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Librarian-Teacher Partnerships for Inquiry Learning: Measures of Effectiveness for a Practice-Based Model of Professional Development

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Abstract

Objective – This study analyzed the effects of a practice-based model of professional development on the teaching and collaborative practices of 9 teams of librarians and teachers, who created and implemented units of inquiry-focused study with K-12 students during a yearlong course. The authors describe how the collection and analysis of evidence guided the development team in the formative and summative evaluations of the outcomes of the professional development, as well as the long-term results of participation in this initiative.

Methods – The authors used an interpretive, participative approach. The first author was the external reviewer for the project; the second author headed the development team and served as a participant-observer. Triangulated data were collected from participants in the form of learning logs, discussion board postings, interviews, questionnaires, and learning portfolios consisting of unit and lesson plans and student work samples with critiques. Data were also collected from the

professional development designers in the form of meeting notes, responses to participants, interviews, and course documents. For two years following the end of the formal course, the authors also conducted follow-up email correspondence with all teams and site visits with six teams to determine sustained or expanded implementation of inquiry-focused, collaborative curriculum development.

Results – The practice-based approach to professional development required continual modification of the course design and timely, individualized mentoring and feedback, based on analysis and co-reflection by the developers on the evidence gathered through participant logs, reports, and school site visits. Modeling the inquiry process in their own course development work and making this process transparent to the participating community were essential to improvement. Course participants reported beneficial results in both immediate and long-term changes in practice. The summative evaluation identified significant changes in practice in three areas: (1) the design of inquiry-focused learning, (2) the roles of the teacher and librarian in collaborative development of instruction, and (3) the impact on student performance. Two years after the yearlong professional development course, most participants indicated that they continued to incorporate inquiry-based approaches, and over half of the participants were involving other colleagues at their schools in inquiry-focused practices. Six of the librarians assumed major curricular roles in their respective schools.

Conclusion – The practice-based model of professional development appears to be effective and sustainable. It has been tested and modified by other development teams in the last two years. More extensive use of the model in other contexts with further testing and refinement by other developers is needed to ensure that the model is robust and widely applicable.

Introduction

Professional development alternatives in Hawaii have historically been restricted to ineffective, short-term workshops delivered away from actual school sites. Moreover, these workshops have traditionally focused on the classroom and ignored the potential of collaborative teacher and librarian teaming on instruction. The purpose of this study was to refine a practice-based model of professional development and investigate its effectiveness through formative and summative assessments of a yearlong course for teams of librarians and teachers collaborating on curriculum development at their schools. Our past experiences and those of others (e.g., Marzano 66) have

shown that typical approaches to professional development, such as one-day workshops and formal courses without opportunities to test strategies learned, are insufficient to affect significant changes in practice. Our goal was to refine, implement, and disseminate a practice-based model for more effective professional development through librarian-teacher collaboration. We describe how the collection and analysis of evidence guided the development team toward ensuring that learning outcomes were achieved. Modeling the inquiry process in their own course development work and making this process transparent to the participating community were essential to improvement. We present our experiences with the aim of encouraging

further testing and refinement by other developers in other contexts to ensure that the model is robust and widely applicable.

Literature Review

Professional development programs are systematic efforts to bring about change in teaching practices. High quality professional development is a central component in nearly every current proposal for improving education (Guskey 381). Though initiatives vary widely in their content and format, the desired outcome is student learning. Researchers have increasingly focused on what makes professional development effective, exploring the complex links between the design of professional development, teachers' learning during planned activities, and subsequent changes in classroom practice (Penuel et al. 923; Sato, Wei, and Darling-Hammond 669).

The view of the learning process that emerges across different theories of adult learning is a constructivist perspective with the following propositions (Smylie 94). First, adults enter learning situations with accumulated knowledge, skills, and beliefs from past experiences. These may affect current learning by serving as cognitive and normative schemata through which individuals perceive and interpret their situations, new information, and themselves as learners. Second, adult learning is problem-oriented and occurs when problems relate in meaningful ways to life situations. Third, adults play an active role in their own learning and are not merely passive recipients of information.

Reflective practice occupies a position at the confluence of a number of ways of knowing for adult learners (Ghaye and Ghaye 18). A reflective educator is one who "is committed to continuous improvement in practice; assumes responsibility for his or her own learning; demonstrates awareness of self,

others, and the surrounding context; develops the thinking skills for effective inquiry; and takes action that aligns with new understandings" (York-Barr et al. 10).

Social constructivism also contributes to the foundation upon which current professional development is shaped. Fenwick and Tennant define adult learning as engaging in changing processes of human participation in a particular community of practice (62-63). A community of practice is any group of individuals who work together over time developing particular ways of doing things and talking about things that their members come to learn. Wenger declares that individuals learn as they participate by interacting with the community (its history, assumptions, rules and patterns of relationship), the tools at hand, and the moment's activity (11-15).

A practice-based approach that embraces reflective practice offers a potentially effective means to achieve professional growth. The practice-based approach to in-service training (Ball and Cohen 3-32) uses authentic records and tools for teaching and learning to create a common ground for individuals and teams to work, jointly reflect, explore alternatives, and support each other. The curriculum centers on the tasks, questions, and problems faced in ongoing efforts to design units of instruction and strategies for assessing student learning. This approach recognizes that curriculum reform involves just-in-time, situated learning and acknowledges that the processes of teaching and learning are ambiguous, complicated, and nonlinear. Instead of definitive answers and preordained solutions, participants focus on possibilities, methods of reasoning, and alternative conjectures as they learn from one another (Yukawa, Harada, and Suthers 181).

The consensus view posited by teacher

learning researchers is that effective professional development should be designed to develop teachers' capacity to work collectively on problems of practice within their own schools and with practitioners in other settings, as much as to support the knowledge and skill development in individual educators (Elmore 96). Key features identified in a review of the literature included the following:

- A well-articulated mission or purpose anchored in student learning and derived from analysis of student learning of specific content in a specific setting
- Connection with issues of instruction and student learning of academic disciplines and skills in actual classrooms
- Development and maintenance of collaborative practice within schools and across schools
- Focus over time with the use of assessment and evaluation for continuous improvements
- Timely supports for and feedback on teacher learning and practice (Borko and Putnam 38-51; Elmore 96; Nesbit, Leach, and Foley 85-90)

In this article, we will describe design principles used in a yearlong practice-based professional development course, the specific objectives and interventions employed, and information on the development team and participants.

Design of the Professional Development Course

The professional development (PD) course, entitled "Building Inquiry Partnerships," employed a practice-based approach that was founded on principles of constructivist and adult learning, and was structured to support participants as they designed and

implemented units of inquiry-focused study for K-12 students.

Development Team

The course development team consisted of three persons with dual roles as designers and learning facilitators/mentors. The lead designer and senior mentor was a professor in an LIS program with extensive experience teaching and facilitating workshops. A second senior mentor was a retired library media specialist, experienced practitioner, and skilled facilitator. The third mentor was a staff member of the state's School Library Services Branch, skilled in the use of technology for learning. In addition, an external researcher attended all planning meetings and collected and analyzed data, as described more fully below. The external reviewer and the lead designer served as the investigators for this study.

The Population

Nine teacher-librarian teams from K-12 schools (a total of 21 female participants) were the focus of this study. There were four elementary school teams, one intermediate school team (with one librarian and two teachers), and four high school teams (one with two librarians and one teacher, and another with one librarian and two teachers). The team members had a wide range of school level experience, from a librarian in her second year of service to teachers nearing retirement. Some teams had prior collaboration experiences, while others were collaborating for the first time. The teams were formed at the beginning of the PD course, when 10 librarians brought teacher partners with them at the start of the course in June 2005. Participants in the PD course not included in this study were three librarians who began the course alone but later secured partners after the school year started. Their teacher partners did not participate in the PD course.

Design Principles

The general design principles for the course were as follows (see also Figure 1):

- Embrace *reflective practice* for continuous improvement through awareness, deep thinking, and action that aligns with new understandings.
- Incorporate authentic records and tools for *teaching and learning* that center on tasks, questions, and problems *situated in practice*.
- Support a *community of practice* that provides common ground for work, collaboration, exploration, co-reflection, and mutual support.
- *Connect to patterns of practice in context*, building from knowledge, skills, and beliefs from past experiences to develop effective practices in one's classroom, school, and with other practitioners.
- Promote formative and summative assessment in a continuous cycle of *evidence-based practice*.

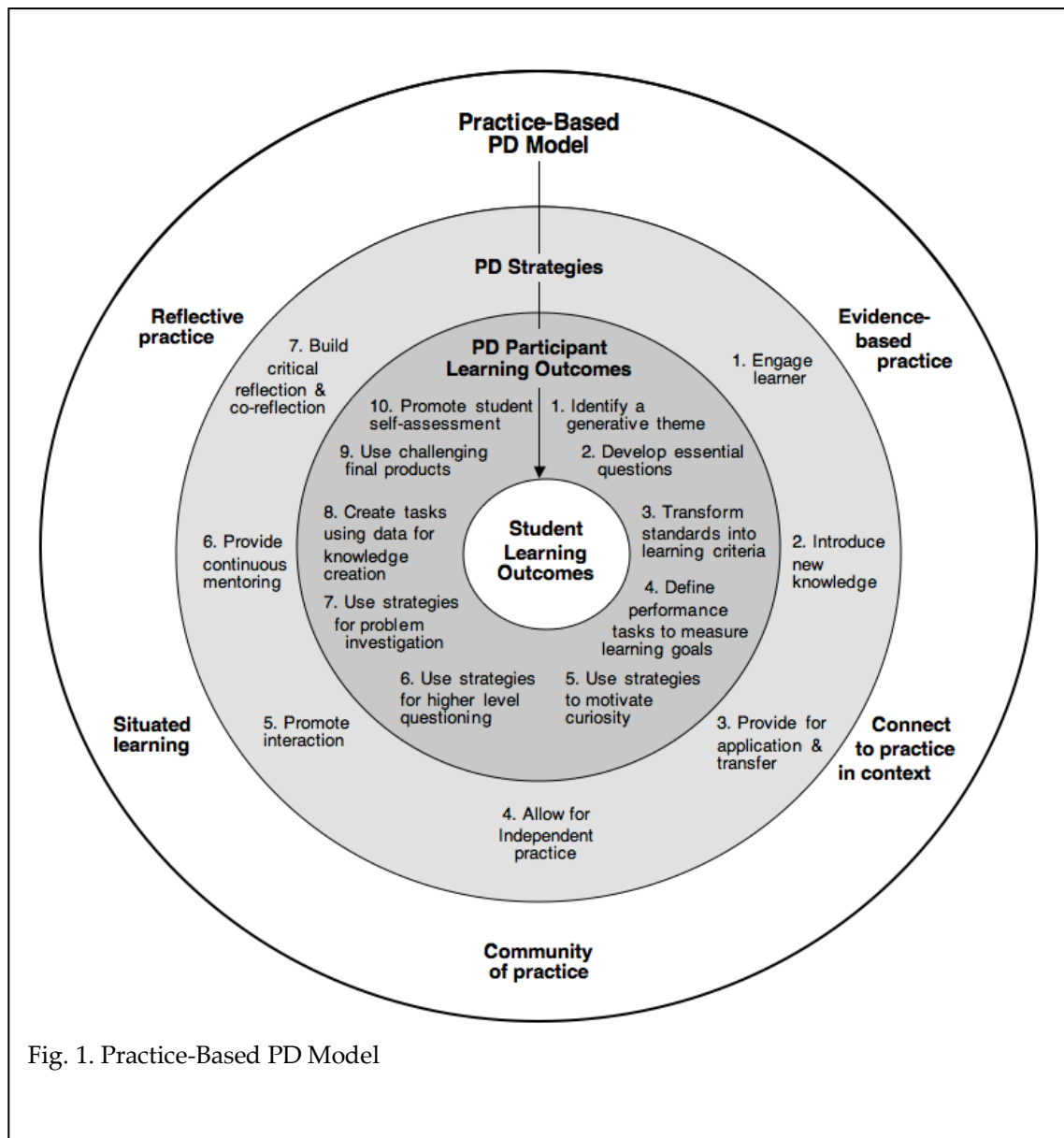


Fig. 1. Practice-Based PD Model

- Design an inquiry-based unit that connects to content standards and information literacy standards.
- Determine essential questions through focusing on a generative theme and transforming standards into learning objectives.
- Foster the inquiry process through student performance tasks that measure the learning goals and strategies that motivate curiosity, call for higher-level thinking, and support problem investigation.
- Achieve assessment-driven decision making through collecting formative and summative assessment data and analyzing the data to inform instruction.

These desired outcomes were specified as ten PD learning outcomes in the course syllabus (see also Figure 1):

1. Focus on a generative theme or problem.
2. Identify one or more essential questions that drive the project.
3. Transform standards into clearly stated learning criteria.
4. Define performance tasks that clearly measure the learning goals.
5. Incorporate strategies that motivate student curiosity.
6. Incorporate strategies, which challenge students to generate higher level questions.
7. Incorporate strategies that help students investigate their theme or problem effectively and efficiently.
8. Incorporate tasks that assist students in creating personal knowledge from collected information and data.
9. Require final products that challenge students to effectively communicate their knowledge.
10. Integrate opportunities for students to (a) assess students' own progress

throughout their work, and (b) evaluate their final products.

Scaffolding Strategies, Support Structures and Tools

Scaffolding strategies, support structures, and tools were designed to promote and embody the design principles. The major strategies used by mentors to scaffold learning of new concepts and practices were as follows (see also Figure 1):

1. *Engage the learner*: tap prior knowledge, encourage questions.
2. *Introduce new learning*: connect new concepts or skills to prior knowledge, demonstrate and model new concepts or skills.
3. *Provide for application and transfer*: guide practice, provide timely feedback.
4. *Allow for independent practice*: focus on site-based, work-embedded implementation of new learning.
5. *Promote interaction*: encourage collaborative curriculum planning, cross-school dialogue, sharing of products.
6. *Provide continuous mentoring*: encourage participation, show interest in progress, respond positively to inquiries, provide helpful feedback, extend the inquiry in key directions.
7. *Build critical reflection and co-reflection*: engage in ongoing assessment of progress and reflection on planning and implementation experiences.

The support structure consisted of face-to-face meetings and ongoing online dialogue. In June 2005, the course began with a three-day, face-to-face summer institute that was a critical engagement activity. The institute modeled an inquiry approach by challenging participants to think deeply about the following types of questions:

What is worth learning? How do we guide students for this learning to occur? How might students demonstrate their learning? How do we know if this understanding has occurred? The mentors introduced the key concepts: (1) determining essential questions, (2) fostering the inquiry process, and (3) assessment-driven decision making. Teams engaged in intra- and inter-team discussions to share and reflect on their past experiences, thus connecting prior teaching activity with the key concepts. The teams also began the work of collaborative curriculum planning. The mentors introduced a general process for designing and implementing a unit, supported by monthly individual and team reflections and yearlong mentoring. Each team was assigned a buddy team with whom to co-reflect throughout the year.

The teacher-librarian teams continued curriculum development and implementation on site. Two other face-to-face activities were a midpoint reunion and team presentations at an annual educational conference. The January 2006 midpoint reunion, which was also offered via videoconferencing, celebrated lessons learned, and identified areas of strength and areas for additional support. A critical component of the reunion was to revisit assessment issues. By this time, participants had started collecting assessment data and wanted more guidance in interpreting the results and brainstorming how best to use the findings in refining instruction. The designers invited participants to serve as critical friends to one another. In pairs, they shared their work and suggested ways to interpret the data and strategies for improving instruction. The designers also contributed to the discussion. In their reflections at the end of the day, many participants cited the benefits of collaboratively thinking about and discussing the complexities of assessment.

One participant noted, "Assessment IS reflective learning."

The other major face-to-face event involved the teams presenting their units in progress at the February 2006 E Conference, an annual educational conference sponsored by the state department of education. Approximately a thousand teachers, school support personnel, and administrators as well as university faculty attended this conference. Our teams were clustered in hour-long panels with each team given 10 to 15 minutes to share major learning goals, assessment strategies, collaborative teaching strategies, and student performances. Two teams brought along students to talk about their learning experiences. The overwhelmingly positive responses they received from attendees served as a tremendous morale booster. One participant told the developers:

I was very nervous about speaking for the first time at a state conference but what an experience! I had people coming up to me after the presentation to say how impressed they were with the team's collaborative planning and the results we were getting from the students' science investigations. I felt truly empowered.

In addition to the face-to-face activities, the designers established an online support structure: (1) monthly individual reflection logs via email, (2) monthly team reports posted in workspaces on a university website <<http://www.hnlc.org>>, and (3) buddy responses in the workspaces to the monthly reports from other teams. The mentors also engaged in continuous online mentoring in hnlc.org and via email.

The scaffolding tools included two texts written by the senior mentors that the teams used to help them integrate new concepts

and to guide their work. Participants were also provided with templates for the unit and lesson plans, a checklist for a generative topic, and a performance task template.

Supported by these strategies, structures, and tools, teams engaged in collaborative planning and implementation in situated learning through practice. The culminating product was a learning portfolio that included evidence of an inquiry-based unit and assessment-driven decision making (unit and lesson plans, rubrics, concept maps, worksheets, student self-assessment tools, formative and summative assessment tools, student work samples with teacher and librarian commentary at different levels of proficiency) and evidence of reflective practice (cumulative team reports, individual logs, and final reflections).

Methods of Evidence Collection and Analysis

The authors coordinated the collection and analysis of data for this study. The first author was the external reviewer for the project; the second author headed the development team and served as a participant-observer. Findings were validated through data triangulation.

For evidence of the design team's work, the investigators collected minutes of planning and debriefing meetings, course agendas, and session plans. In addition, the external reviewer conducted interviews with each member of the design team.

For evidence of participant practice, from June 2005 to May 2006, data were collected from individual reflection logs, monthly team reports and buddy responses, and final learning portfolios. A pre- and post-course questionnaire was administered to ascertain participants' self-perceived gains on the ten PD learning outcomes (see Table 1). Five teams (11 participants) were selected for in-depth, two-hour interviews from March-

May 2006, using open-ended questions to stimulate discussion (see Appendix A). In addition, a questionnaire was administered in May 2006 to the 13 participants who were not interviewed (see Tables 2 and 3).

To examine longitudinal work beyond the year of the formal professional development, the investigators collected email responses from the teams in the second and third years (from 2006 through 2008) as well as anecdotal records on follow-up visits with six of the teams.

Data were coded for elements of the PD model, practice-based design principles, course components, interaction structure, and characteristics of the learning and collaboration processes specific to each participant and team. Coder reliability was achieved by conducting member checks in the follow-up interviews.

In the following five sections, we elaborate on the foci of the investigation: (1) the use of evidence-based practice to guide the formative development of the course, (2) the summative evaluation of changes in inquiry-focused teaching practices among the participants, (3) the implementation of course design principles, (4) use of technology, and (5) evidence of sustained and expanded practice.

Evidence Based Course Implementation

Beyond attending the summer institute and the midpoint reunion, the participants posted over 500 messages during the eight months of the course. The development team met face-to-face at least once a month for approximately three hours and kept in continual contact by email to review the evidence and determine if the strategies, support structures, and tools were achieving the desired outcomes of the course. Design modifications were made throughout implementation to better achieve the

objectives. Evidence of the design team's work and participant practice were examined to document this iterative course design process. The following examples of the process are organized around several key PD learning outcomes for the participants.

Identifying a Generative Theme and Developing Essential Questions

The first day of the summer institute focused on major elements of an inquiry-focused approach. A key point was identifying a generative theme that is central to a discipline, invites student curiosity, is age-appropriate, offers opportunities for connections to students' previous experiences, and leads to deeper investigation (Perkins 93-95). Reviewing the participant feedback, the development team realized that most participants were uncertain about how to develop generative themes. They revised the second day's agenda to begin with discussing the differences between topics and generative themes and brainstorming strategies for developing generative themes.

Promoting Student Self-Assessment

From the start, participants acknowledged needing help with assessment. While all had conducted summative evaluations to analyze students' final products, they were novices at formative assessments that involved student self-assessment. Although these topics were addressed in the summer institute, the September team reports and logs indicated that this was an ongoing challenge.

In response, the developers established an assessment helpline on the course website. They posted the first questions as identified from the reports and logs and welcomed input. While not everyone responded in the helpline discussion, participants viewed the

discussion and shared in their subsequent logs and reports a range of assessment strategies including semantic webs, observation and performance checklists, rating scales, and rubrics.

Getting students to practice self-assessment was a challenge most teams had not faced before. The developers encouraged the use of "I can" statements with younger students and focused prompts for logs with older students. A number of teams subsequently used both strategies. One team videotaped their students as they rehearsed their oral presentations and encouraged self and peer critiquing of the videotapes.

In addition, the developers redesigned the midpoint reunion in January to allow for hands-on time with assessment. Participants brought drafts of their units and lessons and traded critiques on assessment strategies and tools. As noted in their subsequent logs, this helped teams adjust their teaching based on ongoing assessment of student performance.

Defining Performance Tasks to Measure Learning Goals

In early fall, several teams indicated that the plans for their inquiry projects were more complex than originally anticipated and requested additional consultations. In response, the developers conducted site visits with two high school teams. For one, re-examining the expectations for a history day project led to identifying more precise benchmarks for key tasks and devising checklists to allow students to more clearly see the sequence of assignments and associated deadlines. For the other team engaged in capstone projects, discussing how to incorporate quality service learning experiences resulted in the articulation of clearer expectations for both students and community mentors. In both cases, this individualized mentoring helped the teams

to scaffold and scale the projects through more careful examination of students' prior knowledge and the skills needed to execute the tasks.

Lessons Learned

As the developers read through the monthly reports and the logs, they realized anew the importance of the discourse occurring not only between developers and participants but also among the participants. They encouraged participants to look beyond their buddy teams to other team reports for more cross fertilization of ideas. They modeled the reflection process by sharing their collective reflections on the work being done across teams. Each month, they posted a co-reflection on the major themes and topics evidenced in the current logs and reports, shared proposed action steps, posed more questions, and invited comments.

These strategies resulted in critical exchanges among participants. An elementary team that had successfully used buddy pairing between 5th and 2nd grade students for note taking activities connected with another elementary team exploring grouping strategies for a multiage classroom to develop guidelines for cross-age pairings. In another example, two high school groups working on project-based learning posed critical questions for one another such as: How will the data collected from the research skills pretest help you to map out future lessons and activities? What skills will you assess? How do you sustain motivation in projects of this duration? What lessons were the developers learning? A practice-based approach to professional development required timely,

individualized mentoring and feedback, based on careful analysis of the content and tone of online discourse and active listening during site visits and face-to-face meetings. Collaborating as a development team necessitated co-reflecting on qualitative data being gathered through the logs, reports, and visits and using that evidence to work on modifications and introduce new interventions. In short, the developers discovered that modeling the inquiry process in their own course development work and making this process transparent to the participating community were essential to improvement.

Summative Evaluation of Course Outcomes

At the conclusion of the PD course, a summative evaluation was conducted to ascertain changes in inquiry-focused teaching practices among the participants. Data were collected through two questionnaires and in-depth interviews with five teams (11 participants), using open-ended questions (see Appendix A). Questionnaire 1 was administered to all participants at three points in time: prior to the June 2005 summer institute, after the institute, and in March 2006. The questions addressed self-perceived gains on the ten PD learning outcomes (see Table 1). Questionnaire 2 was administered in May 2006 to participants who were not interviewed to ascertain any changes in inquiry teaching values (see Table 2). Additional data were collected through examinations of individual logs, team reports, and final portfolios (especially unit plans and critiqued student work samples).

Table 1: Questionnaire 1 – Self-Perceived Gains in Knowledge and Ability

Rating Scale:												
1 = I have limited or no knowledge about this.												
2 = I know a little more about this but am not comfortable about applying this.												
3 = I feel more comfortable about apply this.												
4 = I feel quite comfortable about my knowledge and ability to apply this.												
Key: Shaded cells indicate gains over previous self-ratings	Pre-Institute				Post-Institute				End of Course			
	N=25*				N=25*				N=20			
I am able to ...	1	2	3	4	1	2	3	4	1	2	3	4
1. Identify a theme or a problem that serves as a generative focus for study.	7	8	9	1	0	1	11	13	0	0	9	11
Percent of Total	28	32	36	4	0	4	44	52	0	0	45	55
2. Develop one or more essential questions that relate to the theme or problem.	5	12	7	1	0	0	14	11	0	0	10	10
Percent of Total	20	48	28	4	0	0	56	44	0	0	50	50
3. Transform standards into clearly stated criteria that demonstrate what is learned and how it is learned.	4	10	11	0	0	0	16	9	0	0	11	9
Percent of Total	16	40	44	0	0	0	64	36	0	0	55	45
4. Create a performance task that measures achievement of learning goals.	6	9	10	0	0	1	14	10	0	0	14	6
Percent of Total	24	36	40	0	0	4	56	40	0	0	70	30
5. Incorporate strategies that motivate student curiosity and interest.	3	10	12	0	0	1	15	9	0	1	14	5
Percent of Total	12	40	48	0	0	4	60	36	0	5	70	25
6. Incorporate strategies that encourage students to generate higher-level questions.	4	13	8	0	0	1	14	10	0	1	14	5
Percent of Total	16	52	32	0	0	4	56	40	0	5	70	25
7. Incorporate strategies that help students investigate their theme or problem effectively and efficiently.	4	15	6	0	0	0	17	8	0	1	12	7
Percent of Total	16	60	24	0	0	0	68	32	0	5	60	35
8. Design tasks that assist students in creating personal knowledge from collected information and data.	3	16	6	0	0	2	15	8	0	0	15	5
Percent of Total	12	64	24	0	0	8	60	32	0	0	75	25
9. Develop final products that challenge students to effectively communicate their knowledge.	3	13	9	0	0	0	15	10	0	0	14	6
Percent of Total	12	52	36	0	0	0	60	40	0	0	70	30
10. Integrate opportunities for students to (a) assess students' own progress throughout their work, and (b) evaluate their final products.	4	13	8	0	0	0	16	9	0	0	16	4
Percent of Total	16	52	32	0	0	0	64	36	0	0	70	30

* One teacher withdrew from the course, leaving 24 participants who completed.

Table 2: Questionnaire 2 – Changes in Values of an Inquiry-Focused Approach

Post-Course Change-in-Importance Indicators: - = Decreased in importance; 0 = No Change; + = Increased in importance N = 7. Note: not all questions answered by every respondent			
Indicators for an inquiry-focused class or library—the students . . .	Post-Course Change		
	-	0	+
Exhibit curiosity, ask meaningful questions.	0	1	6
Collect and evaluate information.	0	1	6
Actively engage in hands-on tasks and learning by doing.	0	2	5
Express their ideas in a variety of ways (e.g., writing, graphing, mind mapping).	0	2	5
Use performance indicators to assess their own work and/or critique their peer's work.	0	3	4
Exercise responsible and ethical use of resources and equipment.	0	3	4
Remain on task.	0	3	4
Articulate what they were doing and why they were doing it.	0	2	4
Reflect on their strengths and weaknesses.	0	2	4
Demonstrate performance of higher order thinking (e.g., comparing and contrasting, synthesizing, detecting patterns).	0	4	3

The findings are presented in three sections below: (1) Design of Inquiry-Focused Learning, (2) Roles of the Teacher and Librarian in Collaborative Development of Instruction, and (3) Impact on Student Performance.

Design of Inquiry-Focused Learning

In interview and questionnaire responses, participants indicated changes in a range of areas, but particularly stressed inquiry learning, essential questions, and data-driven assessment.

In the interviews, all five teams discussed how they have achieved a better understanding of inquiry learning. As a middle school teacher new to her subject noted, "Inquiry ... really opened my eyes. It helped me work with the standards and

break them down. I never worked with essential questions before." For mature partnerships, participation in the course led to deeper conversations about the nature of inquiry learning: "Our big aha had to do with the inquiry unit plan. We addressed the essential questions as part of the background building, and the students' own questions as the inquiry."

Four of the five teams discussed the importance of essential questions. One middle school teacher clearly described the influence of the PD course on her understanding: "When we did our unit plans, we got students to do to their activities based on essential questions. Our curriculum coordinator said, 'This is what I've been telling you.' It didn't make sense until I took this class."

Four of the five teams discussed the value of data-driven assessment. One new high school librarian using pre- and post-assessment measures for the first time noted, "It gives us targets that we need to address, because we're measuring how much learning it's going to take. It helped me be more conscious of what was going on, of what we were doing and why we were doing it."

Responses to Questionnaire 1 (Table 1) showed that self-perceived gains at the end of the course compared to those after the summer institute were highest in four areas: (1) identify a generative theme (from 52% to 55%); (2) develop essential questions (from 44% to 50%); (3) transform standards (from 36% to 45%); and (4) incorporate strategies for problem investigation (from 32% to 35%).

For Questionnaire 2, nearly all respondents indicated that they valued essential questions and data-driven assessment more highly at the end of the course: (1) "exhibit curiosity, ask meaningful questions" (6 of 7 respondents), and (2) "collect and evaluate information" (6 of 7 respondents) (see Table 2).

In addition, the individual logs for December/January indicated these changes in teaching practice due to an inquiry focus: (1) essential questions as the focus for student learning; (2) student-centered learning and independent inquiry; (3) data-driven decision making; (4) student self-assessment; (5) challenging students to achieve higher level thinking and problem solving; (6) more thoughtful planning; (7) designing units that are connected to the real world and relevant to students' lives; and (8) more carefully incorporating standards.

Roles of the Teacher and Librarian in Collaborative Development of Instruction

One of the features of the PD course that had the greatest impact on teaching practices was the partnership between teachers and librarians. The value of partnering was one of the topics most often included in additional comments to Questionnaire 1, and five of seven respondents to Questionnaire 2 rated it "most helpful" for their learning.

Individual logs and interview data provided indicators of the roles of the teacher and librarian in the collaborative development of instruction. Participants characterized the relationship as a partnership of equals, with teachers providing subject expertise and intimate knowledge of their students and librarians providing information literacy expertise, knowledge of resources, technology expertise, and guidance to students through the conceptual and emotional challenges of the research process. Participants appreciated using each other as sounding boards in deepening conversations about unit and lesson planning, standards, essential questions, assessment tools, and information literacy instruction. A key change in roles was the degree to which librarians were integral to the entire process of planning, implementation, and assessment, with joint responsibility and accountability. A valuable theme was the way the partnerships extended to other faculty at the school.

Impact on Student Performance

The developers examined the contents of the participants' culminating portfolios to study the impact of the professional development on teaching practices. In particular, they analyzed the units of study and student work samples for indicators of influence on student learning and performance. Here we

provide several examples from different grade levels as suggestive of the impact on student performance that many participants observed.

Elementary School

An elementary school librarian and a second grade teacher collaborated on and co-taught a yearlong unit on human migration, focusing on three essential questions: Why do people move? How do people feel when they are moving? How do people acclimate? The lessons involved guidance on note taking, self-assessment of writing, self-assessment of information literacy, conducting interviews, data interpretation and evaluation, and cross-age tutoring by fifth graders. The individual logs and team reports documented the step-by-step process of planning, revising, implementing, and again revising based on evidence of student learning and student self-assessments. The team was particularly successful in using assessment data to scaffold and adapt learning tools. For example, they originally devised an “idea tree” for students to map the major concepts in their research. However, they discovered that use of the tree required that students have mastery of other critical sub-skills (e.g., taking notes of key ideas, webbing to connect these ideas with one another, transforming key words and phrases into meaningful sentences). This led the team to scaffold the learning experience by focusing on each of these sub-skills.

In the final interview, both members of the partnership expressed a high degree of satisfaction with student learning and performance due to the course. According to the teacher partner:

Working together with my librarian partner, I've spiraled my kids far above the 2nd grade level standards. The students had to

conduct an interview for the first time, applying their note taking skills. They had to organize their notes into a paragraph. They analyzed their results – they had to count, graph, and interpret their data. Each student will complete a brochure, and the brochure will go to the new students and families coming into our community, so it has a practical focus. They do self-evaluation using checklists and revise their work using the checklists. A gifted and talented student that was out of focus is thriving on this experience, also the special education kids, just because we're touching so many multiple intelligences through interviewing, writing, oral presentation. This unit has so much content in so many different areas. Students don't get that in our normal curriculum, which is scripted reading, scripted math, scripted social studies, scripted science. This was a regular second grade class at an average school. But this project is so different from our regular curriculum and offers so many skills and opportunities to apply those skills that the kids just thrived on it.

Middle School

A special education (SPED) teacher and her school librarian focused on a semester-long unit of study on Polynesian migration. Prior to this collaborative venture, the SPED teacher indicated that she had used a “lot of paper and pencil worksheets” and “drill exercises” with her students. During the institute, the team began to explore alternative experiences for SPED students and decided on having the students create first person narratives on a simulated voyage from Tahiti to Hawaii. To gain the necessary background knowledge, the

students visited cultural centers and museums and combed through print and online resources with assistance from the teacher, librarian, and aides in the classroom. Throughout the process, students worked on a group KWHL chart that served as a critical assessment tool documenting what they knew, what they wanted to learn, how they might find information, and what they had learned.

Beyond the disciplinary content, an important objective for this unit was to help SPED students overcome a “learned helplessness.” As the teacher noted in a log: “These kids know they are SPED kids and because we [teachers] expect so little from them, they also come to expect little of themselves. It is so heartbreaking and frustrating to see this. I wanted to do something that might raise the bar of learning.”

The teacher and librarian worked with the students individually and collectively in helping them prepare their simple first person narratives. The students also created facsimiles of artifacts the Polynesian travelers might have taken along on the voyages (e.g., baskets, rope, fishing equipment). Finally, the students videotaped their presentations and shared their final products with their parents. In a culminating reflection, the teacher and librarian stated: “This has been a difficult but most exhilarating experience. Our students have stepped outside their comfort zone to experience what inquiry learning is about.” The following snapshot from the same team report captures one student’s achievement:

David [pseudonym] is very disruptive ... does no homework or classwork ... has many office referrals and suspensions. In this unit, he has been very involved ... he created a star chamber to show

how the navigators used the stars to travel. He struggled with his story and his penmanship was almost unreadable. So he used Alpha Smart and was motivated to keep going. His final story was exciting and funny ... and he was so proud.

High School

A chemistry teacher collaborated with her school librarian to “make over” a unit of study on the chemical properties of matter. In previous years, she had required students to produce papers on different lab experiments and found that her students were largely unmotivated and copying from their friends’ work. The teacher and librarian decided to revamp the unit by incorporating a real-world application in it. They challenged the students to (1) explore the chemistry behind everyday objects, and (2) explain how these objects improved the quality of their lives. They designed the instruction to tap into students’ prior knowledge, broaden their exposure to the topic, assess progress at important checkpoints, and provide for continuous reflection and feedback. To guide students through the inquiry process, the team created a checklist that required students to regulate and assess their own progress and to reflect in writing about what they were learning and how they were learning it. Students ultimately shared their findings in slide presentations before audiences of their peers and invited community guests.

A critical component in the overall learning experience was the students’ ability to describe their growth as researchers. The following examples from different students’ logs submitted throughout the project reflected their grasp of the essential features of inquiry:

Effective search queries: “I have grown into a better researcher...my

searches are now more reliable and effective.”

Iterative nature of the inquiry process: “You need to take a break and look through your work again and again and look for anything than can be improved...you edit multiple times.”

Evaluation of resources: “I felt that I was an average researcher before this project, but now I am much more critical on what information would be best to use...what’s more reliable.”

Collaborative knowledge construction: “You have to encourage everyone to input their

ideas and try to integrate them so they will be more whole-heartedly willing to perform at their best.”

Implementation of Course Design Principles

As noted earlier, five course design principles guided the development of scaffolding strategies, support structures, and tools designed to support participants’ achievement of the PD learning outcomes (see Figure 1). This section discusses the implementation of these principles under the occasionally limiting conditions of the course and the school environment, derived from participant comments in the final interviews and responses to the final questionnaire (see Table 3).

Table 3: Course Assessment

Rating Scale: 1 = Least helpful; 2 = Somewhat helpful; 3 = Helpful; 4 = Most helpful N = 7. Note: not all questions answered by every respondent						
Course Feature	1	2	3	4	Point value	Rank
Summer institute (face-to-face, 3 days)	0	0	1	6	27	1
Partnering with a teacher/librarian	0	0	2	5	26	2
Curriculum development and implementation at your school	0	1	3	3	23	3
Learning portfolios	0	0	5	2	23	3
Online mentoring	0	2	3	2	21	5
Monthly team reports (posted online in hnlc.org)	0	2	3	2	21	5
Monthly individual logs (email)	0	2	4	1	20	7
E Conference presentations	0	2	2	2	18	8
Midpoint reunion - assessment (face-to-face & videoconferencing)	0	0	2	2	14	9
Buddy team responses (posted online in hnlc.org)	0	5	1	0	13	10

Reflective Practice

The first design principle was to embrace reflective practice for continuous improvement through awareness, deep thinking, and action that aligns with new understandings. Aspects of the course design most relevant to implementing this principle were (in rank order by questionnaire responses) partnering, learning portfolios, online mentoring, monthly team reports, individual reports, and buddy team responses. For some participants, reflective practice was integrated with situated learning: "I got a lot out of this course because of the implementing part - reflecting on everything, improving on it, and then doing another unit." Although partnering was highly valued, librarians recognized the limitations set by the school environment:

At this point in time, there's so much pressure for us to meet AYP [annual yearly progress]. Teachers have so much on their plates. It's hard to ask them to give more of their own time to collaborate, because they're exhausted.

[We have] a large campus with 1,800 students. The average class size in science is over 35. We have two librarians, and we're fortunate not to be losing librarians. I can't imagine teaming. It would definitely cut down on the kinds of instruction we do. Our calendar is filled for the whole year.

Situated Learning

The second design principle was to incorporate authentic records and tools for teaching and learning that center on tasks, questions, and problems situated in practice. The aspect of the course design most relevant to implementing this principle was

curriculum development and implementation at schools, which was ranked third in importance for learning by questionnaire respondents. One interviewee compared this course to her previous PD experiences:

I had PD through the science teachers association or through UH [University of Hawaii], but it wasn't where we had to take it back to school and implement something. My approach is always that I'm going to pick at least one thing to use in the classroom. For this course, we needed to implement the whole thing, not just one thing. We could decide what we were going to do, but we had a framework to work within.

Community of Practice

The third design principle was to support a community of practice that provides common ground for work, collaboration, exploration, co-reflection, and mutual support. Aspects of the course design most relevant to implementing this principle were (in rank order by questionnaire responses) the summer institute, partnering, online mentoring, monthly team reports, conference presentations, midpoint reunion, and buddy team responses. One interviewee was positive about the benefits of the course community:

It was good because there was such a positive tone. It felt good to have that kind of support. When you're the only librarian on campus, you wonder, "Am I doing it right?" To hear from other people that they're going through the same thing, I realized I'm on track. When you send each other positive messages, it makes you want to share and

want to contribute to a learning community.

Many participants felt that their strongest community bonds were with their partners:

While I do feel some connection to the other participants in the course, it is my team partners who I feel represent the “community of practice.” These individuals made the learning experience rigorous, meaningful and knowledge filled.

One barrier to forming stronger community ties among buddy teams was the diverse nature of their backgrounds:

During the online portion, it would have been more effective if we were paired with a team at a similar level/ability. Although we offered many solutions/feedback to our buddy team it was not reciprocated when asked for our own projects.

Our buddy team was science oriented, and I’m not science oriented.

Connect to Practice in Context

The fourth design principle was to connect to patterns of practice in context, building from knowledge, skills, and beliefs from past experiences to develop effective practices in one’s classroom, school, and with other practitioners. All aspects of the course design were relevant to implementing this principle. A number of participants indicated that they would be extending their learning more broadly into the school, such as this librarian:

Because our library is currently involved with school-wide curriculum efforts, the course allowed us to create and formulate

units that can be shared. The material created will be added to our existing materials and enhance the resource packet for teachers to use with their classes. The course allowed us to develop/test/improve instructional materials under the guidance and instruction of knowledgeable mentors.

Evidence-Based Practice

The last design principle was to promote formative and summative assessment in a continuous cycle of evidence-based practice. Aspects of the course design most relevant to implementing this principle were (in rank order by questionnaire responses) curriculum development and implementation at the school, learning portfolios, and online mentoring. While many participants found formative assessments that integrated student self-assessments to be challenging, some expressed comments such as this: “I feel lucky that I took this course, because it’s taught me to be a better teacher. It’s all evidence-based. I can understand better the learning process, targets, and assessment.”

Use of Technology

The use of technology enabled learning, communication, and the formation of community but also posed barriers at the same time. Most participants valued the convenience of online communication and the open sharing in the workspaces:

It’s really a good mode of communication. You can get to it anytime. It’s convenient. You can send long emails and not worry that you’re bothering someone.

The advantages were that workspace gave everyone a common place to communicate. We

could share files, engage in discussions, and post examples of works in progress. I found it to be very helpful when looking for immediate feedback. I would not only receive immediate feedback from my partner, but anyone else who wanted to share ideas with me. Through the workspace, we could also share online resources with one another.

Face-to-face I can focus. My attention is all on that person, or group of people. If it's online, the phone rings, kids are asking you questions, there's something else to type, so I think I'll get to it later. Sometimes I close the window by mistake, or the computer freezes. There are all these distractions that make it not so efficient when it's online.)

However, the technology also posed barriers. On a technical level, school computers and networks sometimes failed for days at a time. Participants also had varying levels of fluency and comfort with using technology for communication:

It's hard. You need to try to make sure you're specific. I think, now how is it going to be received? It takes a longer time to compose a message. I have to learn to improve. It helped to meet them face-to-face. I would have felt uncomfortable not having met them before. I wouldn't know how I need to communicate with them, how to choose my words.

Some felt that lack of time reduced the quality of online communication: "Because it happened so frequently, I don't think the quality of the online communication was so high. We were just trying to do it because it had to be done. I think if it was spaced out a little bit more, it would be better. It was crunch time every month."

Others preferred face-to-face communication to online communication:

It was difficult to write concisely about the project, the process, challenges and triumphs. It was easier for me to articulate about the project in person.

On the value of building community online, responses were mixed:

The workspace and email has made it easier to develop a sense of community. Frequency of the encounters helps to build that feeling. Without it, our relationships within our busy schedule would be out of sight out of mind. Even though we didn't get to hear from everyone all the time, we did know that we were all trying to accomplish the same thing and that is where the strength of technology helped to build community.

I think the face-to-face would help to build a better community. You're only getting information if you're reading someone else's piece, but if it's face-to-face, you see everyone.

Longitudinal Reports of Sustained and Expanded Practice

Following the yearlong professional development experience, the authors conducted informal email follow-up with the participants in the 2006-2007 and 2007-2008 academic years. In all but one case, respondents indicated that they were continuing to incorporate inquiry-based approaches, e.g., using essential questions and assessment. In the single exception, the librarian had transferred to another school

and both members of the original team had difficulties finding new partners. What also emerged was evidence that many participants were involving other colleagues in inquiry-focused practices.

At least six school teams had connected their work to school priorities and reform efforts, such as reading and writing programs and standards-based curriculum initiatives. Seven teams had extended their efforts to involve other teachers in their grade level or department. Six had also reached out to faculty in other grade levels or departments, or collaborated with other support personnel such as the curriculum coordinator and technology resource teacher.

From the start, librarians had taken the initiative to form the teams, maintain momentum, and contribute to a change in views about the role of the librarian as a curriculum partner. After the PD course, six of the librarians assumed major curricular roles in their respective schools. For example, two high school librarians were designated as leaders of professional learning communities that focused on improving teaching practices. In another instance, the librarian emerged as a key member of the school's team to train all teachers in assessing students' writing performance. The following e-mail comments from one respondent indicate how the training influenced her current leadership in curriculum and teaching:

My deeper understanding of inquiry-based projects gained at our Inquiry Partnerships workshop has allowed me to transfer and apply my knowledge in our standards-based efforts at my school. This year I co-facilitated a focus group with our curriculum coordinator. Our group's task (which was aligned to our school's Academic Plan) was to

identify five components of a standards-based classroom. The training I received inspired my self-confidence and provided me with the necessary skills to step forward and become a leader in my school.

Conclusion

A practice-based approach to professional development required continual modification of the course design and timely, individualized mentoring and feedback, based on analysis and co-reflection by the developers on the evidence gathered through participant logs, reports, and school site visits. Modeling the inquiry process in their own course development work and making this process transparent to the participating community were essential to improvement. Course participants reported beneficial results in both immediate and long-term changes in practice. The summative evaluation identified significant changes in practice in three areas: (1) the design of inquiry-focused learning, (2) the roles of the teacher and librarian in collaborative development of instruction, and (3) the impact on student performance. Two years after the yearlong professional development experience, most participants indicated that they were continuing to incorporate inquiry-based approaches, and over half of the participants were involving other colleagues at their schools in inquiry-focused practices. Six of the librarians assumed major curricular roles in their respective schools.

The practice-based model of professional development described in this study appears to be effective and sustainable. It has been tested and modified by other development teams in the last two years. In 2006-2007 and 2007-2008, the model was used in professional development focused on assessing for student learning. The training was conducted by two school

librarians with consultative support from the original developers. Using the model, the second author is currently working with a new development team on a proposed training initiative to assist high school teachers and librarians in facilitating senior capstone projects. Other members of the new team include a university librarian, an administrator for the university's college of education, an instructional technology specialist, and two high school librarians. More extensive use of the model in other contexts with further testing and refinement by other developers is needed to ensure that the model is robust and widely applicable.

Works Cited

- Ball, Deborah L., and David K. Cohen. "Developing Practice, Developing Practitioners: Toward a Practice-based Theory of Professional Education." Teaching As the Learning Profession: Handbook of Policy and Practice. Eds. Linda Darling-Hammond and Gary Sykes. San Francisco: Jossey-Bass, 1999. 3-32.
- Donnelly, Roisin. "Investigating the Effectiveness of Teaching 'On-line Learning' in a Problem-based Learning On-line Environment." Challenging Research in Problem-based Learning. Eds. Maggi Savin-Baden and Kay Wilkie. Berkshire, England: Society for Research into Higher Education and Open University Press, 2004. 50-115.
- Elmore, Richard F. School Reform from the Inside Out: Policy, Practice, and Performance. Cambridge: Harvard Education Press, 2004.
- Fenwick, Tara, and Mark Tennant. "Understanding Adult Learners." Dimensions of Adult Learning: Adult Learning: Adult Education and Training in a Global Era. Ed. Griff Foley. Berkshire, England: Open University Press, 2004. 55-73.
- Ghaye, Anthony, and Kay Ghaye. Teaching and Learning through Critical Reflective Practice. London: David Fulton Publishers, 1998.
- Given, Lisa. "Qualitative Research in Evidence-Based Practice: A Valuable Partnership." Library Hi Tech 24.3 (2006): 376-86.
- Guskey, Thomas R. "Professional Development and Teacher Change." Teachers and Teaching: Theory and Practice 8.3/4 (2002): 381-91.
- Harada, Violet H., and Joan M. Yoshina. Assessing Learning: Librarians and Teachers as Partners. Westport: Libraries Unlimited, 2005.
- . Inquiry Learning Through Librarian-Teacher Partnerships. Worthington, OH: Linworth, 2004.
- Marzano, Robert J. What Works in Schools: Translating Research Into Action. Alexandria, VA: Association for Supervision and Curriculum Development, 2003.
- Nesbit, Tom, Linda Leach, and Griff Foley. "Teaching Adults." Dimensions of Adult Learning: Adult Education and Training in a Global Era. Ed. Griff Foley. Berkshire, England: Open University Press, 2004. 74-95.
- Penuel, William R., Barry J. Fishman, Ryoko Yamaguchi, and Lawrence P. Gallagher. "What Makes Professional Development Effective? Strategies That Foster

- Curriculum Implementation." American Educational Research Journal 44.4 (2007): 921-58.
- Perkins, David N. Smart Schools: From Training Memories to Educating Minds. New York: Free Press, 1992.
- Sato, Mistilina, Ruth Chung Wei, and Linda Darling-Hammond. "Improving Teachers' Assessment Practices Through Professional Development: The Case of National Board Certification." American Educational Research Journal 45.3 (2008): 669-700.
- Smylie, Mark A. "Teacher Learning in the Workplace: Implications for School Reform." Professional Development in Education: New Paradigms and Practices. Eds. Thomas R. Guskey and Michael Huberman. New York: Teachers College Press, 1995. 92-113.
- Todd, Ross J. "Evidence-Based Practice and School Libraries: From Advocacy to Action." The School Library Media Specialist and Education Reform. Eds. Sandra Hughes-Hassell and Violet H. Harada. Westport: Libraries Unlimited, 2007. 57-78.
- Wenger, Etienne. Communities of Practice: Learning, Meaning, and Identity. New York: Cambridge University Press, 1998.
- York-Barr, Jennifer, William A. Sommers, Gail S. Ghere, and Jo Montie. Reflective Practice to Improve Schools: An Action Guide for Educators. 2nd ed. Thousand Oaks: Corwin, 2006.
- Yukawa, Joyce, Violet H. Harada, and Daniel Suthers. "Professional Development in Communities of Practice." The School Library Media Specialist and Education Reform. Eds. Sandra Hughes-Hassell and Violet H. Harada. Westport: Libraries Unlimited/Teacher Ideas Press, 2007. 179-92.

Appendix A

End-of-Course Team Interview Protocol

These questions were used to stimulate discussion. Participants were informed that their responses would remain anonymous.

1. How would you describe your partnership? How important has developing the collaborative relationship or partnership been in achieving your learning goals? How important has developing the collaborative relationship or partnership been in improving learning for your students?
2. Has this PD course helped you improve student learning and student achievement? If so, in what ways?
3. How did the face-to-face overviews of strategies and tools (Summer Institute, January Assessment Session) affect your ability to incorporate the course learning outcomes as you did curriculum planning and teaching over the year?
4. What role did your team reports and individual logs play in your learning?
5. What achievements/difficulties did you encounter in the process of planning and implementation?
6. Did you have a previous relationship with any of the mentors? How did the support from the three mentors influence your planning and implementation? Did the support from the mentors affect your ability to communicate and form relationships, especially online?
7. Did you have a previous relationship with any of the other participants? If so, how did this affect your ability to communicate and form relationships, especially online? How did the buddy team support influence your planning and implementation?
8. Have you had previous professional development experiences? If yes, how did this PD course compare in terms of your professional growth?
9. Did this PD experience give you a different perspective on the role of the library in your school?
10. How does the school environment support/not support your collaborative work?
11. What was easy and difficult about using the technology – in general, and for the course work and communication? What are the advantages and disadvantages of using hnlc.org and email for this PD?
12. What are your plans to build on your achievements from this course?