to:

- Serve as a community information center;
- Support life-long learning, small business development, and cultural enrichment;
- Contribute to community problem-solving;

- Preserve local culture and history; and
- Promote networked information literacy.

Public librarians who have experience in developing community information and referral (I&R) files are particularly well-equipped to contribute to the development and management of networked community information services, given: their skills in creating, managing, and using complex files of community data; their familiarity with personal assistance in the provision of these services; their expertise in targeting information needs; and their understanding of their own communities (Durrance & Schneider, 1996).

Community networks are not-for-profit institutions that typically provide online community information, Internet services, and user support to local residents (Schuler, 1996). While they have been compared to the I&R services managed by libraries or other local agencies (Doctor & Ankem, 1996; Pettigrew & Wilkinson, 1996), community networks have also been heralded, generally, as promising partners for public libraries seeking to address networked information access issues. At their most vibrant, community networks:

- Develop and distribute tools, like software and computers;
- Identify and encourage participation from community groups;
- Provide training about use of tools and provision of information;
- Foster a rich information space that includes email, listservs, and newsgroups;
- Link real and virtual communities through social and information-sharing gatherings; and
- Establish public access terminals in comfortable, "neutral" settings (Martin, 1997).

In addition to public libraries, agencies offering I&R services, and community networks, other community-based organizations may perform functions that are important in the effective provision of networked information services to low-income residents. Local organizations representing low-income interests and needs—from churches to neighborhood groups to healthcare institutions—are important content providers. Schools, community colleges, and adult education programs may offer basic computer training. Social service agencies have extensive experience working with low-income audiences to identify and address their needs.

Community-wide collaboration in addressing the digital divide makes sense, but recent research points to entrenched difficulties in working across organizations. One problem lies in simply identifying available resources, services, and information housed in various institutions across a community (Dewdney & Harris, 1992; Kretzmann & McKnight, 1993). Another difficulty is spanning the three institutional tiers that characterize organizations at the community level. That is, a number of social, political, and economic factors make it difficult to form collaborations between (1) large, formal, resource-rich organizations such as the Urban League, United Way, Red Cross, or a major library system; (2) second tier insti-

tutions like a large local church with multiple, ongoing social service programs; and (3) small, often ad hoc, third tier associations like a neighborhood watch association or group of church volunteers (Venkatesh, 1997). While the potential benefits of public library participation in the provision of networked community information services have been extolled and, in some cases, documented (McClure & Bertot, 1998), we are just beginning to grasp the complex issues facing public libraries as they enter this new realm of community information service.

Understanding the Social Context of Use

To be successful, the provision of networked information services for low-income audiences must be based on knowledge of the social context of use. While the Benton Foundation (1998, p. 12) argues that "creative ways will have to be found to make computer networking more a part of the social lives of people in low-income neighborhoods," little research exists to guide such efforts. The pioneering work of Dervin (1976, 1980) and Chatman (1987, 1991, 1996, 1999) explores the overlapping information and social worlds associated with daily life experiences of disadvantaged groups. But we know little about situational or contextual factors associated with their use of *networked* information services (Pettigrew, Durrance, & Vakkari, 1999).

Several recent investigations have highlighted the household social context in studying computer use (Davenport, Higgins, & Somerville, 1997; Kraut et al., 1996), and a few have looked specifically at the household media use environment of disadvantaged groups. The Wynnewood Information Project sought to learn about everyday information needs, behavior, and infrastructure of low-income African American residents in a particular neighborhood (Spink, Jaeckel, & Sidberry, 1997). Schement (1997) advocates coming to terms with ethnicity to understand the attitudes and actions of minorities in building household information environments.

In a related study, Mueller and Schement (1996) demonstrate the importance of investigating social context for producing a full understanding of media use. They found that telephone use by members of low-income households was directed by such factors as friends and relatives running up long-distance charges, the desire to prevent contact between a teenage son and his friends, and strategies for maintaining communication links when household telephone service had been disconnected. Virnoche (1998) demonstrates the importance of going beyond easy assumptions about the needs of groups typically associated with the digital divide. In her study of special outreach initiatives pursued by a community network, she found that seniors—who were relatively affluent, well-educated, and already had computers at home—avidly took up what for them was an enriching social and educational activity. Low-income women who represented single parents participating in a self-sufficiency program, on the other hand, showed little interest in learning to use computers or surf the World Wide Web, given their more immediate and grave survival needs.

Gaining Active Participation of Low-Income Communities

Particularly relevant to understanding the social context for networked information services in low-income communities is research that underscores the importance of social networks in such settings. Family and peer networks are key to individuals' community involvement and to the exchange of information and support, especially among low-income African-American women (Agada, 1999; Barker, Morrow, & Mitteness, 1998; Chaskin, 1997; Metoyer-Duran, 1993; Stack, 1974; Uehara, 1990). It is also recognized that informal collaboration and social exchange with peers helps in learning how to use information technologies (Agre, 1997; Benton Foundation, 1996; Twidale, Nichols, & Paice, 1997). Some of the key contributions of social networking in these two realms are:

- Its role in mediating among formal and informal systems;
- The natural crossover between intangible (affective, informational) and material support that attends it;
- Its relationship to important information use factors such as proximity, familiarity, and relevance; and
- Its importance for the exchange of tacit and private knowledge, for maintaining a private communication space, and for building trust.

While previous research provides insights into community information practices and media use in low-income neighborhoods, it has not directly pointed the way to participative models for involving local residents and crossing institutional boundaries in the development and management of community information services. In articulating problems associated with information infrastructure design and access, Star and Ruhleder (1996) argue that "transcontextual difficulties [double binds] will intensify as collaboration systems and groupware are developed for increasingly nonhomogeneous user communities" (p. 127). This leads to a need for "local tailors" and "technology mediators" to "provide a bridge between relatively generic technologies and their local interpretation and application" (p. 130). Although public libraries are in many ways ideal intermediary institutions for networked community information systems, they are not necessarily perceived as ideal by low-income residents because they often lack such local tailors. It appears that including low-income residents as mediators of the computer-skill learning process would enhance outreach and training. Gaining their participation in the creation of networked community information and development of effective policies and programs should assure a better match between needs and services. This approach has been taken in some communities (Chapman & Rhodes, 1997; Lillie, 1998).

STUDY METHODOLOGY

Our CNI project aims to improve computer use and information exchange at the household, neighborhood, and community levels. To do so requires atten-

tion to the intersection of information and social practices of low-income residents. By taking an ecological approach to understanding the fit between information technology and people's practices and values in a particular setting (Nardi & O'Day, 1999), we hope to arrive at useful insights related to how computing technology might be made to "disappear" into the fabric of everyday life for low-income community residents (Bruce & Hogan, 1998).

The goal of our research was to investigate community-based information practices of residents in several low-income, predominantly African-American neighborhoods in Champaign-Urbana, Illinois. We sought to identify: information needs and exchange channels; the social context of use of information media, especially computers; and perceptions of computer-based tools and resources. Results were intended to contribute to basic knowledge in these areas as well as provide data useful in planning and assessing CNI activities, such as the provision of computer training, the establishment of public access sites, the distribution of computers, the recruitment of new information providers for Prairienet, and the design of improvements to Prairienet's interface. Data were collected through surveys, household interviews, and focus groups (see Table 1).[1] We recruited study participants from among those applying through the Urban League for admission to CNI's computer training and distribution programs.

Household Interviews

Household interviews consisted of two parts: a family interview with whomever could be present and an individual interview with an adult member of the household. The interviews gathered information on neighborhood problems, information needs and exchange channels, household media use, library use, perceptions and behavior related to information technology, places of importance that could serve as public access sites, and demographic characteristics of participants. A total of 40 interviews were sought; 26 interviews (with 34 participants in all) were completed between January and June of 1998. Eight potential interviewees refused to participate and six interviews could not be completed for reasons that included disconnected or unknown telephone numbers and repeated unsuccessful attempts to schedule or complete interviews. Each interview lasted approximately one-and-a-half to two hours.

Focus Groups

Focus group interviews represented an additional means of gathering data about information and computing practices among low-income community members. They were conducted to reach a greater number of low-income residents in a more efficient manner than was possible through soliciting household

1 Copies of data collection instruments may be obtained by contacting the lead author.

TABLE 1
Overview of Data Collection Activities

Data Collection Method	*Participants*	*Research Topics*
Household interviews	34 adults whose households included teens participating in CNI training	• Neighborhood problems; • Information needs and exchange channels; • Organizational affiliations; • Household media use; • Library use; • Information technology perceptions; • Computer experience; • Potential public access sites.
Focus groups	116 adults and 48 teens participating in CNI training	• Information needs and exchange channels; • Organizational affiliations; • Household media use; • Library use; • Information technology perceptions; • Computer experience; • Potential public access sites; • Assessment of CNI and Prairienet; • Motivation for joining CNI and program expectations.
Computer experience survey	178 adults who applied to participate in CNI	• Computer experience; • Motivation for joining CNI; • General interests; • Planned computer uses.
Telephone survey	35 adults who had completed CNI training and received home computers	• Computer use; • Computer problems; • Social networking related to computer use.

interviews. They also served to generate a wider ranging discussion of research topics than was possible in individual interviews and to elicit evaluations of the CNI project and Prairienet. We conducted focus groups with adult members of the Champaign-Urbana community who were participating in a two-day CNI computer training program, after which they received a free computer.

These focus groups were conducted in July and August of 1998 and were attended by 116 people. Questionnaires, which duplicated selected items from the household interviews, were distributed to participants. Each focus group lasted approximately one hour and included two researchers and about ten community members. Focus groups also were held with the teens attending CNI "tech crew" training courses held during the spring and fall of 1998. In all, about 50 teens participated in the focus groups. Teens were invited to discuss their motivation for joining CNI, perceived strengths and weaknesses of tech

crew training, and their expectations about serving as technology mentors for others in the community.

Computer Experience Survey

All of the approximately 700 community members who wished to participate in CNI's computer distribution and training program completed application forms. One of the application forms was a Computer Experience Survey that elicited data on individuals' current computer experience, what they hoped to learn in the program, general hobbies and interests, and planned computer uses. Selected survey items have been summarized for the first 178 applications received, to inform the development of the first phase of CNI's community training curriculum. It can be assumed that virtually all of the people who attended the summer 1998 training workshops and thus participated in our community analysis focus groups submitted applications that were analyzed in this study.

Telephone Survey

A follow-up telephone survey of adult community members who had received training and computers in summer 1998 was conducted to gauge use and impact of CNI resources. The first round of the survey was conducted in December 1998. Respondents were asked to report on the extent and nature of their computer use since receiving their home computers. Community members also provided information about problems they had experienced in using their computers. Finally, they described the degree to which they had exchanged computing help and resources with others in their social circle. Of the 116 attempted interviews, 35 were completed and selected results from them are reported here. About 40 potential respondents were unreachable due to disconnected phones or because they had moved.

Data Analysis

Data for the household interviews consisted of extensive notes taken during interviews, augmented with notes added by members of the research team after listening to audiotapes. In addition, there were questionnaire responses and media inventories for each interview. All data were processed electronically. Short answers were coded and analyzed using Statistical Package for Social Sciences (SPSS). The text of longer answers was entered in an Access database. Cross-tabulation and content analysis of these reports allowed the research team to develop a general summary of findings. The preliminary Computer Experience Surveys and telephone survey responses were similarly coded and entered online. Focus group discussion summaries for both teens and adults were based on notes taken during the discussions and later playback of audiotapes. Summaries of each focus group were produced. These were later synthesized to

TABLE 2
Sex of CNI Interview Participants

	HH	*FG*	*Total (%)*
Female	22	101	123 (90)
Male	4	8	12 (9)
Missing	0	1	1 (1)

Notes: HH = household interview; FG = focus group.

create a general summary of findings for, respectively, adult and teen focus groups. The following presentation of study results is based on findings from all of these sources, with an emphasis on the household and focus group interviews.

STUDY RESULTS

Demographics of Study Participants

Basic demographic characteristics of the 136 individuals who participated in our household (HH) and focus group (FG) interviews are presented in Tables 2–5. (As described above, telephone survey and Computer Experience Survey respondents are basically coincident with those participating in focus groups.) We can describe our typical respondent as an African-American woman in her thirties who has some college or vocational education and earns an annual income that confers eligibility for financial or social assistance programs (such as food stamps or Head-start). Of the 90% of focus group attendees who answered a question about their current employment, 25% were unemployed; of these, the majority characterized themselves as either a "student" or "homemaker." Most of those who were employed listed pink collar jobs, such as "secretary" or "teacher's aid." Based on comments made in interviews, we surmise that a substantial number of the households participating in the CNI program are headed by women who are single parents.

TABLE 3
Age of CNI Interview Participants

	HH	*FG*	*Total (%)*
<20	0	1	1 (1)
20–29	0	31	31 (23)
30–39	6	37	43 (32)
40–49	3	28	31 (23)
50–59	2	3	5 (4)
>60	3	2	5 (4)
Missing	12	8	20 (15)

Notes: HH = household interview; FG = focus group.

TABLE 4
Race of CNI Interview Participants

	HH	*FG*	*Total (%)*
American Indian Or Alaskan Native	1	2	3 (2)
African-American	21	84	105 (77)
Hispanic	0	8	8 (6)
Caucasian	3	12	15 (11)
Other	1	0	1 (1)
Missing	0	4	4 (3)

Notes: HH = household interview; FG = focus group.

Computer Ownership and Use

Our data on computer ownership and use suggest that most low-income residents in our community are cut off from networked information services. Only 17% of our combined household and focus group samples ($N = 134$) had a computer at home, and only half of these were networked. Of our household sample, 31% reported that they had never used computers while, at the other end of the spectrum, 39% said they used computers daily. Fewer than half of all household interviewees had used a computer outside their homes. External use at a public, institutional site was more commonly cited than private use at a friend or relative's home. In terms of institutional sites, access through a school or workplace setting predominated over local library access.

Both teens and adults depicted their current access to computing resources as scattered and superficial, with use not reflecting their own goals and interests. For example, a number of people remarked that they used computers at work, but only for the one or two applications deemed essential to their jobs. Similarly, teens reported that while they may have computer labs in their schools, the labs are only open at certain hours and only for use on class assignments for students taking certain courses. Teens who had taken computer courses depicted their content as primarily learning the names of computer

TABLE 5
Educational Attainment of CNI Interview Participants

	HH	*FG*	*Total (%)*
Have not completed high school	0	7	7 (5)
High school graduate	6	24	30 (22)
Some college or vocational school	10	53	63 (46)
College graduate	5	19	24 (18)
Completed a graduate or professional program	1	6	7 (5)
Missing	4	1	5 (4)

Notes: HH = household interview; FG = focus group.

parts and gaining keyboarding skills. They may have looked over the shoulder of a friend doing e-mail a few times, but did not glean enough basic knowledge to use e-mail themselves. Further, without ready access to computers on which e-mail was permitted, they had little means to practice anything they may have picked up from friends. Teens also presented a somewhat less rosy view of home access than that suggested by our basic statistics on home computer ownership. A number of teens said that while their families did own a computer, that computer was actually unusable because it was broken, too old, or only temporarily placed in the home (i.e., rented or borrowed).

Given this splintered ecology of access and use, it is not surprising that most of those who applied to the CNI program had little previous computer experience. Over half of those completing the Computer Experience Survey reported that they had never used Prairienet, e-mail, or the Web. In terms of basic computer applications, almost one-third had never used a word processor and nearly half had never used spreadsheet or database programs. Only about one-quarter were regular users of e-mail and word processing, and only about 10% reported using the Web regularly.

Community Information Needs and Exchange Channels

Neighborhood problems reported in household interviews ranged from crime to inadequate city services to mundane aggravations over neighbors' behavior. Community information needs most often cited were related to health, parenting, education, leisure activities, and employment opportunities. Interview respondents also wanted more easily accessible information about available and affordable services of all kinds.

When asked specifically what type of information they would like to have available online, similar topics were mentioned. Those named, in order of frequency, were:

- Community services and activities (e.g., food programs, legal and city services, local leisure and cultural activities, and hours of operation for businesses and other organizations);
- Resources for children (e.g., 4-H clubs, daycare, summer jobs, school information);
- Healthcare (e.g., free screenings, insurance programs, and easy-to-understand medical information);
- Education (e.g., tutoring programs, scholarships, and adult high school degree programs);
- Employment (e.g., job listings and grants for minority businesses);
- Crime and safety (e.g., neighborhood crime rates and data on sex offenders); and
- General reference tools (e.g., dictionaries).

Information about library services was mentioned by only one household interviewee, who wanted to see the local bookmobile schedule put online.

Low-income neighborhood residents in our study reported reliance on a full suite of channels to acquire and exchange community information. These included informal, word-of-mouth contacts with people in one's intimate social circle; contacts with community institutions through print, telephone and in-person visits; library use; and use of mass media channels such as newspapers and television. In our household interviews, people were asked to describe how they usually got information about (1) hobbies and interests; (2) available resources and services in the community; and (3) community activities. Informal, institutional, library, and mass media channels were mentioned as sources for all three categories of information, but with substantial variation in use of channels for particular types of information (see Table 6).

For information on hobbies and interests, people primarily used mass media channels, with libraries, institutional channels, and informal word-of-mouth contacts each cited only about half as often. Mass media, institutional contacts, and word-of-mouth channels were equally important for acquiring information about community resources, with the library rarely mentioned in this context. Institutional and informal exchanges were cited about equally as channels for getting information about things going on in the community, with libraries and mass media channels each mentioned only about one-third as often. Thus, as an information channel for low-income residents, the library appears to be less critical than other major channels, especially for obtaining community information. Contacts with community organizations and word-of-mouth exchanges with people in one's close social circle appear most important for accessing and exchanging information about local resources and activities.

Most people described their everyday interpersonal encounters as the primary way that they typically found out about things in the community. One person commented "I ask questions . . . someone I know knows someone somewhere who has the information I need." Another said "I ask around, talk to people at the grocery store." And a third person commented with a grin: "I talk with my neighbors in the summer. That's what I call 'voice mail.'" In household interviews, people were asked to name those with whom they had recently dis-

TABLE 6
Information Channels Typically Used by Low Income Residents

	Information Channels			
Types of Information	*Mass Media*	*Local Institutions*	*Libraries*	*Word-of-Mouth*
Hobbies and interests	*			
Community resources	*	*		*
Community activities		*		*

Note: * = most frequently cited channel for each type of information.

cussed something of importance. Friends and relatives were most often, and about equally mentioned. Professionals (e.g., ministers or social service agency staff) and work colleagues were cited equally, but only about one-third as often as friends and family members. In fact, about half of community trainees said they heard about the CNI project through family and friends, about a third heard of it through the Urban League, and only about 10% learned of the program through mass media, such as radio, television, or newspapers.

In discussing information needs, participants often indicated a wish for "recommendations" or "advice," which helps explain the importance of interpersonal information exchange. Our focus group interview process itself revealed how information about available resources was informally exchanged and accompanied by experiential advice. When community members expressed the desire to find, for example, affordable daycare or free checking, other focus group participants not only named possible organizations, but chimed in with evaluative comments and tips on how best to get the desired service. Their comments frequently addressed the accuracy of public information about the service or the level of hospitability shown to low-income people by those providing the service.

Use of institutional channels included contacts arising from one's role as the recipient of services provided by such organizations as Public Aid, the Urban League, hospitals, the Salvation Army, and the park district. But institutional channels were also activated through organizational affiliations. In other words, CNI participants were not just consumers of institutional services, but also contributed to them. About 90% of our household interviewees belonged to some kind of local organization, with religious and social groups predominating. Many of our study participants were active churchgoers, participated in volunteer programs through the Urban League or other local community organizations, and were members of local social service associations like Empty Tomb, which distributes food and other items to those in need. People commonly exchange information through conversations or announcements at their group gatherings.

Personal and professional sources of community information overlap as friends, relatives, colleagues, and neighbors pass along news from the institutions with which they are affiliated. Household interviewees, for example, noted that they got information about community activities and resources "from girls who work at the university," from a relative working in a local recreational institution, from kids who report on upcoming events at school, and through an outreach worker at one's place of employment.

There was not a great deal of consensus in the organizations named as important purveyors of community information and services, important affiliations, or potential public access computing sites for low-income residents. Churches were overwhelmingly named most often, followed by libraries, schools, the Urban League, park districts, healthcare institutions, food banks, and neighborhood crime watch groups. These organizations can be viewed as

potential "information grounds" (Pettigrew, in press) in the context of daily life in low-income neighborhoods, places where people gather and exchange information about common interests. When asked specifically what organizations they would like to see online, responses were similarly scattered and many people named types of organizations (e.g., "healthcare") as opposed to specific organizations. Social service organizations were mentioned most frequently, followed by local political or civic groups, healthcare organizations, and recreational institutions. Libraries and churches received only two mentions each, suggesting that these community institutions did not occur to most people in the context of online information providers.

Perceptions of Information Technology

In an effort to gain some understanding of the social context of information technology use in low-income neighborhoods, data were gathered on CNI participants' attitudes towards computers and their expectations and experiences related to computer use. In focus group discussions, adult community members participating in CNI said they were most eager to receive computers, Prairienet/Internet accounts, and training for the following reasons:

- Self-improvement (to gain computing skills to help in work, education, and household management);
- Feelings of being marginalized and left out of what everyone else is doing;
- The desire to advance and be a part of their children's interests; and
- The desire to obtain information about employment, educational, or recreational opportunities.

In terms of computer applications, adult trainees participating in focus groups seemed most eager to use computers for communication (e-mail and discussion groups), Web browsing, and simple applications like word-processing and spreadsheets. While some were excited about creating webpages, most seemed to feel that they were not ready for that yet.

In general, adults' motivation for gaining access to computer resources and skills was mirrored by teens. Teen tech crew members seemed eager to learn just about anything associated with computers to:

- Not feel left out of the "coming thing" that everyone else seems to know about;
- Be in a position to have peers look up to them;
- Succeed in college;
- Be better prepared for their chosen careers; and
- Be knowledgeable consumers of computer-related products and services.

The specific skills that teens expressed the most interest in were (in descending order of importance): Web browsing, e-mail and other communication tools, Webpage design, games, and trouble shooting their own equipment.

CNI participants were overwhelmingly positive in their attitudes about computers. Low-income community members were well-versed in popular rhetoric about the benefits of the information age. Familiar phrases like "access to the world in a click" and "accessing information at the touch of a button" were offered by study participants. Household interviewees were asked for their opinion about what computers were good for. In response, they identified a wide range of positive uses. Beneficial job-related uses cited included business bookkeeping, paying bills and taxes, getting job information, learning job skills, and expanded work options, such as working from home. A number of improvements in household management were also attributed to computer use, including maintaining the family's budget, balancing one's checkbook, and ordering groceries online. Educational uses for adults and children received high praise. People were enthusiastic about the contribution of information technology to writing papers, personal learning, and formal research through Web browsing, and access to school Websites and online computer tutorials. A number of people extolled recreational and cultural opportunities afforded by technology, with the ability to meet people from around the world mentioned most often. Surfing the net seemed to be heralded as an enjoyable and enriching pastime in and of itself. Finally, low-income community members noted the benefits of computers as tools for communication, valuable for keeping in touch with friends and family members, locating old friends, writing letters, and making fliers.

In the household interviews, low-income residents were asked if there were things they would like to do with computers that they currently could not do. E-mail to distant family and friends received a great deal of attention, with a local church bulletin board and exchanging information with Bible study cohorts also mentioned. Web browsing for information of interest in one's daily life was the other most commonly desired application; topics mentioned here were fishing, auto mechanics, parenting, home improvements, crafts, recipes, and treatments for illnesses. One woman contextualized her desired computer use in the setting of her everyday community activities further, by citing a range of applications that would assist her in both her job as a cosmetologist and her role as a girl scout leader:

> I'd like to have a printer for girl scouts, some kind of kids "chat" so the girls could have pen pals. I could interact with other scout leaders, learn from other kids, get information to help plan troop activities, get the Brownies involved. I'd also like to get cosmetology information, learn from other countries and shows.

Household interviewees also expressed their concerns about computers. Just as low-income community members were well aware of popular rhetoric re-

garding the benefits of the information age, they were savvy about potential negative consequences associated with joining the online revolution. When asked about perceived problems with computers, the most common issue raised was keeping up with the technology. Rapid obsolescence and the constant need for additional training were noted as problems in this context. The need to monitor childrens' behavior also received a great deal of attention. Parents were primarily worried about exposure to pornography and the problems that technically astute kids could cause for others. Privacy and security issues were also commonly cited, as were technical problems with computers. The high cost of computing was not often explicitly mentioned. Cost seemed to be one of the major problems associated with keeping up with the latest technology, however, and one person recounted a situation in which a friend almost lost her telephone service because she did not realize that she was being charged for online connect time.

Home vs. Public Access

CNI participants were eager to acquire home computers. In household interviews and focus group discussions, we gained a number of insights into why low-income community members believed that home access was critical to becoming an active computer user. It appears that, with busy schedules—especially in single parent households where one adult is juggling work, education, childcare, and home upkeep responsibilities—public access sites might be difficult for some low-income community members to take advantage of. A single mother with a young daughter stated simply that when not at work "home is where we're usually at." Another mother, commenting on use made of her CNI computer so far, stressed the timeliness and convenience of home access: "I've been having a ball—to access information at the touch of a button! I don't have to run to the library where I can't keep what I need." Fear of criminal activity in the immediate proximity of the home may also lead to reluctance to visit public access sites. As one household interviewee stated: "I hang out here, where I know it's safe."

Perhaps more importantly, home ownership and access provide a familiar, comfortable context, with the myriad resources related to a particular computing task (including people) close to hand. Many parents stressed their desire to engage in computer activities with their children, including learning how to use the technology, and seemed to feel that the home environment was most conducive for this. A grandmother raising her teenage grandson alone remarked: "Even if [my grandson] got one, I doubt I'd use it much because I'm not used to it. I use the phone and write letters. But if we had one, maybe I'd get interested and learn about it. I want my grandson to learn so he can teach me. We'll be e-mailing in a while!"

Most of the simple day-to-day activities for which people wanted to use their computers—such as paying bills, writing to friends, finding a recipe, or browsing the net like they might leaf through a magazine—are activities traditionally

done at home. Some of these pursuits require the at-handness of things you have at home, like previous bills, an annotated calendar, the ability to check what cooking ingredients you have on hand, and old letters. In addition, these are the kinds of activities that just take a few minutes, often at odd, unpredictable moments of the day, whenever you find yourself with a few spare moments. Much of the attractiveness of "automating" such mundane household activities lies, obviously, in the ability to conduct them at home. It just does not make much sense to do them somewhere else. At the opposite end of the spectrum, several study participants expressed the desire to use their computers to start home-based businesses or engage in home-based educational programs. These activities require that a much greater range of supporting resources be ready-to-hand, in addition to demanding sustained and reliable computer access for, perhaps, many hours each day.

Nonetheless, it is logical to argue that some access is better than none, and public access computing has some potential advantages over home ownership. First, an external agent bears most of the cost and responsibility of maintaining the available computing resources. Knowledgeable helpers may be nearby. People can gain exposure to resources they might not seek out on their own. The setting may be more convenient or appropriate as a social gathering place than is an individual's home. Interview participants consistently recommended public libraries, community and public housing recreation centers, and other public institutions (such as schools, social service agencies, hospitals, and courthouses) as public access computing sites. Somewhat less frequently mentioned were churches and commercial settings, such as grocery stores, malls, and fast food restaurants. Commercial sites were often recommended because of the evening and weekend access they allowed. In a few focus groups, people discussed providing access at their employment sites.

In addition to holding generally positive attitudes about the library, the majority of low-income community members participating in our household interviews and focus groups appeared to be regular library users. A majority of all household and focus group respondents (74%) had public library cards. A full 82% of household interviewees reported that they visited the library about once or twice per month, while only about 10% said they never went to the library. While a few people made comments suggesting that libraries did not represent particularly congenial social settings for them, others proclaimed the opposite. One mother noted, for example, that she and her children "hang out there a lot." It is clear that public libraries deserve prime consideration as public access computing sites. But they may have to overcome barriers related to current practices to become vibrant settings that attract low-income community members to try out the information technology they make available. Increasing the public's awareness of computer resources and services may be a primary problem: although all the public libraries in Champaign-Urbana have Prairienet public access stations, and the vast majority of CNI participants claimed to be active library users, virtually none had heard of Prairienet.

Community Information System Contributors

Finally, a key insight from our study of low-income community members is that people are not just consumers of networked community information services, anxious to identify sources of help to meet their needs. Through their jobs, volunteer work, and informal support of friends and neighbors, residents of low-income neighborhoods are contributors to the community and the community's store of knowledge, and they are eager for their interests, views, and capabilities to be represented in community information systems. Focus group participants expressed significant interest in seeing more online information created by African-American organizations and individuals.

While, as noted above, some people felt that creating their own Webpage was too much for novice computer users, they could see it as a later step in the logical progression of their computer skill development. Many stated that they had information and resources they intended to share through Webpages. Others could not think of anything they wanted to post online, and some wondered about the utility of creating their own Webpages or worried about threats to their privacy and safety associated with making personal information publicly available. Several people further commented that without more ubiquitous access and use among their peers, the Web would have little impact as an information exchange channel.

A number of household interviewees expressed interest in sharing recipes and inspirational or motivational tips online. Several anticipated starting a business and creating Webpages to support them. Others suggested posting information that emphasized their potential role in contributing valuable information to the community at large. Several people, for example, noted their desire to announce community events, such as picnics or meetings with which they were involved. One woman said she would like to post facts about local schools so that parents could make informed decisions regarding where to enroll their children. Another woman expressed the desire to provide a link to the Website promoting the Million Women's March or other information—such as the availability of a university program to teach seniors about computing—that would "pique people's interest to learn something." And one noted that she would like to create a personal Webpage that would encourage other single moms.

Throughout the CNI project, community members from low-income neighborhoods have also presented evidence of their ability to serve in roles beyond that of content provider. As nodes in a social network important for exchanging information, it is clear that community members can improve awareness of networked information services among their friends, neighbors and relatives. They can also extend and complement computing support offered through institutional programs. Preliminary results from the follow-up telephone survey indicate that project participants have been active in informally extending or getting help with CNI resources through their social networks. The majority of

respondents (80%) said that someone besides themselves had used their CNI computer and that they had used their CNI computer to show someone else how to do something (65%). About half of the survey respondents said that someone other than a project staff member had helped them in some way with their computer. The types of people most often mentioned in these exchanges were family members (including those living in or outside the household) or friends, as opposed to neighbors, work colleagues or community professionals, such as teachers or ministers.

SUMMARY AND DISCUSSION

We conducted a study of computing practices and community information exchange among low-income, predominantly African-American, residents of our community. Our aim was to develop an understanding of the social context for the use of networked community information services. While findings contribute to an understanding of the digital divide that currently threatens our society, conclusions about networked information services and low-income communities should be interpreted in light of basic characteristics of the local area from which they were drawn.

Participants in our study are not representative of all low-income community residents, either locally or nationally. First, most of the CNI program participants were women, which may explain, for example, the emphasis placed on information needs related to parenting and children's resources. Second, participants in our study may also be unusual in that they represent very active information seekers, with some existing interest in computers: study participants were drawn from the set of low-income neighborhood residents who were the first to respond to announcements about the availability of CNI training and equipment. Third, the majority of households in our study were not living in dire poverty; most of the adult participants in CNI were employed. And fourth, the people in our study are, after all, denizens of the "Silicon Prairie," a region steeped in information technology (Levy, 1998). People living in poverty who have had less exposure to information technology may be less interested in gaining access to computer skills and resources.

Further, perceptions and habits related to community information exchange are, of course, based on the specific characteristics of the local environment and institutions. In one focus group, for example, some participants suggested schools as public access sites because of their proximity and promotion of activities for kids. Others in the group countered that the schools their kids attended did not seem very eager to open their doors to the community at large and that their hours of operation were severely limited. Library use may be another example of local variation: low-income community members in our study may be more active library users than those in other towns.

Key study findings are summarized in Table 7. Here we present a brief discussion of our basic results. First, community-based networked information services that provide access and training are needed by low-income residents. The vast majority of CNI participants lacked access to computers and the Internet. Few households owned computers, only half of the home computers were networked, and the majority of the people we interviewed from those households had never used a computer outside the home. Previous computer experience and current use among low-income community members was generally, although not universally, quite limited: close to half of the participants in the CNI program had never used the Internet or common computer applications. Exposure to networked information resources—from equipment to online information to user training—was scattered and superficial. Computer use appeared to be driven by the external demands of particular work, school, or other task re-

TABLE 7
Key Study Findings

Computer ownership and use	• 17% of those interviewed had a computer at home, and only half of these were networked. • 31% of household interviewees had never used a computer. • Fewer than half of household interviewees had ever used a computer outside their homes. • More than half of the Computer Experience Survey respondents had never used email, Prairienet, or the Web.
Community information needs and exchange channels	• Community information needs most often cited were related to health, parenting, education, leisure activities, and employment opportunities. • The primary channels cited for access to information about community resources and activities were local institutions and word-of-mouth exchanges with people in one's own social circle. • There was little consensus on specific organizations named as important sources of community information.
Perceptions of information technology	• CNI participants viewed networked information services as important for full participation in society, and useful for meeting life goals and conducting everyday activities. • CNI participants were eager to obtain computers for their homes and to gain skills in a wide range of computer applications.
Home vs. public access	• CNI participants viewed home access as critical to becoming active computer users. • Libraries and community centers were the settings most often recommended as public access sites.
Community information system contributors	• Many low-income community members have a strong tradition of grassroots helpgiving that might be activated in support of the development of networked information services. • Many low-income community members are eager to contribute content to local stores of networked information.

quirements, as well as by constraints associated with trying to manage all the mundane details of everyday family and work activities when financial resources are scarce.

Networked information services at the community level are desired. While experience with networked information services was minimal among CNI participants, enthusiasm and motivation were high. A large number of people were quick to seek participation in CNI and referred information about the program to their friends. Low-income community members identified a wide range of beneficial uses of computers and the Internet within the context of their own lives and associated their computer marginalization with a general sense of being left out of society's mainstream. Low-income residents were eager for online access to information related to community services and activities, especially resources for their children, healthcare, and educational and job opportunities. The desire for relevant local content extended beyond the need to obtain resources and services, however. A number of people sought the means to contribute information about themselves and their assets to the community's store of networked knowledge. Low-income community members expressed an interest in creating personal Websites and using Prairienet to convey information about community activities to others, in part through disseminating information from the organizations with which they were affiliated, such as churches and neighborhood associations.

Based on our research interviews, we conclude that computer use will not really take hold among low-income community residents until they are able to find a way around the splintered ecology of access within which they currently live. Improvements in both public and private access are needed. Home access was viewed as critical for the full integration of computing resources into family, community, work, and educational activities. The reality of public access computing is that it requires users to live by other peoples' rules, schedules, and resources. It is not uncommon to have to stand in line and observe time limits. Desired applications may be either unavailable or forbidden. Fees may be charged. Privacy is minimal to nonexistent. Physical comfort is often lacking. Too much of the task environment is unpredictable, out of the user's control. Talking with others gathered around the terminal may be discouraged. With only intermittent and brief access, many people will not have enough time to get comfortable learning something new. Public computing often requires users to extricate themselves from exactly those daily activities and relationships that their use of computers is meant to support.

In spite of its limitations, public access computing was viewed as an important complement to home access, with recommendations that sites include libraries, community centers, stores and restaurants, churches, schools, and public agencies. One can infer from this diverse array that, like the information provided by a community network, access locations should be relevant to day-to-day circumstances of low-income people. In general, the response to where to place public computer access sites can be summarized by a focus group par-

ticipant who said sites should be "anywhere people go." Proximity, security, hours of operation, and the availability of transportation, technical assistance, and adequate work space were among the factors noted as important for any public access facility.

The reliance on close social ties and word-of-mouth exchanges to identify and obtain a wide range of services and support suggests that institutional programs intended to foster the use of networked information services should find ways to activate these existing social networks, especially in their outreach efforts. Based on evidence of a tradition of community involvement and grassroots help-giving, low-income community members also appear well-equipped to make contributions to the development of local online content and the delivery of computer training. CNI participants both served as, and made use of, "local tailors" in mediating computer technology. Community trainees, for example, requested that future training sessions allow family members to attend as a group. Community trainees participating in one focus group spontaneously created their own support group by collecting each others' names and contact information and getting a sense of what kinds of help they could offer each other. Some focus group participants immediately offered direct help to their fellow participants. For example, one person asked how to do something on the computer and another person in the group volunteered to lend her a manual she had at home. In addition, CNI staff fielding user support calls have reported that a number of callers remarked that they would pass on the answers they received to their friends from the summer training sessions.

RECOMMENDATIONS AND CONCLUSIONS

Community-based organizations can support the efforts of disenfranchised members of society to create and find community information, gain access to computers and the Internet, and receive training and support related to the use of networked information tools and resources. Networked information services should incorporate and capitalize on the enthusiasm, interest, insights, and skills of low-income community members who want to contribute to promotional, training and support, or content development initiatives. As noted by the Benton Foundation (1998):

> [T]echnology activists stress the importance of nurturing individuals and indigenous community organizations that already provide help and support in the community, rather than trying to impose technology from the outside. If an effort is aimed at providing new Internet access points in a certain community, they say, residents should have a say in where the stations are set up. Low-income people should decide for themselves how these tools can best serve their interests. (p. 21)

Incorporating participation of low-income residents in the development of networked information services demands a community-wide approach. While they lacked skills and experience related to computer use, low-income residents of Champaign-Urbana possessed balanced views of the benefits and drawbacks associated with computers. They were eager to gain computer access and skills and seemed poised to encompass networked information services within an existing tradition of help-giving. No single organization is likely to be effective in:

- Recruiting low-income residents into development efforts;
- Providing the scaffolding they need to participate fully;
- Controling the wide range of information demanded or supplied by low-income residents; and
- Representing a public access computing location and environment that would be convenient and hospitable to everyone.

CNI participants tended to describe community information exchange and public access computing as a fabric of activity encompassing a wide range of local institutions. Outreach, access, training, and use must be woven into the fabric, not addressed piecemeal, and not restricted to formal institutions.

Public libraries are an important part of the fabric but must first select roles that match their position in the lives of low-income community members and, then, collaborate with other community-based organizations so that together they provide a strong and resilient set of services. Libraries are not, apparently, strongly associated with networked community information in the minds of many low-income residents. Public library visits were customary, but neither universal nor as frequent as attendance at other community sites among participants in our study. The public library did not figure prominently as a source of community information, nor was it associated in people's minds with the development of networked information resources. On the other hand, attitudes toward the library were positive. Libraries and community centers were the organizations most often recommended as public access sites. Some study participants explicitly recognized the nature of the expertise held by librarians in organizing information, with comments such as: "It is good to bring together information and make it available to people, to organize it and make good information available for people over the net. But we need the right people to make it most efficient. Library people are the key." Although the public library may be underused as a source of information about community activities and resources, low-income residents recognized the potential for library service in this area. One study participant noted: "The library is doing a pretty good job. They have materials designed for the neighborhood. It's a good idea, even if people don't use it all the time."

This article concludes with a number of recommendations for incorporating the participation of low-income community members in the development of networked information services. Our recommendations encompass ways to

both facilitate collaboration across institutions and gain a rich understanding of the social context of the use of networked information services in low-income communities. They present specific suggestions that public libraries (and other community organizations) can consider in their efforts to provide adequate and appropriate networked information services for low-income residents. We hope that librarians' actions on the local level will be mirrored in the national policy arena. Librarians have an important advocacy role to play in the development of universal service policies and programs. They should assert the need for federal support of a community-wide approach to ensuring equity in computer access and use. Such an approach should foster the efforts of a variety of community-based organizations committed to the provision of networked information and include support for outreach, content creation, and training programs.

Recommendations for the Development of Networked Information Services in Low-Income Communities

1. *Begin with a strategic organizational partnership. Libraries should identify partners that represent strong organizational affiliations for low-income community members (e.g., Urban League, local church, neighborhood association).* Working from within an institution for which people already have expressed a strong affiliation can mitigate any feelings of distrust that outsiders might feel for a formal, unfamiliar institution (Agada, 1999).
2. *Recruit low-income residents to join in community-based, participatory action research (Loka Institute, 1998; Whyte, 1991) related to needs assessment, service development, and program evaluation.*
   This can help strengthen involvement and build on the assets of low-income residents beyond what might be achieved through including them on advisory committees and as research subjects.
3. *Design contextualized and open training programs.*
   Provide open lab sessions so that trainees have the opportunity to refresh skills learned in earlier instruction and to convey to trainers what is most meaningful and relevant to them in the use of networked information resources. Design training workshops around meaningful themes, such as how to use networked services to support parenting, improve access to health services, or enhance job opportunities. Include a wide range of applications in training—from e-mail to spreadsheets to Webpage creation—for meeting the life goals of community residents.
4. *Recruit, train, and support low-income residents as "local tailors" who can mediate networked information services for peers.*
   Peer mentoring can occur formally (e.g., during training sessions and individual instruction at public access sites) or informally (e.g., by demonstrating e-mail to neighbors or encouraging friends from church to attend a training session). Help cohorts keep in touch when training ends, for exam-

ple by distributing class rosters so that students can later contact peers for follow-up support and practice, in addition to calling on official user support staff.

5. *Establish public access sites at neighborhood locations that represent convenient and congenial settings and use them to foster collaborative learning and skill development.*
   Potential sites may include community centers, churches, and public housing community rooms.
6. *Collaborate with low-income residents and organizations that represent their interests in the exploration and development of new genres of networked community information.*
   Professionals who serve as information providers and navigators can work with low-income residents to co-create online resources that are usable, useful, and meaningful. Such new genres may include "digital storytelling" related to low-income members' culture and experiences (see The Center for Digital Storytelling Website at http://www.storycenter.org/), online I&R guides (see ServiceNet at http://www.fortnet.org/ServiceNet/), and online asset maps that portray skills and resources—held by individuals and organizations throughout a community—that may be mobilized for community development (see Prairienet's asset mapping Webpage at http://www.prairienet.org/assets/). Librarians could also help promote the community's use of simple Web forms for collecting and organizing local information (see the Hometown Countryside Connection at http://www.hccweb.com/). By recognizing and reaching out to smaller, less formally organized groups, librarians can help assure that important community information does not get omitted from such online repositories.

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