Library & Information Science Research 30 (2008) 175–184

Contents lists available at ScienceDirect

Library & Information Science Research

Public libraries and the Internet 2007: Issues, implications, and expectations

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ARTICLE INFO

ABSTRACT

This article presents an overview of the methods, findings, and the general implications of the 2007 Public Libraries and the Internet study. This annual study has chronicled public libraries' provision of Internet access to patrons and a range of related issues since the early 1990s. The 2007 study focused on the provision and maintenance of Internet access and services, infrastructure issues, community impacts of the technology, training, library technology funding, and e-government roles of public libraries. This article details these findings, exploring how the 2007 data compare to previous studies. It also considers the implications of these comparisons in terms of the levels of service that libraries are able to provide, the challenges that libraries face in providing these services, and the ways in which communities and governments rely on public libraries to guarantee public Internet access.

Published by Elsevier Inc.

1. Introduction

Conducted on an annual or biennial basis since 1994 (see McClure, Bertot, & Zweizig, 1994) the *Public Libraries and the Internet* (henceforth referred to as *Internet*) studies document the steady improvement of public library involvement with and use of the Internet. The *Internet* studies provide longitudinal data regarding the change in public access infrastructure (e.g., the number of workstations per library, bandwidth, and wireless access) and the types and number of services and resources (e.g., databases, e-books, digital reference, and computer and Internet training) public libraries provide to the communities they serve. This article presents national data and findings from the 2007 *Internet* survey, which provides the most recent data describing public library activities in the networked environment (Bertot, McClure, Thomas, Barton, & McGilvray, 2007).[1] A detailed description of the history of the *Internet* studies, along with previous reports and findings, is available on the Information Institute website. http://www.ii.fsu.edu/plinternet.

The 2007 study data expanded on findings from the earlier surveys. It also explored new areas such as library technology budgets, e-government roles of public libraries, and issues associated with maintaining, upgrading, and replacing a range of public access technologies. The data collected by this survey offer insights and understanding of the issues and needs of public libraries associated with providing Internet-based services and resources. Equally important, the data will also help public librarians to better plan for and deliver Internet-based services and resources to their users. Unless otherwise noted, the data in this article are from the 2007 *Internet* survey.

The findings from the 2007 survey demonstrate that public libraries generally continue to expand the public access computing and Internet services available to patrons. Virtually all public libraries offer public access to the Internet. While many public libraries are encountering physical or financial limitations on how much access they can provide, patron demand for access remains extensive. In fact, public libraries appear to be reaching a plateau in the overall number of computers and speeds of connectivity that they are able to provide for patrons. To extend public access services while facing building and space limitations, many libraries now provide wireless access. Issues of cost, space, and infrastructure challenge the ability of libraries to meet patron Internet needs at a time when patrons, communities, and governments rely more on public libraries to ensure Internet access.

2. The Internet in public libraries

Public library involvement with the Internet is extensive and multi-dimensional. The involvement includes a range of topics such equity in access; policy; information behavior; user impact; and management, planning, and evaluation (Bertot & Davis, 2004; D'Elia, Jorgensen, Woelfel, & Rodger, 2002; Hall, 2007; Jaeger, Bertot,

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[1] The 2007 *Internet* survey was part of a larger study undertaken by the American Library Association. The complete *2007 Public Library Funding & Technology Access Study* (American Library Association and Information Institute, College of Information, Florida State University, 2007) includes additional data collection efforts and findings, including financial technology and operating data, site visit data, and a survey findings of the Chief Officers of State Librarians. The full study report, entitled *Libraries Connect Communities: Public Library Funding & Technology Access Study 2006-2007,* is available at http://www.ala.org/ala/ors/0607report/pullibfunandtechaccstudy.cfm.

0740-8188/$ – see front matter. Published by Elsevier Inc.
doi:10.1016/j.lisr.2008.01.001

McClure, & Langa, 2006; Japzon & Gong, 2005; Rodger, D'Elia, & Jorgensen, 2001; Spink & Cole, 2001). The simplistic notion of a computer connected to the Internet made available to the public for use within public libraries spawned debate, concern, and service opportunities of significance. To provide a broader context, this section briefly discusses and reviews selected literature regarding public library Internet connectivity. The review is not exhaustive, but it illustrates the complexity and implications of connectivity. The *Internet* studies provide data that can inform the research and practice of public library Internet connectivity and public access services. The studies, however, do not explore the Internet needs and uses of particular individuals, groups, populations, or communities—they provide national and state level data regarding public library Internet connectivity.

When libraries first began to provide Internet access as a service to their communities, there were concerns that the Internet would usurp libraries or would be incompatible with their traditional missions (D'Elia et al., 2002; Rodger et al., 2001). Though some scholars have continued to question the emphasis that is now given to Internet access and services in libraries (i.e., Buschman, 2003; Buschman & Leckie, 2006), libraries embraced the Internet quickly. They viewed it as a significant enhancement of libraries' ability to meet patron information needs and promote an educated citizenry (Kranich, 2001). Research has found that public computer and Internet access is a means of equalizing access to vast amounts of information in ways that print-based collections cannot (Koontz, Jue, & Lance, 2004). Moreover, there are those who consider the lack of public computer and Internet access to be discriminatory and a widening of an information or digital divide (Bertot, 2003; Hall, 2007).

Internet access has served in many ways to enhance the position of the library in the community as a "third place"—a physical community space beyond the walls of home and work (Oldenburg, 1989). While many traditional public spaces in communities—the town square, the public gardens, the community market, and other places that fostered interaction among community members—have become less visible, the public library continues to be an extremely important public space (Given & Leckie, 2003; Leckie & Hopkins, 2002). This is due in part to the provision of Internet access. One might argue that patrons would find it as unthinkable to walk into a library and find no Internet access as it would be to find no books.

Internet access in public libraries contributes to the information, education, recreation, culture, and economic resources the libraries can provide in their communities—resources that are key parts of the missions of public libraries (Debono, 2002; Hafner, 1987; Kerslake & Kinnell, 1998; Webster, 1995; Williamson, 2000). In this rapidly changing information society, it is vital to "examine libraries from a broader social context in order to better understand the complex roles that libraries play in their communities" (Burke & Martin, 2004, p. 805). An essential aspect of understanding the broad social roles of public libraries is understanding the levels and quality of Internet access and training in public libraries, the barriers and constraints libraries face in providing and maintaining this Internet access, and the ability of libraries to meet the Internet needs and expectations of patrons, communities, and governments.

Since 1994, the *Internet* studies have detailed the implementation, uses, and development of Internet access in public libraries. By focusing on the access, services, and training provided by the libraries rather than the information behaviors of users, the *Internet* studies have documented the rise of public Internet access in public libraries in the United States. Conducted to provide national data regarding public library Internet access, the *Internet* surveys explore issues such as the extent to which public libraries are

- installing, maintaining, and upgrading the technology infrastructure required to provide public access Internet services and resources
- providing and sustaining public access Internet services and resources that meet patron, community, and government access needs and expectations
- serving as key technology and Internet-based resource/service training centers in their communities.

These studies have focused on the ways in which public libraries provide access to the Internet and accompanying services. Such data can inform the research, social, policy, technological, and other contexts in which public Internet access evolves in public libraries.

3. Survey methodology

The 2007 *Public Libraries and the Internet* study employed a Web-based survey approach to gather data. A packet mailed to library directors in the sample included a survey participation-invitation letter from the American Library Association and a print version of the survey. The letter introduced the study, provided information regarding the study sponsors and the research team, explained the study purpose and goals, gave instructions on how to access and complete the electronic survey, and provided contact information to answer participants' questions.[2]

The study obtained data that enabled analysis by the following categories:

- Metropolitan status (e.g., urban, suburban, and rural), which was determined using the official designations employed by the Census Bureau, the Office of Management and Budget, and other government agencies
- Poverty (less than 20% [low], 20%–40% [medium], and greater than 40% [high])
- State (the 50 states plus the District of Columbia)
- National.

Given the quality of the data, researchers could generalize findings to each of these four categories. However, the study only received adequate and representative responses from 43 states plus the District of Columbia. Finally, the survey explored topics that pertained to both public library system and outlet- (branch-) level data. Thus, the sample required for this study was complex.

The study team used the 2002 public library dataset available from the National Center for Education Statistics (NCES) as a sample frame. This was the most recent file at the time the geocoding process began. The study team employed the services of the GeoLib database (http://www.geolib.org/PLGDB.cfm) to geocode the NCES public library universe file in order to calculate the poverty rates for public library outlets. Given the timeframe of the study, GeoLib was able to geocode 16,457 library outlets. From these totals, the researchers used SPSS Complex Samples software to draw the sample for the study. The sample needed to allow the study team to analyze survey data at the state and national levels, along the poverty and metropolitan status strata discussed above. The study team drew a sample with replacement of 6979 outlets. Finally, the sample drawn used a 95% confidence interval for data analysis purposes.

The study team developed the questions on the survey through an iterative and collaborative effort involving the researchers, representatives of the funding agencies, and members of the Study Advisory Committee. The study team pre-tested the initial surveys with the project's advisory committee, public librarians, and the data coordinators of the state library agencies, revising the survey based on their comments and suggestions. The study team developed and tested the survey website using a range of usability, functionality, and accessibility tools.

[2] The study team also accepted completed print surveys.

Table 1
Public libraries connected to the Internet by metropolitan status and poverty

Metropolitan status	Poverty level			Overall
	Low	Medium	High	
Urban	100.0% (n=1570)	100.0% (n=1039)	100.0% (n=136)	100.0% (n=2745)
Suburban	99.8% (n=4821)	100.0% (n=327)	100.0% (n=7)	99.8% (n=5155)
Rural	99.7% (n=7052)	98.2% (n=988)	85.7% (n=25)	99.5% (n=8065)
Overall	99.8% (n=13,443)	99.3% (n=2354)	97.6% (n=168)	99.7% (n=15,965)

Weighted missing values, n=38.

The survey asked respondents to answer questions about specific library branches and the library system to which each respondent branch belonged. Respondents answered the survey between November 2006 and February 2007. After a number of follow-up reminders, the survey received a total of 4027 responses for a response rate of 57.7%. Data quality checks verified the representativeness of the responses across the metropolitan status and poverty strata nationally, as well as within 43 states and the District of Columbia. The data analysis employed weighted analysis to provide estimates.

4. Data analysis

Results from the survey indicated that public libraries continue to provide important public access computing and Internet access in their communities. Nearly all public libraries (99.7%) are connected to the Internet, and 99.1% of public libraries offer public Internet access. These are slight increases over the numbers in the 2006 survey (Bertot, McClure, Jaeger, & Ryan, 2006), revealing that public libraries continue their progress toward universal public access to the Internet.

4.1. Service levels

As Table 1 demonstrates, the connectivity rate of public libraries has effectively reached its saturation point—only a small percentage of libraries remain without an Internet connection. The connectivity rate over that past several years has increased from 98.7% in 2002 to 99.6% in 2004 to 98.9% in 2006 (Bertot, McClure, & Jaeger, 2005; Jaeger, Bertot, & McClure, 2007). All of these numbers are within the margin of error of one another, illustrating the level of consistency across public library outlets in terms of Internet connectivity. Accounting for the margin of error, virtually every public library outlet in the United States has access to the Internet. Table 1 also reveals that urban libraries have 100% connectivity across all poverty levels. The lowest connectivity levels (85.7%) are among rural libraries in high-poverty communities; in fact, this is the only group of libraries with connectivity rates below 98%. The problem of the lowest levels of connectivity in high-poverty rural areas is a continuing issue in providing equal Internet access for patrons in all regions of the country.

Table 2 reveals that an overwhelming majority of public libraries provide public Internet access. The number of libraries offering public Internet access has increased since the 2006 study, when 98.4% of libraries provided public access to the Internet. However, high-poverty rural outlets showed a decline of 14.3% in providing public Internet access from a reported 100% in 2006.

Table 3 shows that the overall average of public access Internet workstations per public library is 10.7. This average has remained relatively steady over the past several years, averaging 10.7 in 2006, 10.4 in 2004, and 10.8 in 2002 (Bertot et al., 2005; Jaeger, Bertot, & McClure, 2007). High-poverty urban libraries offer the highest average number of workstations at 30.3. The lowest number of workstations per library outlet generally is reported in rural libraries, though high-poverty suburban libraries offer the lowest average number of workstations at 4.0 (down from 5.0 in 2006). Regardless of poverty level, urban libraries offer the greatest average number of public access workstations at a rate of 2.4 times that of rural libraries and 1.4 times that of suburban libraries.

The average numbers of workstations also differ between the states and regions of the country. As Fig. 1 demonstrates, the highest average number of public access workstations available for patron use are located in the Southwestern, Southeastern, selected Midwestern and Midatlantic states, as well as California.

Table 4 reveals another way in which public libraries are working to make Internet access available to patrons—providing wireless Internet access. The number of public libraries offering wireless Internet access has significantly increased since first measured by the 2004 *Internet* survey in 2004 (Bertot et al., 2005). Wireless access was available in 17.9% of libraries in 2004 and 36.7% in 2006 (Bertot et al., 2005, 2006). Table 4 shows that in 2007, wireless access was available in 54.2% of libraries. Further, 17.4% of libraries that do not currently have wireless access plan to add it in the next year. If these libraries follow through with their plans to add wireless access, 71.6% of public libraries in the U.S. will offer wireless Internet access within a year.

In 2007, wireless access was most likely to be available in urban, suburban, and low-poverty libraries. Since 2004, there have been notable increases in the percentage of libraries with wireless access available in every category except high-poverty libraries. High-poverty libraries, however, are the most likely to have plans to add wireless access in the next year. Rural outlets and medium-poverty outlets are least likely to have wireless access or plans to add it within the next year.

Table 2
Connected public libraries providing public Internet access by metropolitan status and poverty

Metropolitan status	Poverty level			Overall
	Low	Medium	High	
Urban	99.6% (n=1563)	99.4% (n=1032)	97.1% (n=132)	99.4% (n=2728)
Suburban	99.3% (n=4798)	100.0% (n=327)	100.0% (n=7)	99.3% (n=5132)
Rural	99.1% (n=7009)	98.2% (n=988)	85.7% (n=25)	98.9% (n=8022)
Overall	99.2% (n=13,370)	99.0% (n=2347)	95.3% (n=164)	99.1% (n=15,881)

Weighted missing values, n=34.

Table 3
Average number of public library public access Internet workstations by metropolitan status and poverty

Metropolitan status	Poverty level			Overall
	Low	Medium	High	
Urban	14.1 (n=1416)	23.5 (n=872)	30.3 (n=113)	18.3 (n=2401)
Suburban	13.0 (n=4414)	8.8 (n=302)	4.0 (n=7)	12.7 (n=4723)
Rural	7.0 (n=6779)	7.4 (n=944)	9.2 (n=25)	7.1 (n=7747)
Overall	9.9 (n=12,609)	14.3 (n=2118)	25.4 (n=145)	10.7 (n=14,872)

4.2. Adequacy of access

Despite increases in Internet connectivity, public Internet access, and wireless access, many public libraries still are not able to provide access sufficient to meet the needs of their patrons. As Table 5 shows, only 21.9% of public libraries reported having sufficient workstations to meet patron needs at all times. A majority of public libraries (58.8%) reported too few workstations for patron use at various times throughout the day, while an additional 18.7% of libraries reported consistently fewer workstations than were needed throughout the day. Poverty was less an indicator of sufficiency than metropolitan status. Urban libraries were the most likely (90.8%) to report having consistently fewer workstations than needed, while rural libraries were most likely (28.2%) to report sufficient workstations to meet patron needs. Nevertheless, 57.4% of rural libraries still reported not having enough workstations to handle patron needs at different times throughout the day. For the most part, all of the advances in access at public libraries are not keeping pace with patrons' access needs.

Another factor in the sufficiency of Internet access provided by public libraries is the adequacy of the connection speed (see Table 6). A majority of libraries (52.3%) reported inadequate access speeds. Only 43.6% of libraries report that their connection speed is adequate to meet patron needs at all times, a decrease of approximately 10% from 2006. This is a sizeable drop for a one-year period, indicating that the increasing complexity and bandwidth requirements of social networking, multimedia, and other Web 2.0 technologies are beginning to stress the connection speed capacities of libraries. Rural libraries were more likely than urban and suburban libraries to report adequate access speeds.

A large factor in the sizeable demands for Internet access being placed on public libraries is the fact that public libraries are often the only providers of free Internet access in their communities. As shown in Table 7, 73.1% of libraries are the only provider of free Internet access in their service areas. In rural areas, the percentage reaches 76.5%. Only 17.4% of libraries could identify other places in their service areas that were providing free Internet access. Thus, a high percentage of communities rely on public libraries to ensure that all community members can access the Internet without charge.

4.3. Meeting community needs

One way in which public libraries try to meet community reliance on the Internet access they provide is by maintaining the number of hours they are open. The average number of hours that public libraries are open per week increased slightly since 2004. As Table 8 shows, the average number of hours a library was open was 45.2 in 2007. The average number of hours open per week in 2004 was 44.5, and the average increased slightly to 44.8 in 2006. Not surprisingly, urban libraries have the highest average hours open (54.2), while rural outlets have the lowest average (38.1). Urban libraries in medium-poverty areas show the biggest increase (4.1) in hours open from 2006 to 2007. In contrast, rural outlets had the lowest average in 2006 (38.7) and 2007 (38.1), showing a decrease of 0.6 hours open. In fact, rural, low-poverty, and high-poverty outlets all reported decreased average hours open from 2006 to 2007.

Public libraries also offer patrons a wide range of services related to Internet access. The most frequently offered public access Internet services are licensed databases (85.6%), homework resources (68.1%), digital reference or virtual reference services (57.7%), e-books (38.3%),

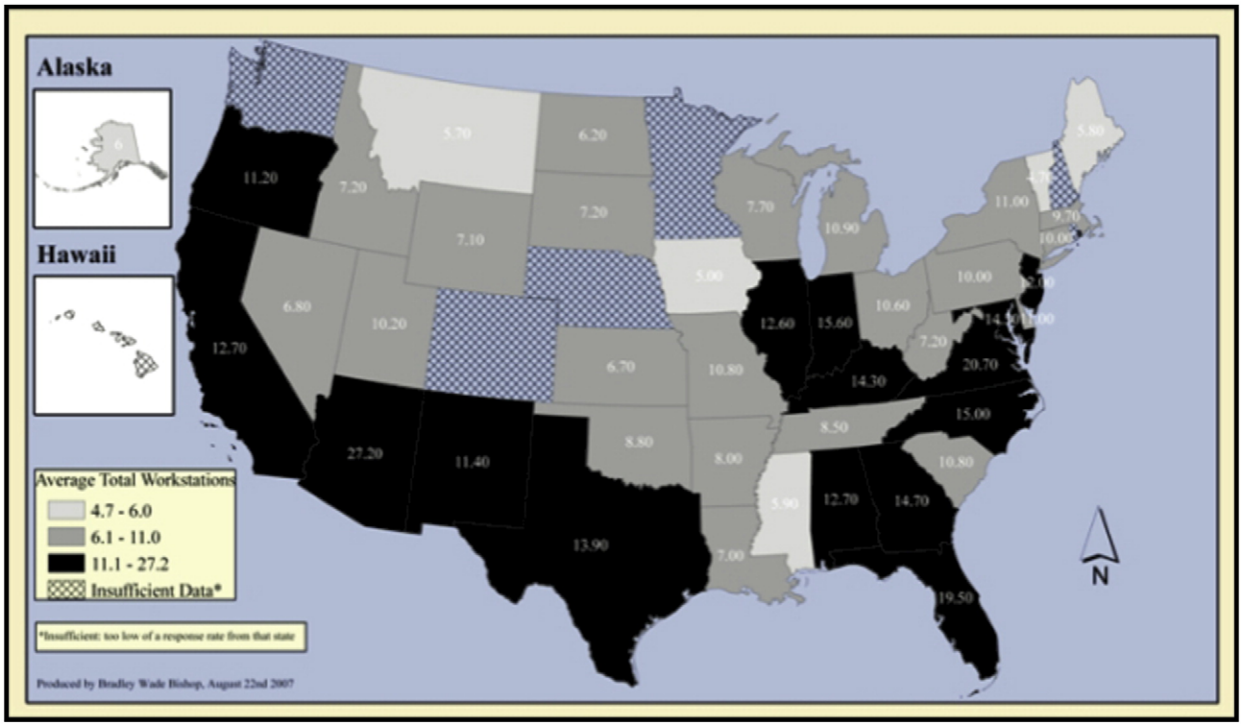

Fig. 1. Average number of public library public access Internet workstations by state.

Table 4
Public access wireless Internet connectivity in public library outlets by metropolitan status and poverty

Availability of public access wireless Internet services	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
Currently available	66.8% (n=1822)	60.7% (n=3112)	45.8% (n=3676)	55.6% (n=7425)	47.0% (n=1102)	50.1% (n=82)	54.2% (n=8610)
Not currently available, but there are plans to make it available within the next year	18.8% (n=513)	17.3% (n=889)	17.0% (n=1364)	17.0% (n=2271)	19.3% (n=452)	25.8% (n=42)	17.4% (n=2765)
Not currently available and no plans to make it available within the next year	12.5% (n=340)	20.0% (n=1024)	35.2% (n=2825)	25.6% (n=3423)	31.1% (n=730)	21.6% (n=35)	26.4% (n=4188)

Weighted missing values, n=8.

and audio content such as podcasts and audio books (38%) (see Table 9). Urban and high-poverty library systems offer the greatest number of services overall. Responding library systems were also able to list other services not included in the question options. Other services noted by library systems included community information, interlibrary loans, genealogy databases, and obituary indexes.

Another way in which public libraries seek to make Internet access available to as many patrons as possible is through providing training in the use of Internet technologies and services. Table 10 identifies the impacts of information technology training provided to patrons by public library staff. Providing information literacy skills is the most frequently reported impact of the technology training provided (45.7%). Technology skills training (39.4%) and general technology skills (37.6%) are the second- and third-most frequently provided information technology training by libraries. Helping students with school and homework assignments was reported by 35.2% of libraries. Given the extent to which public libraries are part of e-government service provision (Bertot, Jaeger, Langa, & McClure, 2006a, 2006b; Jaeger & Fleischmann, 2007; Jaeger, Langa, McClure, & Bertot, 2007), it seems surprising that only 19.9% of libraries offer e-government training. Further, only 1.7% of libraries provide training specifically for business owners. Rural outlets are the least likely to offer training of any kind (30.8%). This is largely attributed to insufficient staff resources to provide formal technology training to the public.

The computers and Internet connectivity in public libraries are used to provide a broad range of services for patrons. Table 11 shows the services provided by public libraries to their communities. Education support services account for many of the most commonly offered services, including education resources for K-12 students (67.7%) and education resources and databases for adult/continuing education (27.5%) and students in higher education (21.4%). Providing services for job seekers was reported by 44% of public libraries, while 29.8% provide computer and Internet skills training.

4.4. The infrastructure plateau

Answers to numerous different survey questions on the 2007 *Internet* survey revealed a very interesting trend—public libraries may have reached a plateau along two major infrastructure measures: Internet workstations and bandwidth (McClure, Jaeger, & Bertot, 2007).

- In 2007, 32.9% of connected public library branches reported connection speeds of 769 kbps–1.5 mbps, down slightly from 34.4% in 2006.
- In 2007, 29.2% of connected libraries reported connection speeds of greater than 1.5mbps compared to 28.9% in 2006.
- Bandwidth speed decreased slightly since 2006; 62.1% of public library branches reported connection speeds of greater than 769 kbps in 2007, compared to 63.3% in 2006.
- Overall, 16.6% of respondents reported that their connection is the maximum speed that they can acquire, 18.1% cannot afford to increase their bandwidth, and 19.3% could increase their bandwidth but had no plans to do so. Thus, more than 50% of libraries indicated that they will not be increasing their bandwidth for reasons of affordability, ability, or availability.
- The average number of public access Internet workstations is 10.7. This number has not changed significantly since 2002 (2002: 10.8; 2004: 10.4; 2006: 10.7).

The last point two points are particularly telling—the average number of workstations has remained consistent for four survey cycles, and it appears that the ability of libraries to continually add bandwidth capacity has an upper limit. It remains to be seen if public library bandwidth is in fact beginning to plateau.

Another aspect of the infrastructure plateau is reflected in the continual process of adding, maintaining, replacing, and upgrading workstations.

- 17.2% of public libraries plan to add more workstations within the next year, while 21.7% of branches are considering doing so.
- 50.1% of public libraries plan to replace some workstations within the next year. Of this number, 25.0% have plans to replace a definite number of workstations, with a planned average replacement of 6.2 workstations.
- A total of 28.9% of public libraries plan to upgrade some workstations within the next year. Of this number, 7.1% have plans to

Table 5
Sufficiency of public access Internet workstations by metropolitan status and poverty

Sufficiency of public access workstations	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
There are consistently fewer public Internet workstations than patrons who wish to use them throughout a typical day	36.4% (n=992)	16.9% (n=867)	13.9% (n=1117)	17.7% (n=2372)	24.1% (n=565)	24.0% (n=39)	18.7% (n=2976)
There are fewer public Internet workstations than patrons who wish to use them at different times throughout a typical day	54.4% (n=1485)	63.3% (n=3248)	57.4% (n=4605)	59.5% (n=7959)	54.9% (n=1289)	54.5% (n=89)	58.8% (n=9337)
There are always sufficient public Internet workstations available for patrons who wish to use them during a typical day	8.5% (n=231)	19.3% (n=993)	28.2% (n=2259)	22.3% (n=2983)	19.8% (n=465)	21.5% (n=35)	21.9% (n=3483)

Table 6
Public library outlet public access Internet connection adequacy by metropolitan status and poverty

Adequacy of public access Internet connection	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
The connection speed is insufficient to meet patron needs	21.8% (*n*=595)	15.8% (*n*=808)	13.9% (*n*=1114)	15.0% (*n*=2003)	20.0% (*n*=470)	26.4% (*n*=43)	15.9% (*n*=2517)
The connection speed is sufficient to meet patron needs at some times	37.8% (*n*=1030)	40.4% (*n*=2068)	33.4% (*n*=2676)	36.2% (*n*=4831)	38.1% (*n*=893)	30.3% (*n*=50)	36.4% (*n*=5774)
The connection speed is sufficient to meet patron needs at all times	35.8% (*n*=975)	39.6% (*n*=2030)	48.9% (*n*=3922)	45.0% (*n*=6009)	36.3% (*n*=852)	40.8% (*n*=67)	43.6% (*n*=6928)
Don't know	1.2% (*n*=33)	1.4% (*n*=72)	*	1.1% (*n*=144)	1.2% (*n*=27)	–	1.1% (*n*=171)

Weighted missing values, *n*=8.
Key: – : No data to report.
*: Insufficient data to report.

upgrade a definite number of workstations, with a planned average upgrade of 6.6 workstations.
- 17.4% of libraries plan to add wireless access within the next year, which would then mean that more than 71% of public libraries offered wireless access.

These numbers indicate that, while many libraries may be approaching or have reached an infrastructure plateau, some libraries still have room to grow in terms of technology. Future iterations of this study will help to clarify the problem of the infrastructure plateau, the extent to which it is actually affecting public libraries, and the degree to which public library bandwidth is sufficient to meet current and future needs (Bertot & McClure, 2007).

5. Issues and implications

Survey respondents reported that in nearly three-quarters of communities in the United States, the public library is the only place to turn to for free public Internet access. This finding alone highlights the reliance of patrons, communities, and governments—either explicitly or implicitly—on the free Internet access and training provided by public libraries. There is no other comparable alternative in most communities in the United States (Bertot et al., 2006a, 2006b; Jaeger, Bertot, McClure, & Rodriguez, 2007; Jaeger & Fleischmann, 2007; Jaeger, Langa, et al., 2007).

This also helps to explain why public libraries have such difficulties in meeting patron needs for numbers of workstations and levels of connectivity. More often than not, libraries are trying to accommodate every person who has no other means of access, every person who needs training or assistance, every person who is traveling, and numerous other groups of people who need to use public Internet access. However, libraries do not have infinite financial resources, staffing, or physical space. There appears to be a growing tension between the workstations and connectivity that libraries can provide and the workstations and connectivity that patrons, communities, and governments demand from libraries. Indeed, the increasing emphasis on interactive Internet-based services and resources—be they commercial or government initiated—require a range of high-end hardware, software, and telecommunications infrastructure to function properly. Moreover, such services require a substantial amount of support in terms of staff and patron training, knowledge, and general assistance. Increasingly, public library resources are stressed and unable to meet these demands easily.

The 2007 survey asked a range of questions that assessed the ability of public library infrastructure to provide public access Internet and computing services. Libraries reported that they faced considerable challenges, such as:

- *Physical space*. Physical space prevents further expansion of Internet services in many libraries. Some library buildings are out of space and cannot support more workstations, some are insufficiently wired to support more cable drops, and some are insufficiently wired for the power requirements of workstations and patron-provided laptops.
- *Financial resources*. Libraries reported that funding workstation replacements, upgrades, bandwidth enhancements, and other services related to public Internet access and computing was a major and growing problem as Internet content requires increasingly faster processors, graphics capabilities, peripherals (e.g., scanners, Web cams, microphones), and larger amounts of bandwidth.
- *Staffing*. Staff skills and time were factors in the decisions of many libraries to upgrade their public access infrastructure. A lack of dedicated IT staff is a particular burden for many public libraries.
- *Maintenance and support*. The addition, replacement, and upgrade of public access technologies bring with it a range of support and maintenance issues. Libraries cited maintenance requirements as a primary limitation on their ability to engage in technology replacement, upgrade, and addition strategies.

Together, these data point to what may be the beginning of a trend—public libraries may have added as much public access infrastructure that is possible with their current buildings and resources. Issues with funding levels and staffing serve to further aggravate this issue.

Another key issue woven through the survey's findings is that, while public libraries provide a substantial *amount* of public access Internet and computing service, the overall physical infrastructure

Table 7
Public libraries as the only provider of free public Internet access by metropolitan status and poverty

Free public access	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
Yes	49.5% (*n*=306)	71.4% (*n*=1955)	76.5% (*n*=4300)	74.6% (*n*=5983)	61.4% (*n*=548)	48.6% (*n*=30)	73.1% (*n*=6561)
No	33.1% (*n*=204)	16.4% (*n*=450)	16.2% (*n*=911)	16.3% (*n*=1306)	26.3% (*n*=234)	40.6% (*n*=25)	17.4% (*n*=1566)
Do not know	9.7% (*n*=60)	9.0% (*n*=247)	3.0% (*n*=167)	5.1% (*n*=410)	6.8% (*n*=61)	5.4% (*n*=3)	5.3% (*n*=475)
Other	4.7% (*n*=29)	1.6% (*n*=45)	3.1% (*n*=174)	2.7% (*n*=216)	3.4% (*n*=30)	2.7% (*n*=2)	2.8% (*n*=248)

Table 8
Average number of hours open per week per library by metropolitan status and poverty

Metropolitan status	Poverty level			Overall
	Low	Medium	High	
Urban	53.0 (n=1570)	56.1 (n=1039)	54.4 (n=136)	54.2 (n=2745)
Suburban	52.1 (n=4848)	46.4 (n=327)	30.5 (n=7)	51.7 (n=5182)
Rural	38.3 (n=7088)	37.0 (n=1010)	36.6 (n=29)	38.1 (n=8127)
Overall	45.0 (n=13,507)	47.0 (n=2376)	50.4 (n=172)	45.2 (n=16,055)

they are able to provide may be lacking in *quality*. Consider the following data points from the survey:

- Bandwidth remained essentially unchanged between the 2006 survey and the 2007 survey. For example, 62.1% of public libraries have connection speeds of greater than 769 kbps, as compared to 63.3% in 2006.
- Overall, 50% of libraries indicated that they will not be increasing their bandwidth for a range of reasons.
- Roughly 52% of libraries identified their connectivity speed as being insufficient some or all of the time. This is an increase of about 6% from 2006.
- Nearly 80% of libraries reported that they have insufficient workstations some (58.8%) or all (18.7%) of the time. These figures are fairly consistent with the 2006 survey findings, in which 71.7% of libraries had insufficient workstations some of the time and 13.7% of libraries had insufficient workstations all of the time.
- Just under 50% of public libraries reported that their wireless connections shared the same bandwidth as their public access workstations.

Together, these data indicate a public library public access infrastructure that is increasingly unable to keep up with the demands of the Web 2.0 environment—an environment that requires increasingly sophisticated workstations, substantial bandwidth, and a range of resources that libraries indicate that they may not be able to support. This will be a major issue as the Internet continues to demand ever-greater technical capacity for its content. Said differently, the public access technology adoption curve seems to be in the process of leveling. It may be that libraries' ability to continuously absorb the demands of public access computing and Internet access is over.

But perhaps the most significant impact of the survey's findings is twofold: 1) the implications for the communities and populations that public libraries serve, and 2) the implications for the relevancy of public libraries in a continually evolving and complex Internet service and resource environment. If it is indeed the case that public libraries are reaching the limits of their abilities to absorb, upgrade, add, or otherwise expand their Internet-based services, the potential to leave segments of society and communities behind is substantial. As indicated in the survey findings, 73.1% of public libraries overall reported that they are the only free public access point within their communities. And though only 49.5% of urban libraries reported being the only free public Internet access venue, one can surmise that the public library may in fact provide the most robust connectivity and access in urban communities. Coupled with the computer, Internet, and resource training that public libraries offer, the lack of up-to-date technology, trained and adequate staff, adequate bandwidth, and other resources and services can create and expand information, technology, and literacy divides within populations and communities.

Focusing on the public library as a cyber-place (putting aside, but acknowledging, the literature on libraries physical places—see Buschman & Leckie, 2006), one must wonder what the implications of a stagnant Internet technology infrastructure would mean for the public library. Would populations, especially youth, expecting reasonable access through the library find the public library inaccessible? Perhaps irrelevant? In an Internet environment that requires continually more powerful computers, faster Internet connections, and multimedia peripherals (e.g., Web cams, scanners, recording and mixing devices and software, streaming audio and video capabilities, and more), an infrastructure frozen in time will falter and be unable to meet patron demands or community needs. This would, in effect, remove what has become a central role for public libraries as they serve their communities.

6. Future research

For nearly 15 years, the *Public Libraries and the Internet* studies have documented the growth of computers, Internet access, and networked services in U.S. public libraries. As libraries and the services they provide to their patrons and communities have become increasingly technology intensive and the technologies themselves have become more powerful, the issues related to providing free public Internet access have grown in complexity over time. In the current social and policy environment, public libraries are entrenched as the place for free public Internet access. Fulfilling that expected community role will only grow more difficult as complex Web 2.0 technologies continue to require greater amounts of bandwidth and processing capacity. Continuing to meet patron, community, and government Internet access expectations will be an extremely import issue for public libraries in the near future.

It behooves library and information science researchers to pay greater attention to and engage in research that expands the amount of knowledge about these issues. Libraries will need data to

- understand better the access expectations of patrons, communities, and governments. For example, little is known specifically about

Table 9
Public library system public access Internet services by metropolitan status and poverty

Internet services	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
Digital reference/Virtual reference	69.1% (n=426)	66.1% (n=1811)	52.3% (n=2940)	57.6% (n=4621)	57.7% (n=515)	67.4% (n=42)	57.7% (n=5178)
Licensed databases	96.2% (n=594)	92.7% (n=2539)	81.0% (n=4555)	84.8% (n=6802)	92.8% (n=828)	91.8% (n=57)	85.6% (n=7687)
E-books	67.2% (n=415)	48.6% (n=1332)	30.0% (n=1687)	38.2% (n=3063)	37.3% (n=333)	62.1% (n=39)	38.3% (n=3434)
Video conferencing	8.4% (n=52)	1.9% (n=52)	5.0% (n=280)	3.9% (n=316)	6.7% (n=60)	13.5% (n=8)	4.3% (n=384)
Online instructional courses/tutorials	44.0% (n=272)	30.7% (n=841)	35.1% (n=1973)	33.7% (n=2704)	39.0% (n=348)	54.0% (n=34)	34.4% (n=3085)
Homework resources	77.0% (n=476)	73.4% (n=2010)	64.6% (n=3630)	68.0% (n=5458)	67.9% (n=606)	81.1% (n=50)	68.1% (n=6115)
Audio content (e.g., podcasts, audio books, other)	51.4% (n=317)	52.0% (n=1425)	29.7% (n=1670)	38.1% (n=3053)	35.8% (n=320)	64.8% (n=40)	38.0% (n=3413)
Video content	26.3% (n=162)	15.7% (n=431)	16.0% (n=898)	16.1% (n=1289)	20.2% (n=181)	35.1% (n=22)	16.6% (n=1491)
Digitized special collections (e.g., letters, postcards, documents, other)	37.4% (n=231)	27.4% (n=750)	16.2% (n=912)	20.5% (n=1642)	24.9% (n=222)	45.9% (n=29)	21.1% (n=1892)
Other	5.2% (n=32)	3.7% (n=100)	3.7% (n=208)	3.6% (n=289)	5.5% (n=49)	5.5% (n=3)	3.8% (n=341)

Will not total to 100%, as respondents could select more than one option.

Table 10
Public library information technology training for patrons by metropolitan status and poverty

Impact of training	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
No training offered	12.5% (*n*=342)	18.9% (*n*=967)	30.8% (*n*=2474)	24.4% (*n*=3263)	21.6% (*n*=508)	7.3% (*n*=12)	23.8% (*n*=3783)
Facilitates local economic development	6.6% (*n*=178)	2.2% (*n*=113)	*	2.2% (*n*=296)	2.6% (*n*=60)	7.1% (*n*=12)	2.3% (*n*=367)
Offers technology training to those who would otherwise not have any	54.2% (*n*=1474)	45.2% (*n*=2314)	30.8% (*n*=2470)	38.7% (*n*=5176)	42.3% (*n*=989)	56.9% (*n*=93)	39.4% (*n*=6259)
Helps students with their school assignments and school work	35.9% (*n*=976)	36.2% (*n*=1857)	34.4% (*n*=2759)	34.3% (*n*=4587)	40.4% (*n*=946)	35.7% (*n*=59)	35.2% (*n*=5592)
Helps business owners understand and use technology and/or information resources	1.7% (*n*=47)	1.6% (*n*=83)	1.6% (*n*=132)	1.6% (*n*=217)	1.9% (*n*=45)	–	1.7% (*n*=262)
Helps patrons complete job applications	24.8% (*n*=675)	18.9% (*n*=971)	21.9% (*n*=1759)	20.8% (*n*=2778)	24.6% (*n*=576)	31.4% (*n*=52)	21.5% (*n*=3405)
Provides general technology skills	45.3% (*n*=1232)	41.1% (*n*=2104)	32.8% (*n*=2628)	37.1% (*n*=4962)	39.2% (*n*=917)	51.7% (*n*=85)	37.6% (*n*=5964)
Provides information literacy skills	48.9% (*n*=1329)	53.7% (*n*=2752)	39.6% (*n*=3173)	46.1% (*n*=6158)	43.4% (*n*=1015)	49.8% (*n*=82)	45.7% (*n*=7255)
Helps users access and use electronic government services and resources	17.5% (*n*=477)	18.6% (*n*=953)	21.6% (*n*=1734)	20.3% (*n*=2717)	17.3% (*n*=404)	26.1% (*n*=43)	19.9% (*n*=3164)
Other	3.8% (*n*=104)	2.2% (*n*=111)	2.9% (*n*=231)	2.7% (*n*=360)	3.5% (*n*=82)	2.4% (*n*=4)	2.8% (*n*=446)

Weighted missing values, *n*=14.
Key: – : No data to report.
* : Insufficient data to report.

what users want from their public library's public Internet access services and resources in systematic and comprehensive studies. Do they want more workstations? Better wireless access so that they can bring in their own devices? Do they want more licensed resources? Training services? Or perhaps different types of training? In addition, understanding community needs (e.g., immigration assistance, agricultural information, etc.) and how those needs could be better met by the library's Internet connectivity would be of significant value. Finally, as governments continue to introduce and require the use of electronic services (e-government), libraries need to understand their role as service conduits and access points to e-government services.

- make decisions about planning, acquiring, managing, and evaluating Internet technologies. As public libraries integrate Internet-based technologies, services, and resources into their public services, there are a range of questions to answer. These include, but are not limited to, what is the best infrastructure to deliver the services that library can afford and meet patron and community needs? How much is enough public Internet access service given the community needs and library resources? Given the library's other service needs, how can the library balance traditional and technology-based services? In what ways can libraries evaluate and measure electronic service and use (e-metrics)? Does planning in the networked environment differ than traditional service planning? How does a library engage in "best fit" planning efforts in a continually evolving service environment?
- argue for funding to provide sufficient Internet access to meet the needs of patrons, communities, and governments. Public libraries continue to invest substantial portions of their collections and

Table 11
Public access Internet services critical to the role of the public library

Public Internet services	Metropolitan status			Poverty level			Overall
	Urban	Suburban	Rural	Low	Medium	High	
Provide education resources and databases for K-12 students	71.2% (*n*=1938)	71.8% (*n*=3680)	63.8% (*n*=5118)	67.1% (*n*=8972)	70.5% (*n*=1650)	68.9% (*n*=113)	67.7% (*n*=10,735)
Provide education resources and databases for students in higher education	15.2% (*n*=414)	21.9% (*n*=1124)	23.2% (*n*=1858)	20.5% (*n*=2741)	26.5% (*n*=620)	21.6% (*n*=36)	21.4% (*n*=3396)
Provide education resources and databases for home schooling	8.5% (*n*=231)	12.4% (*n*=635)	17.9% (*n*=1433)	15.2% (*n*=2036)	11.1% (*n*=259)	2.4% (*n*=4)	14.5% (*n*=2299)
Provide education resources and databases for adult/continuing education students	23.5% (*n*=639)	25.2% (*n*=1289)	30.4% (*n*=2436)	27.4% (*n*=3657)	28.0% (*n*=656)	31.3% (*n*=51)	27.5% (*n*=4364)
Provide information for local economic development	9.2% (*n*=249)	2.6% (*n*=132)	2.9% (*n*=236)	3.7% (*n*=490)	4.8% (*n*=113)	9.5% (*n*=16)	3.9% (*n*=618)
Provide information about state and local business opportunities	4.5% (*n*=122)	1.6% (*n*=82)	3.1% (*n*=250)	2.8% (*n*=369)	2.8% (*n*=66)	12.0% (*n*=20)	2.9% (*n*=455)
Provide information for college applicants	1.9% (*n*=51)	3.6% (*n*=184)	7.8% (*n*=627)	5.0% (*n*=664)	8.1% (*n*=190)	4.9% (*n*=8)	5.4% (*n*=862)
Provide information for local business marketing	*	1.6% (*n*=82)	*	1.1% (*n*=149)	*	2.4% (*n*=4)	1.0% (*n*=164)
Provide information about the library's community	17.9% (*n*=488)	18.0% (*n*=924)	10.3% (*n*=829)	14.4% (*n*=1926)	12.8% (*n*=300)	9.0% (*n*=15)	14.1% (*n*=2241)
Provide information or databases regarding investments	2.5% (*n*=67)	6.1% (*n*=314)	1.5% (*n*=122)	3.4% (*n*=450)	2.3% (*n*=54)	–	3.2% (*n*=503)
Provide access to local public and local government documents	9.6% (*n*=262)	5.2% (*n*=267)	7.0% (*n*=564)	6.9% (*n*=928)	6.4% (*n*=149)	9.5% (*n*=16)	6.9% (*n*=1093)
Provide access to federal government documents	5.0% (*n*=137)	5.8% (*n*=295)	11.0% (*n*=885)	8.9% (*n*=1196)	5.1% (*n*=118)	2.4% (*n*=4)	8.3% (*n*=1318)
Provide computer and Internet skills training	43.7% (*n*=1190)	31.4% (*n*=1609)	24.0% (*n*=1929)	28.5% (*n*=3807)	36.6% (*n*=857)	37.9% (*n*=62)	29.8% (*n*=4727)
Provide services for job seekers	44.0% (*n*=1198)	44.1% (*n*=2262)	44.0% (*n*=3528)	44.1% (*n*=5896)	42.9% (*n*=1005)	52.8% (*n*=87)	44.0% (*n*=6987)
Provide services to new citizens and residents	11.5% (*n*=314)	9.9% (*n*=506)	14.9% (*n*=1193)	13.2% (*n*=1766)	10.5% (*n*=247)	–	12.7% (*n*=2013)
Other	10.9% (*n*=296)	14.8% (*n*=759)	11.5% (*n*=919)	13.0% (*n*=1732)	9.4% (*n*=219)	13.7% (*n*=23)	12.4% (*n*=1974)

Will not total to 100%, as respondents could select more than one option.
Weighted missing values, *n*=14.
Key: – : No data to report.
* : Insufficient data to report.

operating budgets in electronic services and resources, and yet they provide community-wide benefit and are increasingly subsidizing state and local government agency e-government services. How can libraries demonstrate the effort, resources, and costs of assisting patrons with completing government forms and applications? How do libraries demonstrate the value of their Internet services to their funders?

- develop strategies for building improvements, additions, and other building-based needs. The 2007 *Internet* study clearly shows that libraries are reaching the capacity of their buildings. What building and technology infrastructure, staff expertise, and training needs do libraries have to meet the demands of patrons, communities, and governments? What are the service constraints that buildings, inadequate technology infrastructure, and staff knowledge place on public libraries?
- campaign for a greater role in policy-making processes that so significantly impact the Internet access activities of public libraries. The Education Rate program (E-rate), which was established by the Telecommunications Act of 2006 (P.L. 104-104); Children's Internet Protection Act (CIPA) (P.L. 106-554), the proposed Deleting Online Predators Act of 2007 (DOPA) (H.R. 5319); and the proposed Community Broadband Act of 2007 (S. 1853), are all examples of the impacts that the policy environment can have on public library public access Internet services by either facilitating connectivity (such as E-rate and the Community Broadband Act of 2007) or restricting access (such as CIPA and its filtering requirement; DOPA and its requirement that would limit social networking technologies such as chat). What are the best forums through which public libraries can participate in and influence the policy debates surrounding public access Internet services? How can libraries ensure equitable access to all through their public access services while they are constrained in the services they can offer?

These are merely a representative sample of the areas in which researchers could be more actively working to help public libraries provide, improve, and enhance their Internet access.

The 2007 study confirms findings from previous years that librarians need to do a better job of "telling their story" regarding the importance and impact of public access computing to the communities that they serve. This includes undertaking advocacy efforts, such as partnering with key groups in the community, working the political environment better, and marketing/promoting the impact of public access computing through the use of both qualitative and quantitative data.

Public libraries provide a tremendous service to patrons, communities, and governments by ensuring that Internet access is available to all. This is especially true in the nearly three-quarters of communities where public libraries are the only form of free Internet access. Overall, the data from the 2007 *Internet* survey demonstrate that public libraries are making substantial efforts to meet the Internet access needs of patrons, communities, and governments. It is also becoming evident, however, that maintaining access levels and providing the amount of access that patrons, communities, and governments expect is becoming increasing difficult for many libraries. Future research will need to focus on how to better understand and resolve these tensions regarding library technology.

Acknowledgments

The authors acknowledge the assistance of Larra Clark and Denise M. Davis of the American Library Association in the development of this study. The authors also wish to acknowledge the support of the Bill & Melinda Gates Foundation for the research reported here. Finally, the authors acknowledge and greatly appreciate the participation by the many librarians who completed the surveys—without which there would have been no study.

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