

# Developing a National Science Digital Library (NSDL) LibQUAL+™ Protocol: An E-service for Assessing the Library of the 21<sup>st</sup> Century

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## Abstract

At this workshop we wish to share our experiences gained from conducting the user-based assessment project known as LibQUAL+™ across libraries over the last four years. We believe that the development of LibQUAL+™ provides important lessons that are informing our development of a similar protocol for digital libraries, particularly from the perspectives of user perceptions and expectations of service delivery. We view LibQUAL+™ itself as a digital library of evaluation data that has created its own learning community of users. Our understandings, developed from the formative and summative evaluation cycles of the LibQUAL+™ project and earlier experiences are also key to this research. We are using mixed methods in our approach to understanding the environment, employing both qualitative and quantitative analysis in an iterative cycle of continuous improvement and evaluation. We are eager to further our exploration and understand how service quality may relate to learning and educational impact across a variety of digital libraries and, more specifically, within the NSDL environment.

## What is LibQUAL+™?

LibQUAL+™ is an innovative, technology-based suite of services aimed at measuring library service quality. LibQUAL+™ is the result of extensive research and development undertaken by ARL and Texas A&M University, supported in part by the U.S. Department of Education's Fund for the Improvement of Postsecondary Education (FIPSE) and the National Science Foundation (NSF). It is one of the ARL New Measures Initiative Projects aimed at developing assessment

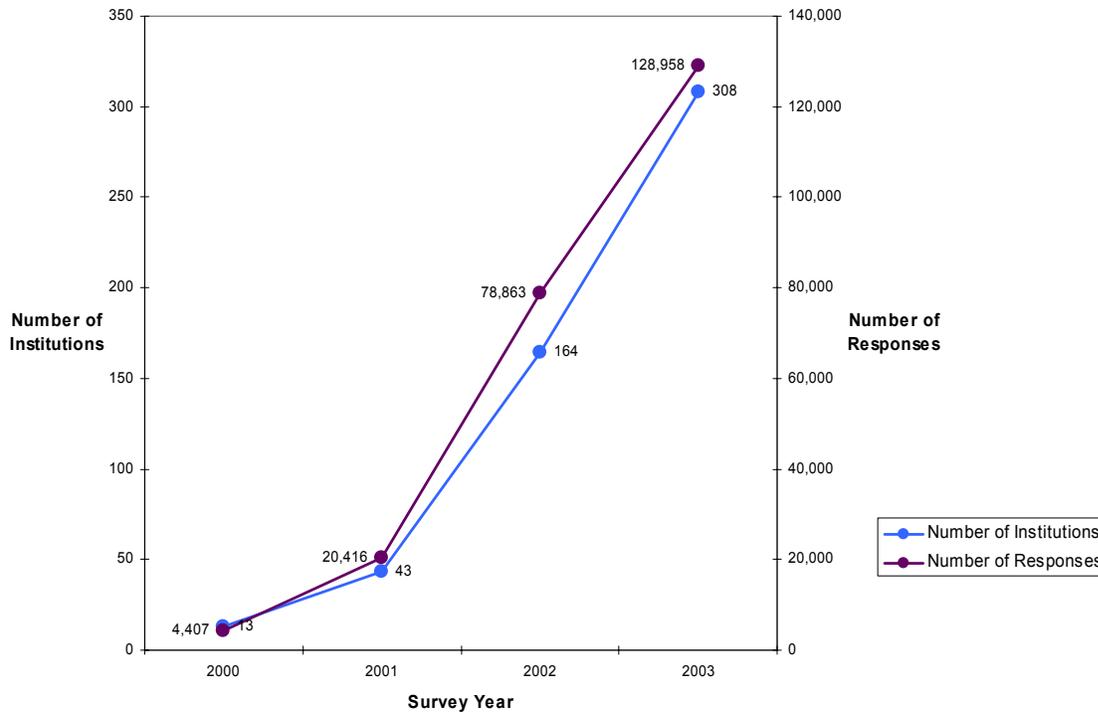
tools and e-services for evaluating the library of the 21<sup>st</sup> century. The project builds on the theoretical foundations of the gap theory of service quality, and in particular on the SERVQUAL measurement of the gap between customers' expectations and perceptions of service quality. After extensive iterative and continuous qualitative and quantitative regrouping and four years of implementations, the re-grounded instrument known as LibQUAL+™ has evolved into a total market survey. following The spring 2003 survey identified three dimensions of library service quality: library as place (LP), information control (IC), and affect of service (AS). Table 1 outlines the evolution of the dimensions in the LibQUAL+™ protocol.

**Table 1. Dimensions of library service quality in LibQUAL+™**

2000	2001	2002	2003
41-items	56-items	25-items	22-items
Affect of Service	Affect of Service	Service Affect	Service Affect
Library as Place	Library as Place	Library as Place	Library as Place
Reliability	Reliability	Personal Control	Information Control
Provision of Physical Collections	Self-Reliance	Information Access	
Access to Information	Access to Information		

The LibQUAL+™ protocol has successfully measured perceptions of library service quality across more than 400 institutions since 2000. It has grown from 12 participating institutions in 2000 to 43 institutions in 2001, 164 institutions in 2002, and 308 institutions in 2003. The LibQUAL+™ survey instrument has successfully collected data from more than 5,000 users in 2000; 20,000+ users in 2001, 70,000+ users in 2002, and 120,000+ users in 2003. Graph 1 depicts the growth of libraries and users surveyed with LibQUAL+™.

**Graph 1. Growth in the number of libraries and users surveyed with LibQUAL+™**



The 2003 survey implementation spans four countries (U.S., U.K., Canada, and the Netherlands) and three languages (American English, British English, and French). The protocol has proved itself as a scalable, Web-based tool that relies on a solid technological foundation, including Cold Fusion programming done by ARL and SQL servers located at Texas A&M University Libraries. Communications, public relations, and technology development are managed by ARL, with Texas A&M researchers involved in the constant refining of the protocol using qualitative and quantitative methods.

The LibQUAL+™ e-service component is emerging as a robust service operation, enabling libraries to engage in user-based assessment not only across institutions but across borders and language barriers for a modest participation fee. Whether a similar service can be developed for digital library operations, tentatively called e-QUAL (for “electronic quality”), is an open challenge that is currently being explored with the funding available to this project from NSF/NSDL.

### **Defining Service Quality in the Digital Library Environment**

The NSF/NSDL-funded part of the project has the overarching **goal of developing a digital library service quality assessment process that enhances student learning by permitting the allocation of resources to areas of user-identified need**. The goal is to develop a total market survey appropriate for the digital library environment. To fulfill that goal, our project seeks to

achieve the following objectives and outcomes within the NSF/NSDL community: (a) define the dimensions of digital library service quality from the perspective of the users; (b) develop a tool for measuring user perceptions and expectations of digital library service quality across NSDL digital library contexts; (c) identify digital library "best practices" that permit generalizations across operations and development platforms; (d) enhance student learning by effectively managing user perceptions and expectations of digital library services; (e) establish a digital library service quality assessment program as an integral part of the library service quality assessment program at ARL; and (f) institutionalize continuous product and process evaluation efforts directed toward positive and timely management of outcomes.

Given the formative stage of evaluation in many of the NSF/NSDL projects, progress towards a summative yet diagnostic tool like LibQUAL+™ may be slower than originally anticipated. However, this project is very promising. Digital library collections are under construction and at different stages of development. Identifying and providing content is of primary importance and is sometimes viewed as an issue separate from provision of access to the content. Developers of digital libraries may be concerned with premature evaluation, such as comparisons to other digital library collections that may have different goals and objectives. These circumstances may present barriers for implementing a total market survey – a uniform standardized survey – that offers the potential for direct comparisons. To address these concerns, we advocate the employment of mixed methods during the development of the survey tool. The final tool will not involve a staged approach; rather, it will be a set of survey questions administered through the Web, including a comments box. We anticipate this to be one tool for digital libraries; we expect digital libraries to be engaged in their own internal and external iterative mixed-methods evaluation cycles as well.

There are notable examples of digital library operations that have been engaged in extensive evaluation studies (the Math Forum is such an example). These operations present a fertile ground for attempting to develop tools that cross digital library boundaries. Digital library communities that are maturing are being studied closely through interviews, site visits, and focus groups. To date, site visits have been conducted to the Math Forum (Duane Webster, Fred Heath, Colleen Cook and Martha Kyrillidou) and MERLOT (Colleen Cook and Bruce Thompson). Focus groups were conducted at the DLESE and MERLOT annual conferences in August 2003 by Yvonna Lincoln, Amy Hoseth (ARL), and Kaylyn Hipps (ARL). The researchers are now typing transcripts and reviewing and analyzing extensive field notes from those conferences.

The qualitative data collection seeks to reground our understanding of users' perceptions within the NSF/NSDL environment. Our qualitative analysis aims at producing a model for digital library service quality, e-QUAL. Qualitative analysis thus far indicates emerging spheres of mediated and unmediated service delivery, which have important implications for developing digital library services. Mediation relates to personal interaction and affect of service attributes. Unmediated interaction describes a more self-sufficient information seeking environment, where the user accesses the content they want in an efficient and effective self-empowering way.

The engagement of the NSF/NSDL collections and services in testing the development of e-QUAL will be an important next step. A Web interface has been built to accommodate a

standardized survey that will measure only perceptions rather than the gap between perceptions and expectations (one scale vs. the three scales of minimum, desired, and perceived expectations employed in LibQUAL+™). The decision to emphasize only perceptions was based on evidence that a simpler response format is needed in order to reach even larger and more diverse groups of users across a variety of digital libraries. An initial bank of questions will be finalized in fall 2003 and will be ready for testing shortly thereafter; a second round of testing and refinement is planned for spring 2004.

In addition to the standardized multiple response questions, a comments box will be made available to collect comments from respondents who would like to offer additional personal observations and context regarding their use, perceptions and expectations. The goal is to utilize this instrument to improve the digital collections and services, develop strategies for managing users' perceptions of having access to the content they are seeking, and provide evidence regarding the attitudes and feelings users have toward digital collections and services. To the extent that users are satisfied and show positive feelings, we assume that this enables positive experiences and learning. In other words, we assume that satisfied users are operating in an environment conducive to learning.

### **Relationship to NSDL Educational Impact**

The NSF/NSDL-funded part of our project has the overarching goal of developing a digital library service quality assessment process that enhances student learning by permitting the allocation of resources to areas of user-identified need. We view **educational impact as a proxy for learning**; the higher the impact the more likely that learning will occur. Impact is viewed as a way to facilitate the learning process. We believe that it will be very difficult to factor out the result of the library experience itself as it is confounded within a variety of other variables. As a result, we do not propose to measure educational impact in a direct way.

We do propose measuring perceptions of quality and learning based on a self-report model, rather than measuring learning directly. We have attempted to measure users' perceived outcomes and their relation to the dimensions of service quality as measured by LibQUAL+™. Analysis is underway to correlate the different kinds of LibQUAL+™ ratings to different kinds of outcomes. Initial analysis shows that the service affect dimension correlates with general satisfaction scores and the information control dimension with perceived outcomes questions. We are currently examining the development of different path models that will shed light to the directionality and nature of causal mechanisms. For example, we know from data and preliminary analysis from the spring 2003 LibQUAL+™ implementation that "the library aids their advancement in their academic discipline" is an important outcome that relates to their ability to navigate the information universe in a self-sufficient and efficient way (information control). In other words, educational impact may be defined as a **perceived outcome** and as an issue of a **value added question** in terms of "what would be different if the library was not there?" or "what is possible because of the availability of the digital library?"

Our approach is being regrounded for the community of users formed around the NSDL digital collections. We recognize that there are issues of educational impact and learning that go beyond our approach. The theoretical linkages between quality of services and effective learning may not yet be well understood. **We believe that user perceptions of having access to the**

**content they seek are important enablers of the learning process.** We hope to be able to continue to expand the boundaries of our approach and understand how it may work with other tools, systems, and processes within the NSDL – as well as other digital library environments – to enhance student learning and educational impact.

## Conclusions

The research described above focuses on the digital library as a **service** provision to needed **content**, and emphasizes the importance of user perceptions of the quality of such services. The goal is to develop a tool that will allow digital library developers to better manage users' perceptions by understanding the dimensions of electronic quality (e-QUAL). Assuming that users learn better when they are satisfied and show positive feelings towards the environment in which they interact, we view the tool we are developing as another assessment mechanism available to digital library developers that works effectively with other related methodologies developed for digital library evaluation.

Digital library evaluation is at the crossroads of technology, evaluation, library, and market development. It is challenging disciplinary boundaries and pushing, dissolving, and recreating the boundaries of teaching and learning. Questions of pedagogy, economics, social, and personal development constitute components of a larger picture that the larger NSDL evaluation process might want to address as it focuses on the educational impact of digital library resources and services. Our project emphasizes the importance of the service delivery aspect of the educational process; we are attempting to measure it in a way that is grounded in users' perceptions.

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For more information regarding the ARL Statistics and Measurement Program, see:  
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