The Inquiry Page:
Bridging Digital Libraries to Learners

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Much advice regarding digital collections focuses on how to build and maintain resources on behalf of users. However, no matter how appropriate, comprehensive, well-maintained, and organized a digital collection may be, learners and teachers must perceive it to be both accessible and meaningful within the context of their particular learning situations, if they are to benefit from it. Resources‹particularly educational resources‹must make sense in terms of the interests, backgrounds, and abilities of the users. What people can learn from an educational application depends on their prior experiences. Thus, if it fails to build on these experiences, it ultimately falls short. As Dewey insisted, the basis of learning is not the curriculum map, but the child's world [1, 2].

Some may think of the unveiling a digital library (DL) as an end point. Yet, even though lesson plans may be provided with it, a DL only potentially affords meaningful learning opportunities. Unfortunately, the better a DL is, the greater the risk that it promotes an impoverished view of learning and of change‹one in which teachers and students are viewed as recipients of a tool, rather than active participants in educational growth and change.

How, then, may a resource collection meet educational needs? Our work focuses on building tools‹web resources, collaborative processes, and knowledge‹that help bridge between DLs and the particular needs of real users in specific settings, whether those be K-12 schools, museums, community groups, nature/science centers, homes, or other organizations and especially those teachers and learners who live on the economic, cultural, or linguistic margins. If a science DL is to be truly national, it must span boundaries and build capacities for integrating digital resources into curricula, promoting appropriate pedagogy, and facilitating communication.

Moreover, a national science DL must take into account a need often overlooked in traditional usability research. Such research often does little to develop the capabilities of users or improve social outcomes associated with use. These research consequences, however, are important, especially when research participants include oppressed people [3]. Drawing on the tenets of participatory action research and the notion of "community of inquiry" as developed in the philosophy of John Dewey and Charles S. Peirce [4], we conceive DL research to be a democratic and collaborative process in which all stakeholders can learn from one another.

The Inquiry Page

A common ground for our DL work is the Inquiry Page, simultaneously a website (inquiry.uiuc.edu), a community of learners, and a locus for sharing knowledge construction [5]. The project supports users as they share their successes and collective expertise. The website serves approximately one million page views per year. In addition, there are local weekly meetings and a wide range of workshops and conferences. The site also serves as an arena for research, promoting the idea that even its own structures and beliefs need continual reexamination.

The Inquiry Page attempts to foster different aspects of learning. In his discussion of the relation between the child and the curriculum, Dewey describes a learner's four primary interests: inquiry, or investigation–the natural desire to learn; communication–the propensity to enter into social relationships; construction–the delight in creating things; and expression, or reflection-the desire to extract meaning from experience. These activities can be viewed as elements of a cycle of inquiry, which is reflected in the design of the Inquiry Units. These online templates for learning activities provide spaces for articulating each element, and thus they become starting points for inquiry in which learners are encouraged to ask questions, investigate, create, discuss, and reflect.

Our project encompasses a diverse set of people, organizations, technologies, and activities. In order to provide a fuller sense of what the Inquiry Page is, we discuss below how it approaches three key aspects of a community of inquiry: What is the nature of technologies used within the community? What is the nature of learning in the community? What are the relationships among the people involved in a knowledge-sharing community?

Technology as both tool and outcome of problem solving

The Inquiry Page [http://inquiry.uiuc.edu] is building an array of tools, including digital learning resources (e.g., Inquiry Units, bibliographies), collaborative structures (e.g., workshops), ideas, and texts. These tools aid the processes of inquiry, but they also represent the outcome of collaborative work. Participants find solutions that work in one setting, then adapt them to others. In this way, participants become active agents in creating their own technologies.

Thus, the conception of technology within the Inquiry project is not of a finished tool to be delivered to users, with training in its components and guidelines for its application, but rather, of an environment in which users create the technologies appropriate to their situations and their needs. This exemplifies what has been called pragmatic technology [6]. Currently, the Inquiry Page embodies a variety of tools, each of which has grown out of users solving problems within their own domains.

These include:

- Inquiry Units: A searchable data base of units for inquiry-based learning. Units are created at will by users and may take any shape they please, from a simple question to an elaborate representation of a complex process of inquiry. Existing Inquiry Units include lesson plans, syllabi, assignment descriptions, research notebooks, library pathfinders, student projects, to do lists, community action plans, and "wrappers" that make websites and individual books or tools easier to find.
- Quote of the Day: A collection of writings on teaching and learning, with a special emphasis on those that expand our conception of what learning can be.
- Links to Resources: A dynamic incorporation of Open Directory resources.
- Assessing Inquiry Learning: Links to articles, presentations, and other resources regarding the special issues of evaluating inquiry-based learning.
- Inquiry Partners: A growing collection of partner projects, courses, and schools.
- Bibliographies: Tools for collaborative construction of bibliographies, with annotations and full-text links.
- Member Directories: Tools that allow projects to create their own indexed member directories with bios and photos.

Learning: Participative inquiry vs. training

Newcomers to a field of inquiry are often frustrated by the gap between their ordinary experience and the codified knowledge of a discipline of study. New teachers, for example, may have trouble connecting what they know of their own learning processes, or the experiences from their own teaching, with the canonical articles and theories they are given in university courses. Dewey [2] argued that this gap widens when people reify disciplinary knowledge, viewing it as static and constructing it as different in kind from the knowledge gained through daily living. If, instead, we could see a discipline as representing the ongoing processes of a community of inquiry, then the conflict between personal, situated knowledge and historically-constituted, communal knowledge would become a problem of integrating and not of choosing one over the other.

Fostering this integration, Inquiry tools are malleable and may be customized to build bridges between an individual and a larger community. For example, not only can the creators of an Inquiry Unit upload private files to a central database, but they may also incorporate links to other online resources, including other Inquiry Units. To facilitate these collaborative processes, Inquiry Units are indexed by user-generated keywords, grade level, subject area, or partner project. However, we also provide individual users and projects the ability to specify the ways they wish to share their Units. Participants can indicate whether the Unit is public, ready to use or not, open to comments being

appended, and whether their e-mail address is to be shown on the unit. These tags can be employed by other users as they search for units. Once a unit is located, it can be adopted as is, or the user can do a "spin off" to modify the unit for new purposes. For example, students can spin off a copy of a teacher's unit describing a course module or assignment, and thus use the curriculum Inquiry Unit as a starting place for their own work.

In these ways, the Inquiry Page provides a common space for learners at all levels to construct disciplinary and interdisciplinary knowledge together. For example, in the Telebotany partner project [see http://www.biobrowser.org/], teachers and students use the Inquiry Page to collaborate and to gather information about the plants and animals they find in forests, wetlands and prairies [7]. Inquiry units, in conjunction with a digital library of environmental resources, generated for and by the students, facilitate their activities. Their work, and the information they gather, can have a profound influence on environmental policy, on specific educational resources, and on the daily lives of the people participating in the community-learning process.

Relations among knowledge-sharing participants

DL design and evaluation is itself a form of learning, where democratic knowledge sharing among diverse DL participants is crucial [8]. This exemplifies participatory action research, with concerns for both social practice and social justice [9]. Design research is a democratic process with everyone serving as both learners and experts. Glassman [10] notes that the ≥disturbed equilibrium≤ that occurs when knowledge held by diverse individuals comes into contact‹and conflicts‹is the necessary grounding for true learning and change in a democratic society.

An important aspect of democratic knowledge sharing is that diverse stakeholders work together to explore the possibilities and limits of technologies, in an atmosphere in which the expertise of each contributor is recognized. In the Afya project [http://www.prairienet.org/afya-project/purpose.html] for example, a small group of women (SisterNet members, university faculty and students, and librarians) gathered to brainstorm about a workshop for their Spiritual Health Conference that would simultaneously promote learning about computers and spiritual health. The women created an Inquiry Unit template that SisterNet women could spin off to create their personal spiritual health plans. Participants found Web resources related to Black womenπs spiritual health for the template, and together they crafted its instructions for creating, discussing, and reflecting on a personal health plan.

The Afya project demonstrates how diverse participants who are engaged in community inquiry can learn from each other in the course of creating, using, and evaluating digital library tools and resources. SisterNet women learned about how to find, critique, and use digital resources in pursuit of meaningful personal goals from librarians and library science faculty and students. In return, the developers of the SisterNet and Inquiry Page websites learned from SisterNet women how to improve their DL services. For example, SisterNet women noted the academic emphasis (e.g., language about grade levels and school subjects) was not appropriate for their community-action project.

Participants first found a way to bring out community-based uses; we are now working on a ≥distributed Inquiry Page module≤ which customizes the Inquiry Page for the SisterNet and other partners.

Conclusion

Our work with the Inquiry Page is helping us learn about how digital library design must evolve continually and dialogically to accommodate unforeseen adaptations of technologies, to foster meaningful knowledge creation, and to respect the diverse views that lead to social change. We feel that an approach that positions users of a DL as knowledge-constructing stakeholders in a collaborative inquiry, rather than as recipients of a tool, is one path for developing valuable and equitable online services.

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