

Using the Web to Support Inquiry-Based Literacy Development

Guest Coauthor Ann Peterson Bishop

Editor's Message

A theme throughout the four years of my (Chip's) tenure with the JAAL Technology department has been the importance of an inquiry approach to understanding literacy, learning, and technology. This month, Ann Bishop and I, as two participants in a growing community of inquiry, share some of what we have learned about facilitating inquiry-based learning in the classroom; in independent studies; in libraries, museums, and communities; and in all the arenas of life in which people attempt to make sense of experience and grow.

In 1868, Charles Sanders Peirce proposed the idea of communities of inquiry to account for the way that people construct knowledge in collaboration with others. He argued that what is real depends on the decision of the community. When we consider how an invariant curriculum ill suits a changing world, his idea seems even more relevant now than when he first articulated it. In order to foster such a community, we have employed Web-based communication and knowledge-building tools such as the Inquiry Page (<http://inquiry.uiuc.edu>).

With the tools on this website, visitors can create modifiable representations of ongoing stages of inquiry that we call Inquiry Units. For example, teachers can represent the initial stages of inquiry in a unit, which is then continued by students as a spinoff. This process blurs the line between curriculum development and student work and between teacher and student in a way that is more productive for future work and learning. The Web-linked Inquiry Units thus provide a tangible form of a community of inquiry as well as insights for future development of Web-based resources.

Portions of this column were adapted from a talk I presented at ROCMELIA 2001, the Fifth International Conference on Multimedia Language Instruction at the National Taiwan University in Taipei, Taiwan, and published in the conference proceedings (Chuang, Y.S., Wang, Y.S., & Wang, P.L. [Eds.]. [2001]. Taipei: Crane).

How Can We Support Inquiry-Based Learning?

Our students encounter rapidly changing technologies and information resources, as well as the need to understand a complex global society. Yet the traditional modes of learning are often inadequate for coping with these changes or building on the students' diverse and rich personal backgrounds. Moreover, these modes are poor models for the collaborative inquiry and reflective practice (Schön, 1983) that people need as they engage with others in their roles as students, citizens, and productive members of society.

Traditional curricula in most countries have emphasized a delivery of content approach. Knowledge is assumed to exist or be encoded within texts. The role of the teacher is to manage the delivery of this knowledge, and the role of the learner is to absorb as much as possible. More specifically, students are expected to master certain basic learning skills such as solving problems, remembering textbooks, following directions, working alone, and "covering" the curriculum.

Whether such a predetermined curriculum and approach to learning were ever fully adequate is debatable. But in today's rapidly changing world it is clear that they are not. Students need to learn much more than textbook knowledge. Instead, they need to be able to examine complex situations and define the solvable problems within them. They need to work with multiple sources and media—not just a textbook. They need to become active learners, to collaborate, and to understand the perspectives of others. In short, they need to learn how to learn, and they must ask (find problems), investigate (multiple sources/media), create (engage actively in learning), discuss (collaborate and debate), and reflect to do that.

Thus, there is a shift from a transmission-oriented pedagogy to a more open, inquiry-based mode of teaching and learning. The value of inquiry-based learning is now widely recognized (Bruce & Davidson, 1996; Minstrel & Van Zee, 2000; Short et al., 1996; Wells, 2001). For example, the Carnegie Foundation's Boyer Commission on Educating Undergraduates in the Research University (1998) has set a priority on making research-based learning the standard. The main goal of the American Association for the Advancement of Science's Project 2061 is science literacy for all high school graduates. By this the group means the development of the broad, critical perspective and habits of the mind that come through scientific inquiry.

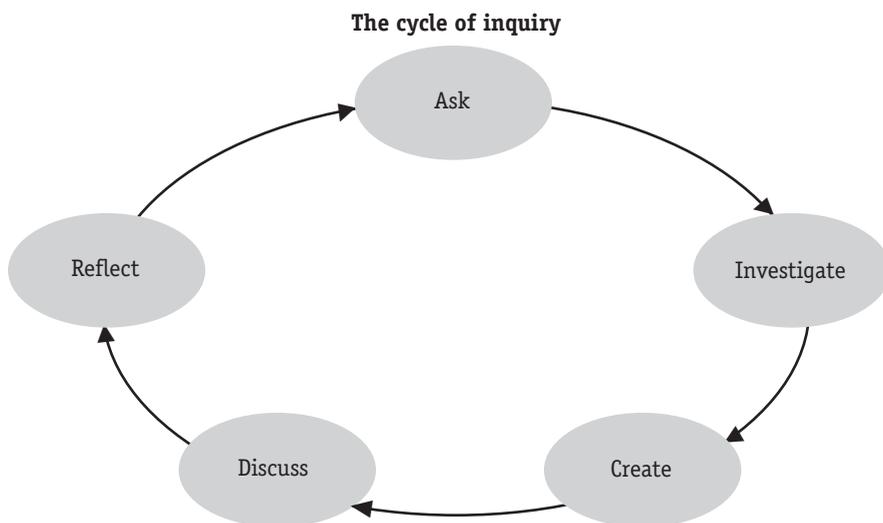
Diversity of Learners and Disciplines of Study

All learning begins with the learner. What children know and what they want to learn are not just constraints on what can be taught; they are the very foundation for learning. For this reason, Dewey's (1956) description of the four primary interests of the learner are still apropos: *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. Dewey saw these as the natural resources—the uninvested capital on which the active growth of the child depends. As Dewey recognized, schooling is not only about the individual, but also about the intersection of the child's interests with those of the society. The disciplines we study in school represent centuries of collective thought as well as the interests of the larger community in maintaining itself by communicating its knowledge and values to the next generation.

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. In the field of education, for example, many 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 argued that this gap widens when we reify disciplinary knowledge, viewing it as static and constructing it as different in kind from the knowledge we gain through daily living. If instead we could see the disciplines represented as 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.

Learning as Process

A key idea for inquiry learning is that there is a cycle or spiral of inquiry. Do not think of knowledge as static and the learner as an empty vessel whose job it is to absorb as much as possible of that predefined material. Instead, view the learner as an inquirer, learning through work on meaningful problems in real situations. The Figure below places the primary interests of the learner in the framework of a cycle of inquiry (Bruce & Davidson, 1996). For any question or problem, a learner should think of asking, investigating, creating, discussing, and reflecting as means for its resolution.



Communities of Inquiry

In language learning there are many efforts aimed at creating curricula that put the learner first. These models also emphasize the essential nature of participation in a community of inquiry. For example, Berghoff, Egawa, Harste, and Hoonan (2000) asked what schools would look like if they operated on the assumption that literacy involves a full range of interpretive abilities—not only the capacity to use language. Their work assumed that learners who make meaning draw from different dimensions of knowing—different forms of expression, different kinds of ideas, and different cultural frameworks. By recognizing and honoring these differences in the classroom, the school can create a richer way to explore the path to knowledge.

Short, Harste, and Burke (1995) talked similarly about creating classrooms for authors and inquirers where reading and writing are integral to processes of learning about oneself and the surrounding world. Short et al. (1996) showed how an integrated curriculum emerges from a view of learning and language united through inquiry processes. There have also been models (Wells, 2001; Wells & Chang-Wells, 1992) that show how the inquiry process reveals deep connections among classroom activity, learning, and language. Bruce and Easley (2000) talked about the need for communities of inquiry to support teachers as they attempt to foster more inquiry in the classroom.

It is crucial to recognize that a successful community of inquiry is not one in which everyone is the same, but instead is one that accommodates plurality

and difference. Clark (1994), for example, considered different ways this accommodation can occur. In some cases, it compartmentalizes differences or establishes a hierarchy of one set of values and ideas over others. It can exclude, as well as include, people and ideas. Clark argued that we should focus on maintaining equitable relations first and then consider collective tasks.

[This] renders the progress of expertise in a community secondary to a relational and epistemological practice of confronting differences so that its participants can come to understand how the beliefs and purposes of others can call their own into question. With this as its primary practice, the project of maintaining community can accommodate both equality and difference. (p. 74)

Differences among participants in the inquiry community can thus have different consequences, depending on how they are addressed. Productive work emerges when differences are not subsumed to a larger order but are understood through a hermeneutic process. A challenge for the inquiry community is to maintain a focus without denying individual experiences, perceptions, and values.

Research Questions

Some of the research questions that emerge from an inquiry perspective on learning are these:

- How do we connect subcommunities and disciplines but still recognize the diversity of each learner?
- How do we promote the process of inquiry at all levels for all participants?
- What tools and procedures best support a community of inquiry?

We are addressing these questions in the context of a project we have developed (and a set of tools we are now using and studying) called the Inquiry Page.

Collections Policy

The project has followed an unusual path with regard to building and managing content on the Inquiry Page. We can describe what is going on with the collection of material on the site from either “publishing” or library “collection development” perspectives. In publishing material online, many other educational sites

have review committees, selection procedures, and rankings to separate the good from the bad. Libraries typically assess the needs of their intended community of users and develop criteria to govern their identification and acquisition of material to meet their users' needs. There's certainly a value to both website publishing and library approaches to building collections of useful material. With the Inquiry Page, we're working on mechanisms to add to what others have done in the realm of setting collection policy.

Inquiry Units contributed by Inquiry Page members make up one of the site's core collections. These units represent a variety of document types, such as syllabus modules, student assignments, project proposals, and records of personal and informal research. We've taken the position that no Inquiry Unit is ever really finished and unambiguously good. A very good unit might need to be adapted to fit particular students or local resources whereas an incomplete unit might be very useful for some purposes or when complemented by a text or other activities. We also see value in being able to share inquiries in progress, whether they are about a science question, a community problem, or a way of teaching.

Inquiry Page policies tend not to dictate or exclude users and creators of Inquiry Units. We support the ability of people to identify, evaluate, and modify units to suit their own situation. We use tags such as Public/Private, Ready to Use/Not Ready to Use and keywords as a way to indicate the status of a unit. Also, unit authors can easily put in their own text to describe a unit's status. For example, we could say in the Background section, "This unit is under development" or "We're trying to put together some good resources for a unit, but it's not ready for classroom use without some additional effort." Because development of the Inquiry Page proceeds through use, we don't want to prescribe or predetermine how it is used, but we do want to learn through the diversity of its uses.

Design and Evaluation

The Inquiry Page develops through a process of *participatory design*. Users contribute to all the various resources on the site, but more importantly they are its designers—through e-mail, electronic bulletin board discussions, and workshops. Participants in this process include K-12 teachers, museum educators, librarians, university students and faculty, and others engaged in various lifelong and informal learning activities. The site encourages a process of inquiry about teaching and learning and about how technology can best support it.

The Inquiry Page aims to respond to human needs by democratic and equitable processes. The users develop the site through creation of content, contributions to the interface, and evaluations—often simply by discussing its usefulness within the inquiry community and what works or does not in the context of their own settings. Workshops on the Inquiry Page—in a wide variety of settings, from academic conferences to small, local settings of potential use—are one focused evaluation activity that serves design through use quite well. Such workshops offer a window on use, and that helps anchor further design of inquiry-based learning technologies (social and digital) in authentic experiences while stimulating creative extensions.

Studies of the Inquiry Page use *situated evaluation* to take into account that actual use is an interaction between specific, local circumstances and the introduction of new tools and ideas.

[Situated evaluation is a] new framework for understanding innovation and change. This framework has several key ingredients: It emphasizes contrastive analysis and seeks to explore differences in use. It assumes that the object of study is neither the innovation alone nor its effects, but rather, the realization of the innovation—the innovation-in-use. Finally, it produces hypotheses supported by detailed analyses of actual practices. These hypotheses make possible informed plans for use and change of innovations. (Bruce & Rubin, 1993, p. 215)

These evaluations tend to be formative and forward-looking, with the goal of improving future practice. Current interactive tools on the site for evaluation include a feedback form with automatic posting of feedback results. Inquiry participants also use methods such as case studies and participant observation to assess site use as a whole and to evaluate whether Inquiry Units meet specific needs. Results of these evaluations feed back into the site design and are also represented in articles about the project. Consider several examples.

- When a group of women in the community decided to use the site to take control of their health needs and to obtain better information, they noted that the emphasis on grade levels and school subjects was not appropriate for their community-action project. We found a way to change the presentation of the units so that grade levels and school subjects were not so prominent. We are also now working on a type of style sheet to allow customization for other projects.
- We conducted workshops for Missouri Botanical Gardens' users, who told us they wanted to include multiple website links in their units. This led to the idea of having live URLs. After we added that feature,

other users asked for full HTML support. Today the site can be used by anyone, but users who know HTML can add functionality to their own units.

- Initial groups of middle school teachers who used the site realized that their students could be users and unit creators as well. They wanted a way to initiate a unit and then have students continue the investigation. This led to the idea of spinoffs, in which one user can build on the work of another. Since then, other users have considerably expanded the range of uses for spinoffs.
- As the units came to be used more in courses, instructors began to ask for a *comment* feature. That was added, and now other students as well as the teacher can add comments to one another's units.

Examples such as these are common in the development of any new website, but they have been even more evident for the Inquiry Page because of its assumption that user knowledge is necessary to create a useful site.

Melding the Learner and the Discipline

Much work on new media for education represents a melding of the learner and the discipline framed by inquiry-based learning. It does that in part because, as a relatively new field of study, it does not privilege a limited or static conception of its key ideas or even of its own boundaries. New educational media's communal knowledge bears a complex relationship with individuals in the community, but it does not stand apart and promote rigid hierarchies of knowledge. The social relations in the community tend to be supportive and constructive. People see themselves valued for their own experiences and perspectives even if they are new to the community. Old-timers find that their own inquiries remain fresh because of this openness.

Our object of study has been how new information and communication technologies promote the very same processes in contexts of teaching and learning, the workplace, and other social realms. In the case of the Inquiry Page, we see a similar dual role for inquiry. That is, the project is devoted to fostering collaborative inquiry among students, teachers, and community members. To do that, it offers Web-based tools, face-to-face meetings, research, and evaluation. At the same time,

there is no recipe for either inquiry learning or for how to support it. Thus, the project itself exemplifies the very processes it seeks to support.

Website of the Month

The Inquiry Page (<http://inquiry.uiuc.edu>) is simultaneously a website, a community of learners, and a research project. It emphasizes how teachers weave a learner's interests with those of the curriculum by supporting teachers as they share their successes and their collective expertise. The website serves approximately one million page views per year. In addition, there are weekly meetings for site users and a wide range of workshops and conferences. The site is also the locus for research, promoting the idea that even its own structures and beliefs need continual reexamination.

The Inquiry Page supports teachers and learners of all ages and curricular areas. It is a website for collaborative curriculum development through the creation of Inquiry Units. These units become starting points for inquiry through which students are encouraged to ask questions, investigate, create, discuss, and reflect. The Inquiry Page is used to

- present problems for researchers,
- demonstrate how research results can be used,
- support the integration of knowledge across a community of inquiry,
- provide a means for all students to collaborate and learn from one another,
- support development of an active digital library,
- document the learning process, and
- articulate lesson plans that are more open-ended and student centered.

Teachers are also learners in this process—about phenomena in general and the processes of teaching and learning. They inquire through their access to resources on teaching and learning, including quotes about inquiry teaching, articles, project links, curriculum units, and content resources; they communicate with other teachers through various online communication media; they construct their own versions of curricula using the online Inquiry Unit generator; and they reflect on teaching and learning experiences as they share both literal and textual photos of their classrooms through these units.

A key concept throughout is that the processes of creating, using, and critiquing the site and the resources within it should exemplify the open-ended aspects of inquiry and social participation that the site encourages. We hope that participants will learn about the tools and the development process as they construct resources they can take away with them. Moreover, we invite them to join in the collaborative process of developing the Inquiry Page.

How You Can Participate

A major activity of the Inquiry Page is to foster the online creation of Inquiry Units by teachers (or students). Each unit starts with a guiding Question and provides a space for activities of Investigation, Creation, Discussion, and Reflection. These activities are often conceived as part of the inquiry cycle and give structure to some important aspects of inquiry that might be supported in a successful learning environment. In order to create a unit, the user must fill out a Web-based form that leads to an XML-formatted data structure. When the unit is called up again by the same or another user, a dynamic HTML file is generated.

Inquiry often leads to new ideas, results, theories, and questions, which can be communicated with others. This communication is central to the inquiry process. To facilitate it, Inquiry Units are indexed by user-generated keywords, grade level, subject area, or partner projects. In addition, users can indicate whether the unit is public or private, ready to use or not ready to use, open to comments or not open to comments, and whether their e-mail address is to be shown on the unit. These tags can be used by other users as they search for units. Once a unit is located, it can be used as is or the user can do a spinoff to modify the unit to fit specific purposes. Students can “spinoff” a copy of the teacher’s unit to describe a course module or assignment, thus using the curriculum Inquiry Unit as a starting place for their own work.

Inquiry Units are being used in a variety of ways in teaching and learning about language arts. They are created by teachers for classroom activities that span educational levels from prekindergarten to graduate school. Students create Inquiry Units to fulfill course requirements or pursue extracurricular goals. Librarians create units to facilitate the use of educational resources by both teachers and students. Community members create units that help them achieve their personal goals as they pursue learning outside the classroom context.

Presented below is a sample of Inquiry Units that represent the range of educational activities tied to language arts in a variety of use settings.

What are the processes and consequences of electronic publication?

Chip Bruce

This unit serves as one section of a syllabus for an undergraduate course in new literacies. It presents students with readings associated with one week of the course.

What directions do children’s interests take in story reading as inquiry?

Sylvia Steiner, Linda Chu

Two kindergarten teachers present the lesson plans they used over two months as they developed inquiry-based activities revolving around the well-known children’s book *The Phantom Tollbooth* (2000) by Norton Juster.

What does hatching chicks have to do with language arts?

Pat Brown

Language arts activities—charting and graphing, spelling and writing, and receptive and productive language activities—associated with a chicken-egg hatching program are described in this unit.

Poetry as play

Sharon Comstock

A librarian created this unit to describe how she used the concept of exploratory play with children in grades 3–5 to guide them in the production of their own book of poetry.

What library and information services are provided for librarians serving the Latino community? How can we present these in the form of a website to librarians and other information professionals?

Yanira Vegerano and Heather Booth

In this unit, two graduate students in library and information science describe and present a website they created called *A Librarian’s Guide to Latino Services*. The website includes resources, from a brief description of the sociocultural basis of Latino heritage to a bilingual dictionary of computer terms to lists of award-winning multicultural children’s books—intended to help librarians create a library environment that better serves the Latino community.

Create your personal SisterNet spiritual health plan

Arlene Anderson

With this unit, a local community member, participating in a workshop on computer use as part of a spiritual health seminar for the general public, learned about relevant Web resources in the context of writing a personal spiritual health plan.

What we find intriguing is how Inquiry Units play a role in helping people cross boundaries that can hamper inquiry-based learning in practice. For example, Vegerano and Booth's unit demonstrates the movement of learners to teachers; the many comments attached to their unit by practicing librarians demonstrates that what was a learning experience for them resulted in a product that librarians in the field found immediately useful. We see that boundary spanned in another direction by Steiner and Chu. Their unit makes explicit their efforts to learn about inquiry-based pedagogy as they implemented inquiry-based activities in their kindergarten classroom. It also blurs the boundary between educational genres because it integrates a lesson plan with sustained reflection on it. We also see boundaries crossed between academic disciplines (science and language arts in Brown's unit), and between professions (teachers and librarians in Comstock's unit). Finally, the boundary between reading and writing in new media is crossed in Anderson's unit.

Glossary

The Inquiry Page contains a variety of resources. These have evolved through interactions with different user communities, each seeking different ways to represent ideas about inquiry and curriculum. The following defined resources can be found at the Inquiry Page.

Evaluating inquiry instruction: a webpage linked to articles, presentations, and other resources regarding the special issues of evaluating inquiry-based learning.

Inquiry in action: a section in which teachers can show what inquiry looks like in their classrooms or where researchers can show their own processes of inquiry. It includes photos, video, text descriptions, and links to Inquiry Units.

Inquiry partners: a growing collection of partner projects, courses, and schools.

Inquiry resources: a dynamic incorporation (using Digital Windmill) of the Open Directory category Reference, Education, Learning Theories, and Inquiry-Based Learning. This category is edited by the Inquiry Page development group.

continued

Glossary (cont.)

Inquiry Page: a Web resource containing a database of units for inquiry-based instruction across grade levels and subjects.

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.

REFERENCES

- Berghoff, B., Egawa, K.A., Harste, J.C., & Hoonan, B.T. (2000). *Beyond reading and writing: Inquiry, curriculum, and multiple ways of knowing*. Urbana, IL: National Council of Teachers of English.
- Boyer Commission on Educating Undergraduates in the Research University. (1998). *Reinventing undergraduate education: A blueprint for America's research universities*. Retrieved from <http://notes.cc.sunysb.edu/Pres/boyer.nsf>
- Bruce, B.C., & Davidson, J. (1996). An inquiry model for literacy across the curriculum. *Journal of Curriculum Studies*, 28, 281–300.
- Bruce, B.C., & Easley, J.A., Jr. (2000). Emerging communities of practice: Collaboration and communication in action research. *Educational Action Research*, 8, 243–259.
- Bruce, B.C., & Rubin, A.D. (1993). *Electronic quills: A situated evaluation of using computers for writing in classrooms*. Hillsdale, NJ: Erlbaum.
- Clark, G. (1994). Rescuing the discourse of community. *College Composition and Communication*, 45, 61–74.
- Dewey, J. (1956). *The child and the curriculum & The school and society*. Chicago: University of Chicago Press. (Original works published 1902 and 1915)
- Minstrell, J., & Van Zee, E.H. (Eds.). (2000). *Inquiring into inquiry learning and teaching in science*. Washington, DC: American Association for the Advancement of Science.
- Peirce, C.S. (1868). Some consequences of four incapacities claimed for man. *Journal of Speculative Philosophy*, 2, 140–157. Retrieved from <http://www.peirce.org/writings/p27.html>
- Schön, D.A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.
- Short, K.G., Harste, J.C., Burke, C. (1995). *Creating classrooms for authors and inquirers* (2nd ed.). Portsmouth, NH: Heinemann.
- Short, K.G., Schroeder, J., Laird, J., Kauffman, G., Ferguson, M.J., & Crawford, K.M. (1996). *Learning together through inquiry: From Columbus to integrated curriculum*. Portland, ME: Stenhouse.
- Wells, G. (2001). *Dialogic inquiry*. New York: Cambridge University Press.
- Wells, G., & Chang-Wells, G.L. (1992). *Constructing knowledge together: Classrooms as centers of inquiry and literacy*. Portsmouth, NH: Heinemann.

Guest Coauthor

Bishop teaches in the Graduate School of Library & Information Science at the University of Illinois at Urbana-Champaign.

1. Information Literacy and Inquiry-based learning Pamela McKinney Learning Development and Research Associate (Information Literacy) at CILASS www.shef.ac.uk/cilass. The aim is therefore to replace these with an inquiry-based collaborative activity, encouraging new students to explore the resources in the department and University and gain initial knowledge of the information resources available. Ideally, the new plan should enable the students to "hit the ground running" when modules begin, through other activities, led by student mentors. The literacy-rich environment emphasizes the importance of speaking, reading, and writing in the learning of all students. This involves the selection of materials that will facilitate language and literacy opportunities; reflection and thought regarding classroom design; and intentional instruction and facilitation by teachers and staff. As noted by Barbara Foorman from the University of Texas, Houston Medical School, "88 percent of students who were poor readers in first grade were poor readers in fourth grade" (National Institute of Child Health and Human Development [NICHD], 2000, 9). Once students reach fourth grade, most of the information they need is given to them in textual format where the.