

**Communicating the impact of free access to computers and the Internet in public libraries: a  
mixed methods approach to developing outcome indicators**

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**Abstract**

The U.S. IMPACT studies have two research projects underway that employ a mixed method research design to develop and validate performance indicators related specifically to the outcomes of public access computing (PAC) use in public libraries. Through the use of a nationwide telephone survey (n=1130), four case studies, and a nationwide Internet survey of PAC users administered through 636 public libraries, this approach will generate generalizable quantitative data on the extent and distribution of the use of public access computing resources, as well as provide rich contextual data that will help understand how people use the computers and Internet connections in public libraries and the impact it has on their lives.

**Key words**

Mixed methods research, public access computing, outcomes evaluation, indicators

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## I. Introduction

Providing free access to computers and the Internet has become central to the mission of public libraries across the country. Library patrons logged over 300,000,000 Internet sessions on public library computers in 2006 (Miller, Manjarrez et al. 2008), continuing a growth trend observable in annual library surveys such as the *Public Libraries Survey* conducted by the Institute of Museum and Library Services and the National Center for Education Statistics (cf. IMLS, 1992-2006) and the *Public Libraries and the Internet* studies currently conducted with support from the American Library Association and The Bill & Melinda Gates Foundation (cf. Bertot, McClure et al., 1997-2008).

While Internet services are available in nearly all public libraries, past research has produced little evidence that shows a relationship between public access computers and Internet access and patron or community outcomes. Most research regarding Internet-related services in libraries has tended to focus on inputs (e.g., number of terminals, speed of Internet connections) or outputs (e.g. number of patron sessions, percent of the time terminals are in use), with data collection usually occurring at the library level. While useful for cataloging the inventory of available resources and charting its growth and use, this type of information provides little to public librarians and policy makers—at the local, state and federal levels—wanting to allocate scarce resources to activities that will maximize value to patrons and the public. Furthermore, public library research that seeks information directly from patrons, as through satisfaction surveys or case studies, rarely produce data that can be generalized or is reliably predictive of patron characteristics or behavior.

To measure and communicate the value of free access to computers and the Internet in public libraries to individuals, families and communities, better methods that ask different questions and yield

robust data are needed. Led by Karen Fisher and Mike Crandall at The Information School of the University of Washington and funded by the Institute of Museum and Library Services and the Bill & Melinda Gates Foundation, the U.S. IMPACT studies currently have two research projects underway that employ a mixed methods research design to develop and validate specific indicators that can be used for performance evaluation and strategic decision making related to the outcomes of PAC use. Through the use of a nationwide telephone survey, library case studies, and a nationwide Internet survey of public access computing patrons, this approach will generate generalizable quantitative data on the extent and distribution of the use of public access computing resources, as well as provide rich contextual data that will help in the understanding of how patrons use the computers and Internet connections in public libraries and the impact it has on their lives. Further, the mixed methods approach will allow for the examination of external factors that may influence patron outcomes, including the level library services and funding, community perceptions, and the availability of alternative modes of free access to computers and the Internet.

## **II. Project goals**

An important issue facing library managers is how to communicate the value of providing free access to computers and the Internet in public libraries. Demonstrating high demand through use statistics or patron satisfaction through service outlet-level surveys are not enough to justify budget requests in a policy environment increasingly focused on how individuals and the public benefit from social programs. Outcomes-focused evaluation provides this information to policy makers in measurable, concrete terms and also helps public managers evaluate program activities, identify problems, and motivate staff towards achievable goals (Hatry, Lampkin, et al., 2003). In the public library computing environment, outcomes evaluation and performance measurement can help libraries

focus their services on satisfying important information needs of patrons and address gaps in electronic access in the communities they serve.

A key tool in performance evaluation is the use of outcome indicators. Indicators are measures of progress or change and are commonly used to track the extent to which programs affect desired outcomes over time. For example, the Urban Institute used the percent of conventional mortgage loans in a particular neighborhood as one factor in a composite indicator of the overall neighborhood economic health. This composite indicator, or index, was used to assess the impact of urban development programs over time (Zielenbach, 2006). Many different indicators can be developed, combined, and used to track outcomes. However, to provide useful data to managers and policy makers indicators need to be

Specific (unique, unambiguous); observable (practical, cost effective to collect, measurable); understandable (comprehensible); relevant (measures important dimensions, appropriate, related to the program, of significance, predictive, timely); time bound (covered a specific period of time); and valid (provided reliable, accurate, unbiased, consistent, and verifiable data). (Urban Institute & Center for What Works, 2006)

Indicators for public access computing can be associated with inputs, such as expenditures on computers or staff time spent on helping patrons, or with outputs, such as the number of computer sessions or attendance at technology-related trainings. However, in order to measure the results of these inputs and outputs, indicators need to measure how PAC resources in public libraries affect the social, economic, personal, and/or professional wellbeing of individuals, families, and communities.

Unlike input and output measures typical in library evaluation, outcome indicators focus on users of services and how those services resulted in a change in their lives.

The development of indicators for areas of interest to an organization's work is a multi-stage process. Since little previous work has been done on the outcomes of PAC use, the immediate goal of the IMPACT studies is to develop a set of common indicators that can be incorporated into an outcomes-oriented performance measurement framework for public libraries to use for demonstrating how the public benefits from PAC resources. The research activities will thus determine whether particular indicators are useful pointers to contribution in specific policy domains and help library advocates advance beyond the anecdotal approach that is the best we have at the present time for discussing the use of PAC.

### **III. Methods for indicator development and validation**

Measuring change is no easy task. As with the urban development example, many indicators are needed in order to capture the range of ways people benefit from using PAC resources. To help develop survey instruments and case study protocols for the tracking of indicators and to provide a framework for the analysis and interpretation of data, a logic model ( or outcome-sequence chart) was developed to identify key sequences in the flow of public library inputs and outputs to the expected outcomes of PAC use. The logic model also helps clarify the relationship between library outcomes and higher-level policy goals, like urban development, for which many types of programs and services may be mobilized to address (Naumer, forthcoming). The IMPACT studies identified seven indicator domains as potentially valuable because of their applicability to PAC use and policy goals: (1) civic engagement; (2) eCommerce/eBusiness; (3) education; (4) eGovernment; (5) health; (6) employment; and (7) social

inclusion. In each of these areas, a number of outcomes were identified from existing studies in order to allow for cross-correlation with other data collections and to show the public library's contribution to indicators of change at the community or societal levels. The candidate indicators are related to specific, measureable outcomes that can be accomplished using the library's PAC resources.

Telephone and web survey questions were developed to gather metrics about the outcome-sequence: how users are interacting with PAC; and specifically what sorts of activities they are engaging in within the seven research domains. The questions go beyond asking if the activity took place to asking about whether a concrete result to which that activity may have contributed occurred—moving from an *output* measure to an *outcome* measure. For example, in the domain of employment, PAC users will be asked if they used a PAC or library Internet connection (activity) to look for a job opening (output), and if so, whether they got a job interview and/or were hired as a result (outcome). Moreover, survey questions were designed to be consistent with related questions on the U.S. Census survey and other large existing data sets to facilitate comparative analysis.

While indicators are rarely able to show direct causal relationships to higher-level policy goals, the IMPACT studies hope to show the public library's contribution to these goals through PAC-facilitated outcomes. As described in Van Den Berg's recent exploration of this area: "...in the case of results at the level of society, the public debate should move from the concept of linear causality to the concepts of conditionalities (necessary but not sufficient conditions for change to occur). Furthermore, it should be made clear that these necessary but not sufficient conditions contribute to rather than cause the change to take place" (Van Den Berg 2005). By creating a link between PAC use and policy goals, the IMPACT indicators will help librarians demonstrate the relevance of public library PAC resources to achieving change at the societal level.

## *A. Validation*

To be useful for explaining or predicting change, indicators need to be valid measures of the concepts they purport to represent. The IMPACT studies will use a mixed methods research (MMR) design to validate the candidate indicators and to fully understand PAC users and the context and conditionalities of outcomes related to PAC use.

Mixed methods research is the study of a single phenomena using at least one quantitative (designed to collect numbers) and one qualitative (designed to collect words) method that are mixed at the analysis and/or interpretation phase. In general, the goals of MMR are to corroborate validity and deepen interpretation of research findings. Green et al. explain:

A mixed-method study that combines [quantitative and qualitative] traditions would strive for knowledge claims that are grounded in the lives of the participants studied and that also have some generality to other participants and other contexts, that enhance understanding of both the unusual and typical case, that isolate factors of particular significance while also integrating the whole, that are full of emic meaning at the same time as they offer causal connections of broad significance. Compared to knowledge claims produced in a single-method study, this multiplistic mixed-method set of knowledge claims is likely to be more pragmatically relevant and useful, and more dialectically insightful and generative, even if accompanied by unresolved tensions. (1997, p. 12).

This practical and nuanced research approach has attracted growing interest medicine, education, and social work (Creswell & Plano Clark, 2007), however, MMR has not been extensively used in library and information science research (Fidel, 2008).

MMR is particularly well suited to outcomes research and the development of indicators, as it allows for both the generalization of findings as well as the exploration of conditionalities and context. As shown in Figure 1, the IMPACT studies will use the different research methods to create links between segments of the logic model: the case studies will provide contextual information about library inputs and their relationship to activities and outcomes and will link the outcome-sequence to broad policy goals; the telephone survey will link user activities to outcomes and provide the means to understand the penetration of PAC use across specific segments of the population; and the web survey will allow for analysis of the effect varying levels of inputs has on outputs and outcomes. The web survey will also supplement and increase the power of telephone survey data.

The IMPACT studies will employ a concurrent triangulated MMR design in order to fully take advantage of the extensive data collection effort. This approach was selected because of its advantage in offsetting methodological weaknesses and stimulating policy insight. A triangulated MMR design allows for the exploration of convergence, that is: the extent to which open-ended qualitative themes support quantitative results from survey data (Creswell & Plano Clark, 2007). This in turn allows for a holistic interpretation of statistical relationships and the confirmation of results. The confirmatory utility of triangulation is especially important in the IMPACT studies, as the populations of interest are relatively small and unreliably reached. Triangulation may also help uncover important dimensions of PAC use that were not considered or diverge from the outcomes-sequence (Jick, 1979).

#### *B. Quantitative data collection and analysis*

The IMPACT team is launching a telephone survey and a web survey administered through public libraries starting in April 2009. The instruments used in both surveys are basically the same, with some

variation to account for the different method of administration. The telephone survey will provide generalizable results and establish a national benchmark against which data from the web survey can be statistically aligned. The web survey will extend the results of the phone survey and will be especially valuable for reaching youth and low income PAC users.

The telephone survey will employ a dual frame probability sample of households that combines a list-assisted random digit dialing (RDD) sample procedure with a cell phone exchange sample. The objective of the dual frame design is to increase the overall coverage of U.S. households in the survey because cell-phone-only households represent roughly 1 in 6 households in the U.S. in 2007 (Blumberg & Luke, 2008). The overall goal is to complete 1130 interviews with public library PAC users over the age of 14. The sample size is expected to yield generalizable results around general output questions with a margin of error of about +/-3.6% at the 95% confidence level. A nonresponse follow-up (NRFU) study is planned that will also help identify and correct for bias. The telephone survey will be an invaluable data source for developing estimates of usage rates among various important subpopulations (e.g., socio-demographic groups such as race, ethnicity, age groups, income levels, education levels, etc.).

There are several difficulty with relying solely on the telephone survey for quantitative information about PAC users. First, PAC users have low prevalence among the general population (Glander & Dam, 2006), usually making telephone surveys prohibitively expensive for use in evaluation at the local library level. Second, anecdotal evidence points to a small to modest proportion of public library patrons who are homeless or otherwise not residing in a household (e.g. Simmons, 1985) and so unreachable by conventional survey methods. Third, national telephone surveys cannot account for the different resources available to PAC users at the local level and their effect on reported outcomes. To counter these research challenges, The IMPACT user web survey will link data about individual libraries from the

IMLS *Public Libraries Survey*, such as the number of PAC terminals available, with user responses and allow for a multilevel analysis into the effect of the presence or lack of library resources on outcomes.

Internet-based surveys are still a largely experimental, yet promising method of data collection. The main drawback to using web surveys is the non-random selection of survey participants and difficulty in calculating response rates, both of which affect the validity of inferences made from the data. Even with these problems, web surveys present an opportunity to collect large pools of standardized data from PAC users at a fraction of the cost of other methods. The IMPACT web survey will use the statistical technique of propensity scoring to reduce the effect of self-selection bias. Propensity scoring was developed to draw inferences about treatment effects in situations where assigning participants to control groups is undesirable or not possible (Rosenbaum & Rubin, 1983). Several researchers have applied propensity scoring to adjust estimates based on convenience samples by combining results with a reference survey and using questions that are asked in both surveys as covariates in a statistical regression (Schonlau, Soest & Kapteyn, 2007). This approach has been shown to reduce bias, though not necessarily eliminating it completely. By using propensity scoring to adjust for selection bias, the IMPACT web survey will extend the findings of the telephone survey and allow for greater granularity of analysis at the item-level where results from the telephone survey are unlikely to produce generalizable results.

The web survey sample includes 636 randomly selected library systems (of the country's 9,198 administrative units across 50 states) representing a broad cross-section of library and community characteristics. Library systems selected for participation will be asked to link to the web survey through their websites during a designated two-week period. The web survey is expected to yield approximately 80,000 completed surveys and an overall response rate of approximately 12%. Once aligned with the

telephone survey, data from the web survey are expected to be generalizable with a margin of error of approximately +/- 2.2% at the 95% confidence interval, offering substantial flexibility for the development of an insightful portrait of PAC users. Libraries participating in the web survey will be provided a comprehensive report on the data collected through their public access system if enough responses are obtained to ensure confidentiality and statistical validity of the results. If not, a comparative report of national averages of peer libraries will be provided instead.

### *C. Qualitative data collection and analysis*

While quantitative data can provide useful descriptions of PAC users and activities, they cannot explain differences in outcomes nor can they confirm the relevancy of indicators to policy makers. In order to provide explanatory and confirmatory insights, and to identify the contextual factors that influence PAC outcomes, four public libraries located in demographically diverse, low income, and communities of varying sizes and geographic regions were selected for case studies to illustrate the full range of public access computer users and the resources available to them.

Case study teams will spend approximately one week at each site, during which they will conduct interviews with PAC users, including children aged 14-17 and homeless persons, library staff, trustees, and volunteers. Community stakeholders, such as local agency staff, policy makers/elected officials, and staff or volunteers at other community Internet access locations will also be interviewed to help understand where the public library's PAC resources fit into the communities. In addition, researchers will observe and take field notes on the behavior and activities of PAC users in the libraries and will gather information about the library's policy environment, such as enabling legislation, management

structure, and budget. Audio recordings from the interviews will be transcribed and open-coded to identify themes and the range of responses related to the indicator domains.

#### *D. Mixed methods analysis*

The three data collection methods outlined above will yield a large amount of different types of evidence: demographic data and responses to fixed-answer multiple choice questions that are easy to quantify, short responses to open-ended questions that are easy to code, and longer responses to in-depth interview questions and extensive field notes that will require iterative reading and multi-level coding. In the mixed method phase of analysis, these qualitative and quantitative data will be analyzed in tandem within the unified framework of the triangulated MMR design.

To validate the themes identified by qualitative analysis of user interviews, codes developed in the analysis of user interviews and field notes will be transformed and merged with survey data. Thus, the strength of findings can be compared directly and areas of convergence and divergence identified. Contradictory results will be also valuable for testing the outcome-sequences and uncovering areas for future research. The triangulation of these data will be used to show what user characteristics are significantly associated with PAC use and explain how those factors interact with the many variables extant in the library environment.

#### **IV. Conclusion**

Linking public access computing resources provided by public libraries to larger policy goals is an effective way of getting the attention of policy makers and creating opportunities for partnerships with other agencies and organizations working towards the same outcomes. This broad view of the library's

mission will help improve services for patrons by identifying their most important PAC needs for achieving desirable goals. The ultimate goal of the U.S. IMPACT studies is to create an inexpensive, easy to use system for identifying and measuring outcomes that any library can use. A common set of validated indicators will help libraries compare their outcomes with peer systems, develop performance goals, and encourage innovation in service delivery.

A preliminary report of findings is expected in Fall 2009 and will include recommendations for how the results can be used by practitioners to measure their public access computer services, improve the services offered, and to understand how the complex array of decisions they make about public access computing affect individual patron and community outcomes. The effectiveness of the web survey as a mechanism for libraries to use for collecting data from PAC users will be evaluated separately. The researchers are grateful to the Institute for Museum and Library Services and the Bill & Melinda Gates Foundation for their support of these initiatives, and the Urban Institute for their instrumental role in its design. We also wish to thank the Chief Officers of State Library Agencies (COSLA) for their assistance coordinating the case studies and web survey, as well as the state and local libraries that have agreed to participate. More information about the U.S. IMPACT studies can be found at the website: <http://impact.ischool.washington.edu>.

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Figure 1: Employment domain logic model example

