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Librarians and Teachers as Research Partners: Reshaping Practices Based on Assessment and Reflection

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As critical partners in shaping quality learning experiences, school library media specialists have a major stake in examining their teaching practices through the lens of actual student behaviors. Empowerment results when they collaborate with fellow teachers in implementing strategies, reflecting on the results, and sharing them with the professional community. This article focuses on the transformative nature of practitioner research. It describes a multi-year project to identify key components of effective teaching in collaborative elementary school classroom-library settings, and to translate this knowledge into practitioner-facilitated professional development alternatives. A summary of this article was presented at the International Research Symposium sponsored by the Center for International Scholarship in School Libraries, Rutgers University, convened in New York, April 28-29, 2005. The Symposium was funded by a grant from the US Institute of Museum and Library Services.

Introduction

The key to building instructional leadership is empowering partners to examine their teaching practices through the lens of actual student behaviors. Practitioners effectively gain this knowledge when they collaborate with colleagues in implementing strategies, reflecting on the results, and sharing them with the professional community (York-Barr & Duke, 2004). This learning is situated in practice and must be learned in practice. In short, schools are places where educators as well as students learn (Hiebert, Gallimore & Stigler, 2002).

Frequent critical reflection is a formal and central part of inquiry. The idea of reflective practice, which was originally popularized by Schön (1983), emphasizes that the tacit knowledge implicit in professional actions must be described through a process of observation and reflection. Mezirow (2000) states that such learning is transformative; that is, meaning is made by negotiating interpretations, using contextual understanding, critically reflecting on assumptions, and validating meaning by assessing rationales. Proponents of the notion of reflection-in-action maintain that this results in elaborating frames of reference, learning new frames, altering points of view, and transforming habits of mind (Mitchell, 2003; McNiff, 2002; McKernan, 1996; Schön).

The process of reflection is not necessarily a private activity. Research on restructuring schools indicates that teachers in effective schools do not operate in isolation (Newmann & Wehlage 1995). Student achievement is related to teachers being collaboratively responsible for student learning. McGregor (2004) stipulates that library media specialists must situate themselves "solidly in the middle of this collaboration" (p. 202). As key members of school communities, they have a crucial stake in contributing to the quality of teaching that shapes students' learning.

Information Power: Building Partnerships for Learning (AASL & AECT, 1998) places student learning unequivocally at the core of services provided by the library media center. As instructional colleagues, library media specialists are strategically positioned to assume a leadership role in curriculum reform (Lance, 2003; Doiron & Davies, 1998; Todd, 1997; Woolls, 1997; Stripling, 1995). They help to resolve instructional problems and model reflective practice. *Information Power* states that "leadership is demonstrated when information literacy is integrated across all subjects and grades, when connections are made between information-based learning and the skills students will need in the workplace and home" (p. 52).

Research Focus

Over the past decade, my investigations as an academic researcher have converged on the following overarching questions related to the importance of reflective practice in improving classroom and library instruction.

- How do instructional partners effectively facilitate student learning, particularly learning that embeds the information search process?
- How do instructional partners refine their craft knowledge?

In this article, I report on a multi-year project to identify key components of effective teaching in collaborative elementary school classroom-library settings. I briefly review the literature on practitioner research and summarize the methods employed in the studies described in this report. The major segment of the article focuses on the results gleaned from the practitioner research conducted in four elementary schools in Hawaii. I summarize each case study in terms of its context, specific questions addressed, data collected, and findings. In all these studies, the instructional partners defined and refined their craft knowledge based on practice and reflection. They analyzed the effectiveness of various interventions that they used to teach students the information-seeking process. They also identified recurring themes and features that crossed context boundaries.

Practitioner Research

The term *practitioner research* is often used synonymously with action research. I use these terms interchangeably throughout this article. The validity of the concepts, models, and results that practitioner research generates depends "not so much on scientific tests of truth as on their utility in

helping practitioners to act more effectively, skillfully and intelligently" (McKernan, 1996, p. 4). Farmer (2003) states that this type of research "provides a realistic bridge between day-to-day educational practice and educational theory" (p. 4).

The roots of contemporary action research can be traced to Kurt Lewin's work in the 1940s. His contribution was an elaborated theory that focused practitioner research on a social problem needing resolution, with the goal being better action or practice. He applied theories to practice through repeated cycles of problem conceptualization, planning, fact-finding, implementation, and evaluation, leading into reconceptualization for a further iteration of the process. Practitioner research as reflective practice was also influenced in the late 1960s and early 1970s by the work of the Humanities Curriculum Project (HCP) in the United Kingdom under the leadership of Lawrence Stenhouse. Rather than collaborative teams of teachers who practiced and researchers who observed and reflected, the HCP emphasized the teacher as both practitioner and reflector (Elliott & Adelman, 1996).

The participative nature of action research has challenged the standard model of social research that assumes that professional researchers should exercise maximum control over the process. Two important dimensions of this research are the democratization of the process and the empowerment of participants, who are viewed as change agents. Practitioners are colleagues in the process of identifying issues and questions and determining alternative means of gathering necessary information to probe for solutions. They participate in the collection and analysis of data, determine future classroom-library action based on findings, and decide on effective means of disseminating gained knowledge to the larger educational community. Although they are the primary informants, the school team members also become interpreters and research designers. The exchanges between various participants and between participants and researchers offer a dialectic that challenges weak or inconsistent data or interpretations. Checking validity in this type of research involves triangulation of inquirers and methods. For example, inquirer triangulation might be derived from at least three people examining and reporting on the same evidence or event. Method triangulation demands the comparative analysis of varying forms of data including journal entries, interviews, field notes, and students' work samples.

Practitioner research requires systematic and intentional inquiry. Participants meet regularly to articulate instructional concerns and discuss alternative strategies to improve practice (Mitchell, 2003). More than a series of concrete steps, action research is "a process of learning from experience, a dialectical interplay between practice, reflection and learning" (McNiff, 2002, p. 13).

The following assumptions undergird practitioner research.

1. Research is exploratory in nature. The aim is to better understand "issues and factors at work in a learning or teaching process rather than to measure the effects of currently known variables" (Neuman, 2003, p. 107).

2. Research legitimizes the teaching experiences and practical wisdom that instructors use in mediating their professional lives (Ghaye, 1997).
3. Researchers and practitioners work side by side as partners in settings where each benefits from the other's expertise. Practitioners use the wealth of their experience to test difficult-to-implement but promising ideas. Researchers, in turn, have greater access to investigational contexts and populations and gain a rich source of fresh concepts and hypotheses (Hiebert et al., 2002).
4. The academic partner plays several potential roles. One is to suggest frames that help practitioners make tacit knowledge explicit. Another is to affirm the value of the practitioners' experiences, ideas, and insights. A third is to provide platforms for teachers and librarian researchers to share their understandings.
5. This form of research has the dual aims of (a) improving local professional practice, and (b) developing the quality of professional practice in a wider sphere. Teaching—whether it occurs in the classroom or the library media center—is not a purely private and personal activity. It is a professional activity that can be continually improved if it is made public and examined openly (Hiebert et al., 2002).

There are specific references to practitioner research in the literature of school librarianship that date back to the 1970s. In 1979, the American Association of School Librarians sponsored a preconference on action research. Speakers at this session encouraged library media specialists to improve their instructional programs by engaging in action research (Loertscher, 1979). In 1987 the British Library published proceedings of a seminar that focused on collaborative inquiry enhancing the use of information skills (Ruddick, Hopkins, Sanger, & Lincoln, 1987). In 2002, the Australian School Library Association produced a meta-review of evidence linking school libraries to student achievement (Lonsdale, 2003). The Australian report confirmed the need for more local "small-scale, qualitative studies" to evaluate the effect of the school library on aspects of learning (p. 1).

Over the last two decades, a steady stream of literature from Europe, Canada, Australia, and the United States has described the process of practitioner research, its relevance to the concerns of library media specialists, and its value to the profession (Englert, 1982; Rehlinger, 1988; Stripling, 1989; Howe, 1998; Woolls & Loertscher, 1999; Dickinson, 2001; McNicol, 2004). Three recent publications have provided useful guidelines for school librarians conducting action research (Howard & Eckhardt, 2005; Farmer, 2003; Sykes, 2002). Sykes renders a thoughtful account of her own experiences as an action researcher. Farmer introduces useful background information about statistical concepts and suggestions for a wiser consumption of research. Howard and Eckhardt promote the importance of sharing the results locally through school and district presentations and nationally through conferences and publications.

Although the body of literature described above offers models and strategies to conduct action research, relatively few library-focused projects using this methodology have been published. A notable attempt to bring attention to action research in library-connected instruction was a special issue devoted to this topic in School Libraries Worldwide. In it Todd (1997) described how a long-term project conducted at a secondary college in Sydney, Australia provided evidence that integrated information literacy skills positively influenced student achievement. Three other studies in the same issue reported the results of practitioner research conducted in an elementary school (Harada & Yoshina, 1997), a junior high school (Loerke & Oberg, 1997), and a high school (Howe, 1997). In each case, the researchers studied how students progressed through various research projects and analyzed how varying teaching methods and strategies influenced their success.

At the 1997 Conference of the International Association of School Librarianship, Howe (1997) reported on her study conducted at an independent secondary school in Pittsburgh in which she concluded that electronic search skills could be effectively imparted through systematic and formal instruction. She noted that some skills were best taught in collaboration with the subject teachers, but that others could be taught in a short course offered by the school librarian. More recently, Farmer (2001) presented a case study describing how her high school in California implemented information literacy standards across the grade levels. She provided a detailed account of how students' skill levels were assessed and how various research products were developed. The paper also included an evaluation of the results of the project.

Methodology

Klobas (1997) identifies the following as key components in designing and executing practitioner research.

- Clear definition of the problem or situation to be addressed;
- Selection of appropriate actions or interventions based on the problem definition;
- Identification of techniques for data collection;
- Implementation of the planning-action-evaluation cycle.

It is important to note that these components are not necessarily representative of an ordered progression from one area to another. As unplanned changes and events occur, the researchers should be able to reflect on these occurrences and consider revised options.

In the four cases of practitioner research reported in this article, multiple data-gathering procedures were employed including examination and analysis of the following: (a) samples of students' work, (b) reflection logs written by students, (c) teacher and librarian lesson plans, and (d) informal notes and anecdotal logs maintained by the instructional partners. In the study at Mililani Mauka Elementary, the librarian also devised a simple

pre- and posttest to determine whether students could identify the major components of the information searching process.

As the university partner in these studies, I observed instruction in the libraries and shared my field notes. In two instances (Mililani Mauka and Shafter Elementary Schools), graduate students from the University of Hawaii's Library and Information Science Program also observed ongoing library instruction and contributed their field notes. In addition, I conducted unstructured and semistructured interviews on a monthly or more frequent basis with the respective teams and made summaries of these interviews available to my school partners for reaction and further reflection. I also shared published research that had implications for the participants' own inquiries. These articles related to topics such as critical thinking, inquiry learning, assessing for learning, and reflective practices.

Summaries of Practitioner Research

The four studies involving practitioner research are chronologically presented, with each described in terms of its school context, research questions, methods of data collection, and findings. Common threads in these cases included the implementation of a process approach to information searching and use, incorporation of strategies for student self-reflection and assessment, and the integration of guided inquiry as a framework for learning. All the schools in these studies used modified versions of Kuhlthau's (2004) Information Search Process. In all instances, the libraries operated on flexible schedules. By virtue of working with me as the external academic partner, the teams shared one unique feature: they had opportunities to learn about the earlier investigations and converse with the teachers and librarians who had participated in them. These conversations motivated them to develop their own research questions.

Mililani Mauka Elementary (1995-1996)[1]

School context. Mililani Mauka was located in a rapidly growing middle-class community outside Honolulu. With a student population of 1,100, it was the largest of the schools in this pool of studies. Almost 46% of the students were Japanese, with other Asian-American ethnic groups comprising an additional 22%. In standardized tests, 91% of the students scored average or above in reading, and 92% placed in average or above stanines in math. Seven percent of the students were in special education, and fewer than 1% of the students were in English-as-a-second language (ESL) programs. All 39 faculty members were fully licensed, with 24 having more than five years of teaching experience.

The librarian Joan Yoshina and the teachers were integrating classroom and library instruction; however, Joan felt that their work lacked student involvement in assessing the students' understanding of information searching as a process. To substantiate her observations, she devised a simple pretest requiring students to identify the skills needed to complete a

research assignment dealing with mammals living in Australia. She discovered that of her upper elementary students, fewer than 20% mentioned formulating a focus or planning for research, and none identified assessing either the product or the process as critical. Yoshina shared her findings with two of her teachers, Karen Makekau and Laverne Tada. Identification of this problem served as the catalyst for their research.

Research questions. The team formulated the following questions to guide their inquiry: (a) What might be effective intervention strategies to help students understand a process approach to information searching and use? and (b) How might students assess their own learning throughout this process?

Two thematic units were identified as the foci for the team's investigations. At grade 4, Tada selected the theme of interdependence in a rain forest. At grade 6, Makekau chose the theme of conflict and compromise and had students examine a range of current national and international conflicts. The grade 4 unit resulted in a classroom re-creation of the rain forest ecosystem. Grade 6 students worked on Web pages to share their information on various national and international conflicts. Both teachers planned separately with Yoshina. Each teacher met with the librarian for approximately six hours before initiating her unit. They also met at the midpoint and end of the units for about two hours each time. Between these formal meetings, they had brief face-to-face touch points and frequently exchanged comments by telephone and e-mail.

Data collection and findings. A total of 51 students, 22 in grade 4 and 29 in grade 6, were involved in the units that ran for 10 weeks. The instructors met with me on a monthly basis throughout the planning and implementation of the projects. A graduate student and I kept field notes on approximately half the lessons taught in the library. The team members maintained weekly anecdotal logs and created lesson plans.

Approximately half the direct instruction was conducted in the library; the rest of the work being done in the classrooms and the computer lab. Classes averaged about two 45-minute sessions a week in the library during the first six weeks, with less formal visits in small groups during the remainder of the project. Yoshina taught the lessons on formulating a focus, planning for research, and collecting information. The teachers led the presearch and production phases of the units.

An analyses of the lesson plans, corroborated by the field notes, interviews, and anecdotal logs, revealed the use of various intervention strategies throughout the information search process including concept mapping and the creation of rubrics for assessing notetaking and the final products. Conferencing and journal writing were used extensively throughout the units.

A posttest similar to the pretest was administered at the end of the units. The most impressive gains were: (a) 95% of the students identified presearch activities as important in formulating a research focus; and (b) 100% of them said that both the product and the process had to be assessed.

The following findings emerged from the instructors' logs, students' journals, interviews, and work samples.

1. A combination of guided practice, immediate feedback, and conferencing was deemed "highly effective." Instructors and students singled out conferencing as "most essential." Both the grades 4 and 6 students felt that the one-on-one interaction helped them think about what they were doing and assisted them in interpreting and organizing their information. One student wrote in his log, "If we were given at least one week to gather notes, then just let us have conferences for the rest of the time." Given the labor-intensive nature of conferencing, both teachers acknowledged the benefits of working with the librarian as a partner. In an interview, one of the teachers said, "Working with Joan, we were able to split the workload. She was adept at counseling the students and we were able to meet with twice as many students in the same amount of time. She was a godsend!"
2. Most of the students' journals mentioned that learning to think aloud was new to them, and they saw genuine benefits in using this strategy. One student wrote, "It all became clearer to me when Mrs. Y [librarian] started telling about what she was thinking as she wrote examples of good notes on the white board." In my field notes, I also captured one student applying this strategy as he explained how he was using an electronic encyclopedia to a peer:

   I look under religion because I know that the causes for this conflict had to do with religion. The information goes too far back and doesn't say anything about today's conflict. I need to go back to the outline of the article and find something more current. Now I am looking under that. If this does not pan out, I might have to...

3. Students and instructors repeatedly mentioned the positive results of constructing and using rubrics. The students helped the instructors draft rubrics for taking notes and for their final products. One grade 6 student noted, "Now I know what to put in my [Web] page. Making the assessment tool made me more confidant [sic] about our project and how we could make it meet the criteria." It should be noted that the students in both grades tended to rate themselves slightly higher than did the instructors. Because this was the students' first experience with rubrics, the instructors felt that additional modeling and guided practice in future projects would benefit everyone.
4. Both students and instructors frequently mentioned the recursive nature of the process. Students found that they were modifying their foci and "going back and forth between taking notes and finding a new topic when I couldn't find enough information on my first topic." More often students found themselves shifting between collecting information and working on their presentations as they discovered they were missing important pieces of information. As one student commented, "This [process] never ends!"

Shafter Elementary (1999-2000)

School context. Shafter was situated on a military base on the edge of Honolulu. All the students attending there were military dependents. The smallest of the schools in this group of studies, Shafter had a student population of 212. Over 45% of the students were Caucasian, and another 27% were African-American. In standardized tests, 92% of the students scored average or above in both reading and in math. Twelve percent of the students were in special education, and another 5% were ESL students. Of the 17 faculty members, 14 were fully licensed, and 12 had taught for more than five years.

Claire Sato, the librarian at Shafter Elementary, had spoken with Joan Yoshina and read her published accounts of the work conducted at Mililani Mauka. She was already involved in extensive collaborative work with many of her teachers and was keenly interested in examining the use of journal-writing as a means of raising students' awareness of the information search process. Sato invited Eileen Suda, who taught a combination grades 5 and 6 class, to join her in this investigation.

Research questions. As a team, they devised the following questions to drive their research: (a) What understandings and problems do students express through their journals as they work through a research assignment? (b) What feelings do they express? and (c) How does journal-writing inform our instruction?

They decided to work on two cycles of research with the students. The first assignment on how geography influences a culture or civilization was a required unit of study completed in the fall semester. Students produced poster displays of their findings that were exhibited in the library. The second assignment, which was conducted in the spring, engaged students in selecting heroes from history. This unit evolved from questions that students had raised about "What makes a person heroic?" and "Who is a hero to me?" Students conducted mock interviews and created trading cards of their chosen heroes. Sato and Suda collaborated on the assignments during periods when Suda's students were in the playground with the physical education teacher. Because the library operated on a flexible schedule, Sato could accommodate this type of collaborative planning.

Data collection and findings. Seventeen students participated in this study, seven in grade 5 and 10 in grade 6. The class spent a total of 12 weeks on the two research assignments. The librarian assumed the lead in a total of 24 instructional sessions that dealt with exploring the general themes, formulating foci and questions, and locating and documenting information. Instruction was largely direct and structured in the first cycle. During the second cycle, however, students worked more independently with Sato and Suda guiding and facilitating their efforts. The classes visited the library as many as three times a week for an hour at a time.

Students each wrote a total of 26 journal entries. A graduate student from the University of Hawaii and I analyzed these entries. To ascertain

cognitive response levels, we modified a coding scheme used by Staton (1998) in her analysis of journal-writing. We coded affective responses using Kuhlthau's (2004) stages of emotional expressions. In addition to the analysis of the journals, the librarian maintained weekly anecdotal logs, and the graduate student from the University of Hawaii recorded field notes for the sessions taught in the library. I also interviewed the school team on a monthly basis for the duration of the assignments.

The following findings emerged from the journal analyses, anecdotal logs, field notes, and interviews.

1. Although students could often complete a task on paper, they had little understanding of the purpose for doing so. This was especially true in the first cycle. In her anecdotal log, Sato noted,

   > By reading the journals, I see how faulty some of our observations have been. All the students seemed to be on task. But did they truly understand what they were doing and why they were doing it? Their journals clearly tell us that they were clueless.

   Reflections like that above led the library media specialist and teacher to reexamine their intervention strategies. One important activity that resulted was the inclusion of debriefing sessions with the class after each new learning experience. During these sessions, either Sato or Suda took the lead in presenting examples of the journal entries and facilitating discussions on how these entries provided evidence of learning. As a team, the instructors also engaged in more frequent conferencing sessions with the students. By modifying their instructional

Journal prompt: Why is exploring a topic important to your work?

Student A, cycle one: "This is educational but when do we really start our research?"

Student A, cycle two: "Exploring helps me know what I will be researching. I look for possible topics. I skim different resources, see if they are understandable and interesting. The more sources, the more places I have to find information. Also I need to find something that interests me because I will have to stick with it for a long time!"

Journal prompt: How would you explain how to find information and take notes to a new student in our class?

Student B, cycle one: "The way we take notes is we get the book with the subject we want, then we answer the questions that we had."

Student B, cycle two: "Scan through all of your resources. Take your time while doing this. While skimming you tag important sections then it will be easier to go back to that page and find information. Always look at your questions because they give you clues about what to look for. Take notes by writing keywords first, then long answers. Don't copy your answers out of the book because the teacher knows what kind of work you do and you will have to redo it anyway."

Figure 1. Examples of journal entries for cycles one and two.

Finding a focus: *"I feel misplaced because I am not realy [sic] sure of what I am supposed to do. I kind of feel like I am doing something wrong."*

Gathering information: *"I feel good about it because I learned lots of things that I never knew before. I feel I am getting a lot accomplished."*

Completing a product: *"YES! I'm done!!! I can't believe it. I think that my trading cards turned out really well. I mean when your mom says that you can make money off of making trading cards you can't be doing too bad!"*

Figure 2. Example of one student's affective responses.

approaches, they noted that students expressed a clearer understanding of key aspects of the information seeking process in the second assignment. Figure 1 displays examples of entries from two students during the first and second cycles of research.

2. In both cycles, most of the students experienced emotional peaks and valleys similar to the patterns reported in Kuhlthau's (2004) studies with high school students. In the exploration stage, for example, Suda's students expressed apprehension, frustration, and bewilderment. As they moved into formulation of a focus, there was guarded optimism. This was followed by feelings of confidence if they were successful in gathering information on their selected topics or dejection if they were not able to find what they needed. Finally, students indicated their elation and relief as they completed their trading cards, which was one of their final products. Figure 2 presents excerpts from one student's journal.
   The instructors acknowledged these feelings as an integral part of comprehension and assessment for learning. Because the journal was not a tool for grading, students felt safe expressing themselves and taking risks in describing what they knew.
3. Journal-writing provided the instructors with critical snapshots that revealed the private thoughts of all students. By reading the journals, Suda and Sato were able to identify more clearly the variations in students' perceptions and understandings of the information search process. This increased engagement also sharpened the team's awareness of individual development. In the following log entry, Sato captures the problem-solving capabilities of one student.

> L. is a child, who usually needs to be told what to do, how to do it, and when to do it. She is currently working on her trading card. In her log, she wrote of all the steps she had taken. I was impressed. I had no idea that she had taken these steps to complete her tasks without calling Eileen [teacher] or me. When she finally came to me today with something she couldn't solve, I commended her for the work she had already done. As we worked together, she came up with suggestions of what she might try.

4. Reflection was a learned skill that required extensive practice and feedback. Many of Suda's students had never written journals, and they indicated the need for more time to make their entries. As one of the culminating activities, the librarian asked students to comment on the merits of journal-writing. Most indicated that keeping journals allowed them to explain what they were learning and how they were feeling about their experiences. One student noted,

   > Later on, you can look back and see what you did. You can see what you did better than before. You can also see what you thought and felt. The next time you do something like this, you can learn from what you did before.

5. The counseling role of the instructor assumed a richer dimension as both Suda and Sato discovered how positive and constructive dialogue reinforced strong performance. This discourse involved a continual exchange with students to clarify and elaborate on described experiences and to provoke thinking about new ways to approach information problem-solving tasks.

Waikele Elementary (2000-01)[1]

School context. Established in 1998, Waikele was the newest of the four schools in this group. It was located in a rapidly growing lower-middle-class community about 20 miles from Honolulu. Of the 788 students, almost 46% were Filipino from recently immigrated families. In standardized tests, 77% of the students scored average or above in reading, and 83% placed in average or higher stanines in math. Six percent of the students were in special education, and 15% were ESL students. Forty-one of the 45 faculty members were fully licensed. Only 13 had taught for more than five years.

Debora Lum, the librarian, and Kathy Souza, a kindergarten teacher, had attended a summer institute where both Yoshina and Sato had described their practitioner research. Intrigued by these investigations, Lum and Souza wished to study how they might effectively engage kindergarten students in inquiry-based learning.

Research questions. The team's research questions centered on: (a) How might kindergarten students demonstrate their understanding of inquiry as a process? and (b) How might we nurture such inquiry?

Unlike the experiences at Mililani Mauka and Shafter where existing curriculum requirements largely predetermined the units of study, the Waikele team wished to experiment with an inquiry generated by the children. The opportunity presented itself when one of Souza's students discovered a strange bug on the school playground. The kindergartners had a flood of questions about the insect. Souza invited them to find out more about it and asked for volunteers to serve as the "detectives" on this project. The three volunteers not only conducted the investigation, but also reported their progress to the class throughout the project. They worked with the librarian in seeking information. When the students were unsuccessful in locating the bug through the library's resources, the librarian helped them to send e-mail to an

entomologist. Ultimately, they created a one-minute video that was viewed by the entire school on the closed-circuit television network. Both Lum and Souza helped the students organize their information, and the school's video coordinator assisted in the production phase of the students' work.

Data collection and findings. The students spent four weeks on this project. Lum and Souza maintained logs throughout the process. As the university partner, I observed them in three work sessions with the students and prepared field notes on these experiences. I also met with the instructors at four points in the project and recorded our conversations.

While they were working on their project and again at the end, students contributed to a Web representation of the inquiry process (Figure 3). This was a critical artifact that captured their collective knowledge as kindergartners about the process.

By studying the above artifact and conversing with the students, the instructors identified the following notions about inquiry that emerged from their young learners.

- An inquiry is fueled by a desire to know something;
- Prior knowledge must be considered as part of an investigation;
- Questions (i.e., wonderings) shape an inquiry;
- Information may not be easily found;
- Ethical management of information is critical;
- Knowledge gained should be communicated to others.

Additional findings gleaned from the instructors' logs and interviews included the following.

1. The instructors recognized the centrality of student-generated questions in the inquiry process. These questions framed what the children wanted and needed to know. Souza reflected, "I now realize that when questions come from the children, they are more powerful and purposeful than teacher-generated questions."

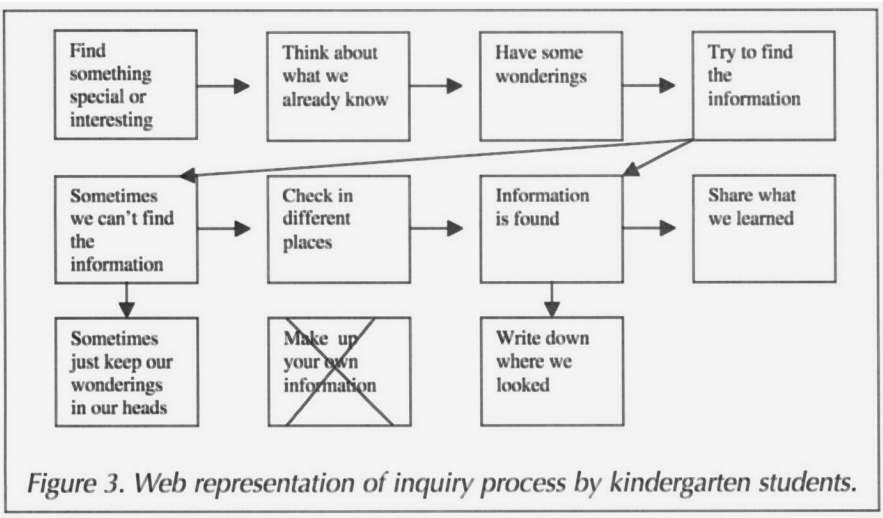

Figure 3. Web representation of inquiry process by kindergarten students.

2. Affect was strongly associated and woven into cognitive meaning-making. Students expressed a growing sense of empowerment as they brainstormed ideas, selected alternatives, and overcame problems. They proudly mentioned learning new skills in using technology to gather information and communicate their findings. One student said, "I want to teach my friend how to ask wondering questions and find answers to them." Another told Souza, "I have a new wondering. I think I know where to find out more about it."
3. Both instructors found themselves reexamining their roles as teachers. They experimented with more facilitative styles of interaction that focused on coaching rather than "telling and testing." They provided students with time and space to investigate and ask questions. Where appropriate, they offered suggestions, posed options, and raised further questions that stretched the students' thinking and encouraged connections with prior learning.

Mililani Waena Elementary (2003-04)[4]

School context. Mililani Waena was one of the older elementary schools serving the Mililani community. Of the 650 students, 20% were Japanese, with almost equal proportions (11%) of Filipino, Hawaiian, and Caucasian students. In standardized tests, 83% of the students scored average or above in reading, and 89% placed in average or higher stanines in math. Seven percent of the students were in special education, and 2% were ESL students. Of the 46 faculty members, 41 were fully licensed, and 31 had taught for more than five years.

The faculty at Mililani Waena had recently received training in problem-based learning, and they were eager to develop learning that incorporated this approach. The librarian, Linda Kim, had read about the Waikele work with kindergartners, and she wished to develop a strand of research that examined how genuine inquiry might be developed in an upper-elementary classroom in her school. One of her grade 5 teachers, Leila Robello, indicated that she was unhappy with a unit on nutrition that she introduced each fall. She normally taught the unit through textbook assignments and culminated it with students taking a quiz on the food groups and writing a short report on the nutritional value of specific foods. Kim asked if she wanted to experiment with a problem-based approach to the unit, and Robello was willing to take the risk.

Research questions. As a team, they wanted to explore the following questions: (a) How might a problem-based approach make learning real for students? (b) How might implementing this approach influence our teaching?

Rather than beginning with a teacher-selected topic, Kim and Robello invited students to contribute topics and issues dealing with the general theme of nutrition. Students brainstormed many possibilities, discussed them with families and peers, and voted on one problem they agreed was critical: the need for more appetizing and nutritious school lunches. Their

goal was to devise appealing and balanced school lunch menus and present the two best menus to the cafeteria manager and the principal.

Data collection and findings. Twenty-one students were involved in this study, which lasted for nearly a semester. Kim and Robello met informally to plan and improvise lessons throughout the project. Kim took the lead in the pre-search and information-gathering phases of the work. Robello worked with the students on the products. Throughout the process, Kim kept informal notes describing students' progress and lesson-planning with Robello. As the university partner, I met with her about twice a month to examine student work samples and discuss problems and progress. Students maintained weekly logs. Kim and Robello wanted the students to help in defining and shaping the project. Although they established broad guidelines for it, they continually modified the specific tasks as they worked with the students.

The school team emerged with the following key understandings about a student-centered approach to learning.

1. Questioning was at the core of the experience. In this case, the students identified the problem and the essential question. With the help of the instructors, they also created more specific questions that helped them search for information about the nutritional content of various foods and the importance of achieving a balance in healthy school lunches for young people.
2. Learning was a social experience. Students interacted with their peers, experts, and families at various points in their work. For example, they surveyed other grade 5 students about what they wanted in a school lunch. They interviewed a dietitian and the cafeteria manager about the nutritional content of the lunches served. They also asked members of their families about ethnic meals prepared at home and the possibility of incorporating some of these foods into a school menu. Students created their menu entries in pairs, and another student team critiqued each menu.
3. Students learned by doing. As mentioned above, they created and conducted a school survey, interviewed family members and community experts, and visited supermarkets to study labels on food products. To accomplish these various activities, students determined relevant questions to explore, methods to summarize the collected information, and strategies to evaluate this information. Throughout the process, they actively engaged in team and class discussions to identify problems and seek ways to solve them. The final products—creating new menus—demonstrated students' ability to apply their learning to an authentic goal.
4. Assessment was a shared and continual experience for both instructors and students. The youngsters discovered that each activity was an essential piece in helping them understand and move forward on their project. In their logs and group discussions, they asked themselves

questions such as, "What new information did I learn from this task?" "What's my next step?" and "What new questions popped into my mind?" Students also worked with the instructors in creating a checklist to critique their menus.

Students' responses and performances, in turn, influenced the instructional plans. For example, when students wanted to survey schoolmates about their favorite lunches, it was immediately apparent that they had little experience with survey techniques. Working as a team, Robello and Kim helped the students devise appropriate and relevant questions and taught them how to compile and summarize the data.

5. Problem-based learning strengthened feelings of empowerment among the students. The issue that they tackled was personally meaningful and connected to a broader health concern. Throughout the investigation, the students collaborated with the instructors on the questions to pursue, end goal and products desired, sources of information to use, criteria to measure their products, and plans for their culminating presentation. In their final logs, students commented on the aspects of this project that were "different" from other classwork. They overwhelmingly mentioned the hands-on and experiential nature of the investigation including the survey, interviews, menus and "taste tasting the winning menus which were Spanish rice and chili dog." They liked the "openness" of the project ("We selected what we wanted to study"). According to the students, being active partners in making critical decisions about the learning experience outweighed the obstacles they encountered at various points in their work. The consensus was that the students wanted to "do more projects like this one."
6. For the instructors, problem-based learning required taking risks and sharing control with the students. In her notes and her conversations with me, Kim repeatedly mentioned that this form of learning required that the instructors "take their cues" from the students. In our final meeting, she said,

> We had to have a framework for the project and basic expectations for the students, but we also had to be open and flexible about listening to what students wanted to know and how they wanted to proceed. This was pretty scary for Leila [teacher] and me. We had to temper our normal tendencies to "direct" the project with our desire to "negotiate" and "facilitate" the direction of this unit. We discovered that we had to have a focus but we also had to listen carefully to what students had to say. We had to honor their thinking and work with them to build as much of their thinking into the experience as possible.

Salient Themes and Issues

In discussing the results of these various studies with the school teams involved, it became apparent to everyone that the elements of practitioner research paralleled Kuhlthau's Information Search Process. As one of the librarians noted, "We were actually moving through the same process that our students were experiencing without explicitly recognizing it." Figure 5

Information Search Process		*Practitioner Research*
Initiation	⇨	Recognizing the need or impetus for change
Selection	⇨	Identifying potential research questions
Exploration	⇨	Reviewing and discussing relevant literature and experiences
Formulation	⇨	Planning the project and interventions, defining the problem in terms of enabling actions and methods of assessment
Collection	⇨	Employing multiple means of data collection
Presentation	⇨	Analyzing the data and summarizing findings, using results to inform teaching, disseminating findings to the larger community
Assessment	⇨	Reflecting throughout the project

Figure 5. Practitioner research in relation to information search process.

indicates the sense-making relationship inherent in both practitioner research and the Information Search Process.

It was important that they realized they were "learning as a part of a community." In an attempt to interpret these interlocking experiences, I introduced the notion of dualities as a useful construct to describe the overlapping yet conflicting themes and activities that drive the dynamics of change in practice. According to Barab, Barnett, and Squire (2002), the inherent interplay of these dualities provokes questions that ultimately transform current practices. These dualities are conflicting demands that need to be balanced rather than minimized. They occur along a continuum, and the choice of action is not seen as opting for one polar opposite over another, but rather as balancing and making compromises to address competing needs in particular learning contexts.

As a group, we identified the following tensions in our body of practitioner research. Examining our findings in terms of dualities provided us with an analytical lens for characterizing community dynamics and describing their inherent interaction.

Learning as both private and social. One school librarian said that for both students and instructors, learning was continually "under construction in the mental representations of the individual's mind." These representations were abundantly evident in the reflection logs and anecdotal records written by all participants. At the same time, learning was situated in the social interaction among the members of the community. As students worked in teams to solve problems and prepare their presentations, they discovered the power of team thinking. A grade 6 student captured the synergy of the interaction when she wrote, "I had some good ideas but when my team members talked about their ideas, I knew we could come up with something even better if we combined our ideas." The instructors also repeatedly expressed the same sentiments. They underscored the need for opportunities to reflect privately and exchange

ideas publicly as essential elements in constructing knowledge. As one of the librarians noted,

> By talking things out, frustrations became surmountable. In our meetings, I would mention how something was a problem, then Kathy [teacher] would ask questions. As we tackled the questions, one of us would come up with alternatives that I had not originally considered. Gradually, we would both see ways to approach the situation that I don't think either of us might have considered if we were working totally alone.

Inquiry as linear and recursive. In planning for the learning experiences, the instructional teams organized the lessons in a conventionally linear fashion that started with an introduction of the assignment and progressed through various phases of the information-seeking process. Through their logs and interviews, however, the team members readily acknowledged that the learning process itself was "messy," "convoluted," and "much more complex" than they had anticipated. Although the Information Search Process presumes some sense of linearity (e.g., students formulate a focus before attempting to gather information), the learners going through the process often backtracked or leapt ahead depending on their assessment of progress being made. The following student's log reflects the recursive nature of the process.

> I realy [sic] thought I had all of my notes and I was ready to work on my poster board. Boy, was I wrong! The first thing I had to do for my board was to draw a picture of artifacts from Greek civilization. But did I save pictures? Nope! I forgot to check what I needed for my board while I was taking notes. Now I have to go back to the Internet and books to find what I need.

The work of the instructional teams mirrored the same back-and-forth actions that were critical in assessment-driven learning. Toward the end of a project, one of the librarians said,

> Our final unit plan looked very different from our original one. We made so many adjustments to it based on what we observed students doing. A big a-ha for us, I think, was that preplanning the unit was very important so that we had a sense of our targets and what we wanted to have the learners accomplish. At the same time, we had to be flexible enough to make changes as we looked at actual student work. We had to be willing to return to the drawing board. This was a lot of work but it was so critical.

Pedagogy as directive and facilitative. Barab et al. (2002) indicate that both the *acquisition metaphor and the participation metaphor* are inherent in instructional practices. The acquisition metaphor describes an authoritative and directive form of instruction that inculcates a passive and receptive approach to learning. The participation metaphor refers to a facilitative stance that encourages active, self-determined learning. The teams involved in these studies continually wrestled with balancing these two approaches. Concepts that were unfamiliar to students (e.g., creating higher-level questions, evaluating Internet resources, comparing information from two or more sources) required more explicit teaching strategies. Rather than a lectures-only approach, however, I observed the teams intro-

ducing these concepts by combining lectures with time for guided practice and feedback. During their lectures, the instructors frequently asked questions and challenged students to predict what they might discover before engaging them in the work sessions.

The students' logs and conferences with the instructors also created important avenues for dialogic interaction. The following excerpts from a conference between a student and a librarian captures a facilitated exchange.

> Student: I found some really cool information about pyramids on this Web page.
> Library media specialist (LMS): Sounds promising. Who was the author of this Web page?
> Student: It was part of some class project so I guess it was done by a student.
> LMS: How about looking again at the criteria we set up as a class for evaluating web sites? It's always a good idea to check against the criteria.
> Student [pausing a minute]: Oh, you mean the list we put together about things to look for? [pausing again] Oh, the one about whether the person was a reliable expert?
> LMS: [nods her head]
> Student: Yeah, it might not be such a good idea to use this source after all.
> LMS: Well, how could you check whether the information at this source might be reliable after all?
> Student: Go to some other sources?
> LMS: What might you have in mind?
> Student: I like the Internet so I could check one of the online encyclopedias. If that doesn't work, I could find some of the books.

Curriculum as teacher-directed and student-centered. Given the demands of standards-based expectations for all students, the instructors felt genuine pressures to control and manage the curriculum. At the same time, they continually debated how they might provide for more student involvement in shaping the learning experiences. At Waikele and Mililani Waena, the teams experimented with more open-ended, student-inspired foci for the inquiries. In the other instances, the topics or themes were pre-selected; however, the instructors incorporated a range of opportunities for students to formulate questions, select personally relevant foci for study, and decide on the best means to communicate their findings. They persisted in looking at learning experiences from the "child in the chair who is watching us work at the table" (Jacobs, 2004, p. 26). In this negotiation, they involved the students in decision-making that motivated and empowered them. They struggled with achieving the targeted consistency while providing the flexibility that was considered critical for student participation in the process.

Curriculum focusing on product and process. All the teams had previously emphasized the completion of end products as the major learning targets for units of study. They estimated that 50-70% of the time was devoted preparing final presentations. At the same time, they admitted that the culminating efforts were often disappointingly superficial. Their interest in conducting practitioner research, therefore, was motivated by their desire to make the learning experience deeper and more meaningful for students.

By devising curriculum that incorporated the information-searching process as a critical component for inquiry learning, the teams recognized the centrality of a process approach. One teacher's comments during an interview clearly captured her efforts to mesh process with product in her work.

> I have to admit that before we collaborated on this unit, I always skimmed through stuff at the beginning. I didn't really think about the importance of the presearch phase. Actually, I didn't *know* about the presearch phase. I never really thought too much about the fact that the students might not understand the assignment. I never considered that they didn't have a big picture about the general topic. I never gave them time to consider the questions. I guess what I am saying is that I never really saw this whole thing as a *process*. I just concentrated on pushing students through the assignment so they could work on a poster or a slide presentation or whatever. Now that I am working on this unit, I cringe to think what I expected and how little I realized that students cannot be expected to do good work if you haven't brought them through the *how-to* part of things.

Issue of time. Time was one of the crucial issues embedded in the above-mentioned dualities. In all instances, the teams faced the challenge of "finding time" to do more in-depth planning. The school administrators were critical to resolving this problem. At Shafter, for example, the principal promoted the library's flexible schedule and allowed teachers to be released during physical education activities so that in-school planning could take place. At other sites, the administrators created special waiver days for in-school curriculum development. They hired substitutes for the teachers, and the librarians were able to join the faculty in planning the curriculum. Teams also resorted to asynchronous means of communication (e-mail) to complement their face-to-face planning sessions.

The need for more time, however, remained a persistent challenge. In addition to the alternatives described above, all teams voluntarily met during their preparation periods and after school. They also elected to plan during the summer and spring vacations. In my interviews with the teachers, I asked them why they were willing to collaborate given the time and labor involved. One teacher's response reflected the general sentiments of the group.

> I won't lie to you. This is a lot of work. It takes a lot of time. But I wasn't satisfied with what I was doing before in terms of research with the kids. Working with my librarian has really opened my eyes. I can see a difference in the quality of what the students are turning in. I didn't realize that she could help with so much of the teaching and conferencing. It's like sharing the workload. I also feel that the first time we plan is the hardest. We have to understand each other's teaching and planning styles and we have to work out a kind of rhythm. You know what I mean? I just feel it gets easier over time. I guess what I am trying to say is that it's an investment that pays off in the long run for students and teachers like me.

Issues of leadership. In any team, leaders are necessary for a group to establish and meet its targeted goals effectively. Newer conceptions of school-level leadership have expanded the notion of teacher leadership

from formal roles to include leadership practiced through more informal means (York-Barr & Duke, 2004). Informal leaders work collegially with other faculty to encourage examination and evaluation of instructional practices and their effects on student learning and progress. They exert influence by being able to collaborate, build trusting relationships, and promote growth among colleagues (LeBlanc & Shelton, 1997).

In the studies reported here, the librarians emerged as informal leaders who established their teams and nurtured rapport with their partners. In each case, the librarian had more years of overall teaching experience, as well as more years of tenure in the school. Data gathered from the logs, interviews, and meeting notes revealed the librarians' strong facilitative skills in conducting collaborative work. The librarians suggested timelines for meetings and maintained informal notes from these sessions. They were adept at guiding discussions, frequently using the following types of coaching questions espoused by Costa and other educators (Jacobs, 2004).

Tell me more about ...
Could you explain what you mean by ...?
What if we were to ...?
How else might we ...?
What do you believe about ...?
How do you feel about ...?
What follow-up can we provide ...?

The Journey Continues

Learning is turning the mirror toward us as professionals and examining our personal assumptions about teaching, risking the sharing with others, and engaging in thoughtful conversations that ultimately reshape our practice (Senge, 1990). Spiraling cycles of action and reflection form the core of collaborative inquiry. System-wide reform takes root through collaboration at the school level, where the particularities of context and individual differences are salient. Reflective practice has the greatest potential to create educational improvement because it places the individual practitioner at the center of reform efforts.

In this article, I focus on the advantages of learning through practitioner investigations of their own programs. In the next phase of my work with co-researchers, we will be designing and studying professional development that fosters communities of reflective practice and the critical issues that must be addressed if we are to support their emergence. This research must describe not only the structures and participants in such communities, but the processes by which they interact. There will also be a need to identify the existing system tensions and how they affect community life.

When practitioners bring to the surface issues and problems arising from actual classroom and library practices, they derive new understandings from them, translate these new understandings into performance, and extend the knowledge base of the profession. For adult learners, the learning process is complex and varied. Inquiry learning, reflection, and

practitioner research are interwoven practices that promote critical thinking, intelligent choices, and self-empowerment. Wells (1993) states compellingly why professional communities of inquiry are crucial.

> If the goal of reflection is understanding, the purpose of understanding is improvement in action. It is through engaging in this ongoing cycle of action research that we can best hope to change schools from within. (p. 275)

Notes

[1] The Mililani Mauka study is detailed in Harada and Yoshina (1997, 1998).
[2] The Shafter study is reported in Harada (2002).
[3] The Waikele study is reported in Harada, Lum, and Souza (2002/2003)
[4] The Mililani Waena study was presented at the 2003 American Association of School Librarians Conference in Kansas City, MO. Slides used in a presentation entitled, "Problem-Based Instruction: Making learning real," are available at http://www2.hawaii.edu/~vharada/ under "Sample Presentations."

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