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Personalizing the Information Search Process: A Case Study of Journal Writing with Elementary-Age Students

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Current teaching and learning paradigms emphasize a constructivist approach to building knowledge. At the core of this approach lies a fundamental question: How do we help children move from merely going through the motions of learning to actually making personal meaning of their world? In the case study reported here, a team comprised of school-level and university faculty focused on journal writing as a means of deepening students' cognitive and affective awareness of the information-search process. The subjects were students in an upper elementary grade classroom in Honolulu, Hawaii. The study also explored the impact of journal writing on the school library media specialist's reflective practices. This article describes the context for this field-based research, the questions investigated, methods employed, and findings gleaned from two cycles of research assignments. A 1999 AASL/Highsmith Research Award supported the study.

Educators at all levels are involved in a paradigm shift from a view of knowledge as an "external entity" to knowledge as being internal and subjective (Hughes, Kooy, and Kanevsky 1997). This new paradigm considers knowledge as mutually constructed by teacher and student in order to make sense of human experience, and not as simply transmitted from the teacher's possession to the student's (Petrie 1990; Moore 1999). Learning only occurs when students create understanding through relevant experience rather than through the accumulation of facts received from others. This paradigm requires the creation of learning environments where the building, rather than the banking, of knowledge is encouraged and facilitated (Shor and Freire 1987).

School library media specialists are critical partners in developing such "learning to think" environments in our schools (Callison 1998, 44). Together with teachers, they design and implement learning experiences that incorporate the information-search process. The key is the "emphasis on the process of learning more than the products the student generates to display what he or she has learned" (Callison 1998, 43). This process includes a complex web of skills that involve the identification of information needs, effective access and critical evaluation of information, and creation and generation of personal knowledge based on the collected information. A crucial aspect of the process is a student's continual self-assessment of new insights gained or problems encountered.

Journal writing is a method that encourages reflection and metacognitive practice. Shor and Freire maintain that interactive journal writing "allows for the dynamic exchange of information

rather than a static transfer of knowledge" (1987, 100). This form of writing is also a powerful medium for teachers to learn with and from their students. It provides opportunities for both student and teacher to be understood. Freire (1970, 67) explains:

> The teacher is no longer merely one who teaches, but one who himself is taught in dialog with the students, who in turn, while being taught, also teach. They become jointly responsible for a process in which they all grow.

Many library educators have mentioned the importance of journal writing as a strategy for recording and documenting student perceptions during research assignments (Stripling and Pitts 1988; Kuhlthau 1993; Callison 1998; Tallman 1998). However, no one has published an in-depth study of journal writing in the context of information searching with elementary-age students.

In this article, the author (1) summarizes past research on students' journal writing; (2) identifies the research focus and describes the subjects and the method of the present study; (3) presents the findings; and (4) discusses insights and conclusions derived by the research team.

Journal Writing

Staton (1988) defines journal writing as a written conversation about topics of mutual interest between two persons on a functional, continued basis. Through journals children communicate their individual thoughts and ideas, including the expression of emotional reactions. In the process of doing this, they often extend their own thinking as they record, summarize, and organize their perceptions over time (Anson and Beach 1995). Because teachers reciprocate in this communication process, journal writing can influence the way they understand student learning and can aid them in exploring new avenues of instructional decision making (Jewell and Tichenor 1994).

Reed conducted the first comprehensive study of journal writing in classrooms in 1979 (Staton, Shuy, and Kreeft 1982). In her work with sixth grade students in a Los Angeles school, she revealed that such interactive writing empowered both students and teachers to learn with and from one another. Reed's research provided a valuable ethnographic framework for subsequent investigations in this area.

Research studies conducted in the last two decades have documented the effectiveness of journal writing in a variety of disciplines. In social studies, for example, secondary students were able to model some of a historian's thinking processes in explaining and analyzing historical, economic, and political events through their journal accounts (Segal 1990; Levitsky 1991; Steffens 1991).

The use of journals in learning mathematical concepts has also proven fruitful. According to studies in this area (Miller 1991; Atherton et al. 1992; Gordon and MacInnis 1993), students who recorded their thought processes in solving mathematical problems more accurately identified their faulty reasoning than students who did not. Teachers, in turn, indicated that they were able to provide more effective and specific interventions as a result of reading students' journals.

In a similar fashion, a study conducted in science classes revealed that journal keeping enabled college students to more precisely describe observed phenomena (Johnstone 1993). Investigators

noted that these students demonstrated a better understanding of the problem-solving processes underlying their formal laboratory work than did students who did not journal.

Fine art teachers have incorporated journal writing into music and art education and have detailed how students expressed their personal responses to art and music texts through their journals (DeLorenzo 1990; Prisco 1990; Ameigh 1992). By sketching their ideas for drawings and scribbling their inspirations for songs, students chronicled the evolution of their own works of art.

The integration of journal writing has also been documented in foreign language classes and with second-language learners. For youngsters learning a foreign language, journals allowed out-of-class time and space for practicing written conversations in the language (Sandler 1987). Similarly, teachers of immigrant children learning English as a second language found journal writing provided an invaluable record of the students' acquisition of new vocabulary and their emerging use of English (Reyes 1991).

A study more closely related to the present investigation was Tallman's report (1998) on the use of journal writing in I-search assignments with high school students. The I-search process emphasizes the selection of research topics on a need-to-know basis and requires that students produce their results in a narrative form.Tallman, who has written extensively on use of the I-search approach as an alternative to the conventional research project, indicated that the act of recreating the research process by documenting it in a journal aided high-school students in sharpening their own critical awareness of the information search process.

In Tallman's study, students maintained double-entry journals. They used one column to record their notes and a second column to express their personal responses to these notes and raise questions provoked by the noted passages. Students were encouraged to write about research strategies that were effective as well as strategies that proved unsuccessful. Tallman also reported that the teacher and the school library media specialist, who worked as an instructional team, were able to probe for more substance as a result of reading the students' journals. They "challenged the students to analyze, recognize, examine, simplify, discern, compare, determine, access, decide, judge, prioritize, diagnose, accept/reject, combine, and reorganize" their thinking (Tallman 1998, 27).

Research Questions

Building on some of the earlier research cited, the present field-based investigation addressed how the incorporation of journal writing in the information search process influenced the thinking and behavior of both students and instructors in an upper elementary grade setting. Data were collected in the 1999–2000 school year and discussed and analyzed in 2000–2001. Partial findings were presented in an earlier paper (Harada 2001). This article, however, more thoroughly details the interaction between students and the school library media specialist throughout the information search process. Key questions in this study were:

- What understandings and problems dealing with the information search process do elementary grade students describe in their journals?
- What feelings do they express?

- What insights and emotions does the instructor describe as she reads and responds to students' journals?
- How do journals influence the instructor's teaching and engagement with students?

Population

The study was conducted at the Major General William R. Shafter Elementary School in Hawaii. Established in 1951, the school is located on a military base on the outskirts of Honolulu. All students are members of federally connected families. Over 45% of the students are white; another 27% are African American. This is unique in Hawaii where the ethnic composition of most public schools is 75 to 90% Asian American and Pacific Islander. The school's transience rate is also among the highest in the state—students spend an average of two to three years in Hawaii before their families are transferred elsewhere. Seventeen students, ages ten and eleven, in a mixed grade classroom participated in the study. According to the teacher and the school library media specialist, a majority of the students participating in the investigation were "average and better students." Nearly 90% of them performed at stanines 4 (mid-range) through 9 (high) in reading skills on a Stanford Achievement Test administered in fall 1999. Over half of them scored in stanines 7 through 9. The group included ten white, four multiracial (for example, Asian American/white, African American/white), one African American, one Hispanic American, and one Asian American.

Method

The school library media specialist and teacher participating in this study had twenty years and fifteen years of school experience respectively. Their goal was to present the process of information problem solving as a web of related tasks and skills. The teacher, the school library media specialist, a graduate student from the University of Hawaii's Library and Information Science Program, and the author comprised the research team.

Instructional Context

The school library media specialist and the teacher agreed to collaborate on research assignments that grew out of content covered in the classroom. Ultimately, they cooperatively designed and taught two units of study. The first unit on ancient world civilizations extended over a period of six-and-half weeks and centered on contributions of these civilizations to people's lives today and the influence of the environment on the lifestyles of these ancient peoples. As their final products, students created poster boards documenting their findings. These boards were displayed in the library media center. The second unit, which lasted nearly five weeks, focused on heroes and heroines through the ages. After a cursory survey of notable men and women throughout history, students selected their personal heroes and heroines to study in greater depth. They created trading cards (akin to baseball trading cards) on their heroes. In addition, students designed and staged oral presentations that ranged from mock television interviews to multimedia shows. Parents and the school principal were invited to the presentations.

The school library media specialist served as the lead teacher through most of the information search process. She introduced the following major phases of the information search process in the first unit of study:

- Presearch—exploring a general topic and conducting preliminary searches.
- Focus formulation and presentation planning—selecting a specific focus for the project.
- Collection and organization—locating and retrieving relevant information and taking notes.
- Presentation and assessment—synthesizing information, creating and presenting the final product, and assessing the product and the search process used.

Twenty-four instructional sessions were conducted in the library media center over a period of twelve weeks. Each session lasted an average of sixty minutes. Since the media center operated on a flexible instructional schedule, these sessions were scheduled on days and at times best suited to classroom needs. A typical session included opportunities for students to share their prior knowledge about a specific skill being addressed and for the school library media specialist to explain the steps in performing the skill and to demonstrate how the skill might be applied. Time for guided practice was also provided. The teacher served as an instructional partner in these sessions, contributing comments and suggestions, and providing feedback during the work periods. Because students were often unable to complete their tasks in the library media center, the teacher provided follow-up time in the classroom. In addition, students were encouraged to independently visit the library media center during recesses and before and after school to continue their assignments.

The instructors created journal prompts that were open-ended and encouraged both feelings and cognitive perceptions (such as, What did I do today? How did I accomplish my task? What would I do differently next time? How did I feel as I worked today?). Students composed their journal entries on laptop computers and dated and saved their entries on individual disks to share with the instructors. While the teacher read the entries and sporadically commented on individual journals, the school library media specialist was the primary respondent. She spent an average of two hours providing comments and raising questions on each set of logs.

Journal Analysis

The core data for textual narrative analysis were the journal entries written by the students and the responses provided by the school library media specialist. Parental consent was required for all children involved in the study.

The author and the graduate student, who served as the principal coders, independently coded each entry. Using a reliability measurement suggested by Fraenkel and Wallen (2000), they estimated the percentage of agreement of their coding by tabulating the number of instances of agreement and disagreement, dividing the number of instances of agreement by the total number of instances, and multiplying that quotient by one hundred. There was an 87.2% agreement, which was considered an acceptable inter-rater reliability margin (Fraenkel and Wallen 2000). All disagreements were resolved by discussion between the coders.

Coding Procedures

Since most of the entries were brief (ranging from three to ten sentences), the coders used an entire journal entry as the unit of analysis. Each entry was identified as either a cognitive response (for example, presearch activities provide an overview of a general topic) or an affective response (such as, frustration over lack of information).

For cognitive (C) responses, the author adapted a coding scheme that was originally used in Staton's analyses of student journals (1988). The levels included:

- (C1) Unrelated information—writer is unable to provide information related to a concept or procedure.
- (C2) Disjointed recall—writer is able to regurgitate or recall fragmented bits of information relevant to a concept or procedure.
- (C3) Re-statement of concept with limited supporting comments—writer is able to paraphrase a concept or procedure and to provide one or two relevant details.
- (C4) Elaborated statement of concept—writer is able to paraphrase a concept or procedure and to provide commentary that supports it with coherent detail, links it with previous experiences, relates it to a larger issue or context, and extends it through judgmental and evaluative comments.

To code affective (A) responses, the author used the following stages identified in Kuhlthau's research (1993) on students' emotional expressions throughout the information search process:

- (A1) Optimism—usually during the presearch phase.
- (A2) Doubt and frustration—usually during the focus formulation and initial stages of information collection.
- (A3) Confidence—usually during the latter stages of information gathering and during the presentation preparation.
- (A4) Satisfaction or dissatisfaction—usually following the completion of a project.

In analyzing the school library media specialist's responses, the author focused on the information professional's counseling role in information mediation (Kuhlthau 1993). According to Kuhlthau (1993, 143) counseling assumes that the "user is learning from information in a constructive process as the information search proceeds" and that the dialogue between the student and school library media specialist is "dynamic and unique for each person." The coding team expanded on the mediation responses suggested by Kuhlthau and used the sentence as the unit of analysis. They ultimately created two separate categories of responses: questions and comments that facilitated additional student (S) responses, and comments that provided the school library media specialist's (L) ideas or feelings. The response levels were:

- (S1) Eliciting recall of information
- (S2) Requesting clarification or restatement
- (S3) Asking for summarization
- (S4) Requesting extension or elaboration
- (S5) Encouraging expression of feeling
- (S6) Providing positive feedback
- (L1) Expressing school library media specialist's opinion
- (L2) Expressing school library media specialist's personal feeling
- (L3) Providing additional information

Data Triangulation

To achieve methodological triangulation, the team employed additional data gathering techniques that concentrated on rich narrative descriptions from multiple perspectives:

- Anecdotal, weekly logs kept by the school library media specialist provided critical insights into her interpretation of specific incidents and their theoretical connections to this study.
- Field notes recorded by the graduate student were documented for all sessions conducted in the library media center, included reconstruction of dialogue, accounts of particular events, and descriptions of activities.
- Interviews with the school library media specialist and the teacher conducted by the author were held twice a month over a six-month period.

Findings and Results

Cycle One

During the first unit of study, the school library media specialist conducted eleven instructional sessions with the teacher assisting. Most of the students completed eight journal entries; actual numbers varied because of student absences. Tables 1 and 2 provide statistical summaries of the cognitive and affective journal responses. In the subsequent narrative discussion, the team examined the journal findings in the context of relevant documentation from field notes, anecdotal logs, and interviews. This convergence of data yielded a richer perspective of the teaching practices and instructional mediation resulting from the journals and the observations of student performance.

Table 1. Cycle One: Cognitive Levels of Journal Entries

Cognitive levels	Presearch/ Exploration (N=17)	Focus formulation (N=17)	Collection/ Organization (N=17)	Presentation/ Assessment (N=17)
(C1) Unrelated information	10 (59%)	2 (12%)	9 (60%)	4 (24%)
(C2) Disjointed recall	5 (29%)	13 (76%)	5 (33%)	2 (12%)
(C3) Restatement, limited support	0	2 (12%)	0	10 (59%)
(C4) Restatement, detailed support	2 (12%)	0	1 (7%)	1 (6%)

Table 2. Cycle One: Affective Levels of Journal Entries

Affective levels	Presearch/ Exploration (N=17)	Focus formulation (N=17)	Collection/ Organization (N=17)	Presentation/ Assessment (N=17)
(A1) Optimism	14 (87%)	13 (76%)	0	0
(A2) Uncertainty, frustration	2 (13%)	43 (24%)	2 (14%)	0
(A3) Confidence	0	0	12 (86%)	0
(A4) Satisfaction, dissatisfaction	0	0	0	Satisfied 16 (94%) Dissatisfied 1 (6%)

Presearch

To launch the study, the school library media specialist created several learning stations, each focusing on a different civilization (such as, China, Greece, Rome). The stations included books, maps, encyclopedias, and computers where bookmarked links to relevant Web sites could be accessed. As part of the lesson, the school library media specialist demonstrated how students might explore the broad topic of ancient civilizations by selecting one of the civilizations and skimming through the different resources. While browsing among the stations, students were also encouraged to take notes on "things that interested them." This activity was conducted over two sessions. At the end of each session, students shared their findings with their peers while the teacher recorded and organized their comments on chart paper under headings for each of the civilizations.

In their logs, students described how they felt about exploring a topic. At this initial stage of the search process, fourteen students (87%) were enthusiastic and optimistic about the upcoming project. They enjoyed the excitement of finding new information: "I like research because you get to learn about things you have never known before." Two students mentioned the novelty of learning through hands-on activities. Still others noted that doing research in elementary school "is helping us when we have do it in middle school and college."

Reacting to the students' excitement, the school library media specialist wrote in her own log: "I found today to be exhilarating. I was really impressed by the way the students took to it. One student said, 'Boy, doing exploration has made me even more certain that I would like to do Mesopotamia.'"

In spite of their enthusiasm, however, students could not articulate why the exploration phase was important to their projects. Fifteen students (88%) either admitted that they did not know ("I think it helps me but I don't know how") or described it in terms of fragmented tasks ("We learned to use an index"). One student, who saw this phase as an activity completely divorced from the project, wrote, "This is very educational, but when do we really start our research?"

This lack of student understanding about the initial phase of the process led the school library media specialist to create a wall mural, *Stepping Stones of Research.* She used this visual artifact to emphasize the concept of research as a series of steps with the first step being the exploration of a general topic. The mural, which was displayed on one wall of the library media center, served as a visual focus for ensuing class discussions about the process.

Focus

Based on their exploratory survey of the different civilizations, students were invited to select the one they found most interesting for their projects. The school library media specialist emphasized the importance of selecting a topical focus that "called to them." In addition, she distributed a checklist that highlighted the phases of the search process and asked students to check off the tasks they had already completed (such as, explored the general topic). Students also brainstormed on the different aspects of a culture they might research including customs and rituals, occupations, values and beliefs, arts, government, and recreational pursuits. Over the course of three sessions, students selected their topics and devised specific questions for their projects.

In their journals, students explained how they selected their topics. Thirteen students (76%) indicated they chose topics solely because they thought they might be fun or exciting. This journal response prompted the school library media specialist to write, "I assumed students would also mention the need for sufficient resources. I now realize that we need to spend time actually articulating the why and the how of the process." As a result, the school library media specialist and teacher conducted a debriefing session at the next meeting. Students were able to generate additional criteria including the availability of resources and the relevance of information found. The ten-minute debriefing discussion, which provided time for instructors' feedback on the journals, became a regular feature of the work sessions.

Once students had identified their topics, they devised their research questions on a separate worksheet. Although the questions were not an official part of the journals, the research team analyzed them using Bloom's taxonomy of educational objectives (1956) and found that most of the questions concentrated on factual recall. To stimulate a higher level of questioning, the school library media specialist employed a think-aloud procedure to demonstrate how she might start with simple recall (what, when, where) questions and then expand her questions to those that asked how, why, and what if. Students were encouraged to do the same with their original questions.

During this phase of the research process, thirteen students (76%) expressed continued optimism and enthusiasm about their projects. They enjoyed the challenge of selecting their own research focus. One girl stated, "I like choosing my own topic because it makes me feel like I'm in charge and that I can decide what I want to do and what I don't want to do." Four students (24%), however, expressed increasing doubts about their progress. One girl admitted that she felt

"misplaced because I am not really sure of what I am supposed to do. I kind of feel like I am doing something wrong." The teacher and school library media specialist immediately conferred with the individual students to allay their concerns and offer specific help.

Collection

Prior to having students collect and record information, the school library media specialist spent a session explaining the note-taking procedure. Using several large charts, she demonstrated the following steps: review your questions, skim an article to find keywords that address your questions, jot down the keywords, and use the keywords to develop your own sentences and paragraphs. The school library media specialist also discussed how taking notes in this fashion minimized plagiarizing. In addition, students were taught how to record bibliographic information for each resource used.

In an interview following this particular session, the teacher and school library media specialist indicated that the note-taking session "went very well and students seemed clear about the procedure." They were dismayed, therefore, when student journals revealed that fourteen students (93%) could not identify the steps, or provide details about the procedure. One student indicated, "The way we take notes is we get the book with the subject we want, then we answer the questions that we had." Another student stated, "We take notes to get us started and to understand the research better."

Reflecting on this experience, the school library media specialist wrote: "I see how faulty some of our classroom observations can be. All the students seemed to be on task. But did they truly understand what they were doing and why they were doing it?" In a subsequent debriefing session with the class, the teacher and school library media specialist reviewed the note-taking procedure and had students create their own visual diagrams of the procedure. Students then exchanged their diagrams with peers and critiqued them.

Ultimately, students spent five sessions in the library media center collecting their information. Toward the end of this phase, students were asked how they felt about their progress. Twelve of fourteen journal entries (86%) reflected students' confidence in their work. One boy wrote, "I feel good about it because I learned lots of things that I never knew before." Another student said, "I feel I am getting a lot accomplished and it is kind of fun."

Presentation and Assessment

Actual work on the final products was completed in the classroom and at home. Individual students visited the library media center when they needed more information, but were not scheduled for formal instruction as a class. After their display boards were exhibited in the library media center, students wrote journal accounts on how well they thought they had done. All but one student (94%) expressed satisfaction ("I did a good job," "People liked my board"). The disappointed student indicated that he had not completed one portion of the display because "I started late and I ran out of time."

In a final log for this unit, students were invited to describe the information search process to a new researcher. Six students (36%) provided disjointed or vague explanations, such as "You do searching, then focus, then research in books, then do a display board." Ten students (59%)

accurately identified the steps in the process and provided limited details on one or more of the stages. In examining the responses, however, the school library media specialist and teacher concluded that most of the students had simply memorized and regurgitated the steps and that the sparse details they provided did not reflect an internalization of the total process.

These student responses prompted the instructional team to reflect on the complexity of the process. Had they been too ambitious in expecting novice searchers to demonstrate a metacognitive understanding of the process at the same time they were learning the skills embedded in that process? In an interview, the teacher admitted that researching was a far more "convoluted process" than she had first envisioned. She said, "You need to teach them the skills in the process but you also want them to think about why they are doing this [process]." The school library media specialist responded, "We know that one project will not make them expert researchers." As a team, they agreed that journal responses in this first unit served as a crucial assessment measure for mediation approaches in future projects. They also reaffirmed that a continued team approach to instruction would be essential in the second unit of study.

Comparison of Cycles One and Two

Based on their examination of student products and performances in the first unit, the school library media specialist and teacher reduced the time spent on formal instruction during the second cycle of research. Instead, each session began with an informal review and discussion centering on several essential questions: How well did we do in the last session? Where are we today? What do we already know about this part of the process? Building on students' prior knowledge, the school library media specialist and teacher reinforced the understanding of specific skills and phases of the process and corrected misconceptions. The remaining time, usually thirty to forty-five minutes, was spent in guided work sessions. Thirteen meetings were conducted in the library media center.

During this second unit a critical intervention component was the increased use of individual conferences with students. Both the teacher and school library media specialist circulated during work sessions to respond to student queries. They also engaged students in conversations that focused on ideas or feelings expressed in the individual journals.

In logs written toward the end of each phase, students described the tasks involved in the respective stages of the process and shared advice and insights as well as feelings about their work. Most of them completed nine entries although actual numbers again varied because of student absences. Tables 3 and 4 summarize the cognitive and affective journal responses. The discussion below compares the statistical results from the first and second cycles and substantiates these findings with excerpts from the journals.

Table 3. Cycle Two: Cognitive Levels of Journal Entries

Cognitive levels	Presearch/ Exploration (N=17)	Focus formulation (N=17) (N=17)	Collection/ Organization (N=15)	Presentation/ Assessment (N=16)
(C1) Unrelated information	1 (6%)	0 0	1 (7%)	0
(C2) Disjointed recall	6 (38%)	5 (29%) 4 (24%)	2 (13%)	0
(C3) Restatement, limited support	5 (31%)	12 (71%) 10 (59%)	7 (47%)	1 (6%)
(C4) Restatement, detailed support	4 (25%)	0 3 (18%)	5 (33%)	Satisfied 16 (94%) Dissatisfied 1 (6%)

Table 4. Cycle Two: Affective Levels of Journal Entries

Cognitive levels	Presearch/ Exploration (N=15)	Focus formulation (N=17)	Collection/ Organization (N=13)	Presentation/ Assessment (N=15)
(A1) Optimism	13 (87%)	5 (29%)	0	0
(A2) Uncertainty, frustration	2 (13%)	12 (71%)	2 (15%)	0
(A3) Confidence	0	0	11 (85%)	0
(C4) Satisfaction/ Dissatisfaction	0	0	0	Satisfied 11 (73%) Dissatisfied 4 (27%)

Presearch

The school library media specialist and teacher paired the students and had them explain this particular phase of the process to one another. They used this informal exchange as a springboard for a review on the nature and value of exploring a broad topic. Two work sessions were devoted to the presearch phase. Students' affective responses in this initial phase were similar to those reported in the first unit. Over 87% of the students were enthusiastic about the general topic ("I think it is neat to study people that are heroes to us") and optimistic about their products ("Making trading cards for our heroes will be fun").

For many of these students, there were marked improvements in their cognitive responses (such as a move from C1 and C2 levels to C3 and C4). While ten students (59%) were unable to describe the purpose of the exploratory phase in the first cycle, only one student was still confused about this in the second cycle. Six students (38%) briefly noted that the presearch stage helped them to see the bigger picture. In addition, nine students (56%) were able to elaborate on various aspects of the exploratory phase. The examples below illustrate students' growth in understanding between the two cycles.

In the first cycle, Jayanne admitted that she did not understand what exploring a topic meant but she "guessed that it tells me when I need to pick a topic. It helps me look up things." Her entry in the second unit reflected a reasonable grasp of the concept:

> 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 you will have to find answers.

Ryan, who originally stated that exploring a topic was "helpful because you get to look up stuff and find the correct information," offered the following extended advice in his second entry:

> Find a broad topic to research that has a lot of small topics in it. Find information on the topics. Look in different sources, branch out. Use more than books. Use the Internet, encyclopedias, magazines. Find what interests you.

Nicole, who wondered when the class would start their "real research" in the exploratory phase of the first unit, expressed a change of thinking in the second cycle:

> Before you can decide on what to do your project on, you have to explore. Scan different sources for topics on your research. Use different types of resources to get a feel for the general topic. Make a list of topics and resources.

Focus

Two sessions were devoted to formulating a focus and planning for the final products. Students reviewed the criteria to use in selecting their research topics and discussed the problems they might encounter. The school library media specialist and the teacher also described the final products for this unit (trading cards and oral presentations on heroes) and worked with students on developing time lines.

In the first unit, over 75% of the students remained highly optimistic as they engaged in focus selection and presentation planning. However, student responses in the second unit more closely paralleled patterns noted in Kuhlthau's studies (1993). Twelve students (71%) voiced uncertainty when they discovered they were preparing an oral presentation as well as creating the trading cards. Gabby said, "I just hate it when I get stressed like this. I hope I find time to do all these things." When the class learned that the school administrator would be invited to the presentations, Kelly expressed her fears about this prospect: "I think it will be embarrassing. Not with my parents. I already know they will love it. But with the principal, now that is a whole other story."

While many students selected their topics solely on the basis of personal interest in the first cycle, twelve students (71%) expanded on their criteria in this round of research. They indicated that availability, readability, and relevance of sources were other important criteria along with personal interest. Ryan connected his selection of a research focus with his earlier exploration of the broader topic. In the excerpt below, he also pointed out the importance of finding resources that he could comprehend:

> I looked at my results from when I explored the general topic. I decided which [subtopic] had more information and which one was interesting. I made sure the information made sense and that I could understand what I was reading. Then I selected my research topic.

During the first cycle, Hannah said she had selected her topic because it looked easy. When asked to elaborate on what she meant, she responded, "It will be easy because it will be fun." In this cycle, she pointed out the importance of considering her audience and selecting a topic that would expand learning for her peers:

> I made my final decision on my hero by finding somebody that my classmates could get excited about. I wanted to find a hero that they didn't know too much about so they could learn new things.

As reported earlier, students devised largely recall-level questions in the first unit. When asked to describe how they created their questions, the majority of the students simply said they "wrote what, when, where questions." This time, thirteen students (77%) offered remarks indicating that they had moved beyond the mechanics of writing questions to deeper levels of thinking about the value of questioning. Chelsea, for example, emphasized the significance of having an essential question: "Make one main question that is sort of the focus. Then all the other questions kind of help you answer the main one."

Ryan indicated that he wrote questions "which would lead to new questions." His own set of queries on Jonas Salk reflected an interconnected series of higher-level questions:

- Why did Salk get interested in studying a cure for polio in the first place?
- What steps did he have to go through?
- What made him keep on going? Did he ever want to stop?
- How did he know when he had the cure?
- Why was he a role model for other people?
- Did he do anything else in his life?

Collection

At the beginning of this phase, students reexamined and expanded upon their visual diagrams of the note-taking process. They spent a total of seven sessions gathering information in the library media center and the adjoining computer lab. Similar to responses in the first cycle, 85% of the students were confident about their progress during this phase of the information search process. The only source of frustration noted was the "slowness of computers" during Web-searching activities.

While 93% of the students struggled to explain the note-taking process in the first cycle, 80% (twelve students) elaborated on the procedure in this cycle. Alex, who originally referred to note taking as "writing down our questions and answering our questions," explained the procedure as follows:

> Get sources and see if they are of any use. Skim sources and see if they have information on your topic. Don't be afraid to get rid of useless sources. You take notes by answering the questions you had and writing information needed for the bibliography. I always skim through the title of each paragraph to see if it might help me with my questions. If it does, then I read it more carefully. Do not use the exact words as the resource because this is plagiarizing which is illegal.

Gabby, who merely stated that she took notes "the way the librarian told me to do it" in the first cycle, offered the following advice in the second round:

> Scan through all of your resources. Use as many resources as possible. Take your time while doing this step. While skimming you tag important sections then it will be easier to go back to that page and find important information. Always look at your questions because they give you clues about what to look for. Take notes by writing key words 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.

Presentation and assessment

For this unit, the teacher and school library media specialist created rating sheets and rubrics to have students assess their trading cards and evaluate their oral presentations. They emphasized the use of these assessment tools throughout the preparation phase and during the final-evaluation period. Two sessions were conducted in the library media center to initiate the production phase of the project. The bulk of the preparation, however, was done in the classroom and at home over an additional three-week period.

At the end, eleven students (73%) were satisfied with their products. Chelsea's log, for example, expressed her relief and pride:

> 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!

While only one student indicated dissatisfaction with his final product in the unit on ancient civilizations, four students were disappointed with their completed work in this cycle. They admitted not paying adequate attention to time parameters. Alex wrote, "Never procrastinate. Next time, rehearse a lot more because our presentation wasn't as good as I imagined it would be." Two students also noted that lack of group cooperation was an obstacle. In her log, Sarah identified the difficulties of team cooperation:

> Working together better would help a lot. Next time, try to get C. to be more considerate because it was our project not just her project. Actually get people to come and rehearse because every time people were either too busy, wanted to play, or weren't even there.

In their final entry, students were once again asked to describe key aspects of the information search process to a newcomer and proffer advice. The school library media specialist also informed students that they would be creating PowerPoint slide presentations to share this information with future classes. While over half of them had regurgitated the steps with limited or no details in the first unit, 94% of the subjects commented extensively on the process in this cycle. Figure 1 displays representative entries from two students.

Figure 1. Cycles One and Two: Journal Entries of Two Students

Journal prompt: A new student wants to learn how to do a research project. How would you explain the steps to him or her? What advice would you offer?
Hannah's entries **Cycle 1:** You do presearch, focus, research in books, fill out note sheets, get a panel board, and type out information, and many more little steps. **Cycle 2:** You choose a broad area and get an idea of topics inside it. Think of what interests you. Explore by looking through sources. Then narrow your choice so you have a section of a big topic. Choose one that is interesting and has a good amount of information. Start with who, what, where, when questions. But also think of why and how questions. Also do a plan so you can be well paced and on time. Then find information. Choose a source with lots of information, evaluate your resources. Take notes so you can form sentences later on and write your bib. Don't copy. Organize your notes so you know where it all goes. Combine or group or divide them. Then present your report. When you are assessing your work, be truthful. Don't give up cause hard work pays off. Also it helps if you have a positive attitude. Most of all have FUN!

Gabby's entries

Cycle 1: You search, then focus, collect information, and present it.

Cycle 2: You choose a big topic. You might ask your teacher what you should write your report on, or what she requires you to do. To get a general picture, look through different resources. See if the resources are understandable. Select the best topic. Choose the topic that you think most people won't pick because you could teach others something they may not know. Make good questions, like how did something happen or why did somebody do this or how things might be different if this didn't happen. Find resources, scan through them. Use as many different resources as possible. Take notes by writing keywords, and then long answers. Don't plagiarize out of a book. Now you are ready to put it into paragraphs. Put the information together so that it makes sense. Use correct grammar and check over your work. Finally you show others what you learned. Then you have to assess your work. Be honest or you will only be fooling yourself. Doing a project is very time consuming and it takes patience. It takes dedication. Each time you do a project it should get better and better. Never TRY to do your best; just DO your best.

It was also noted that in the first cycle, twelve students (71%) referred to assessment as the teacher's evaluation of the final product and equated it with their project grades. At the end of the second unit, 65% described this aspect of the process as a self-review rather than simply the instructor's evaluation ("Evaluate yourself so you kind of know how you feel about your work"). Students also mentioned the importance of comparing their efforts against established criteria ("You assess how well you met the standards on the rating sheet"). Several pupils indicated that self-assessment required supporting comments ("Don't just give yourself a high rating but say why"). Two students commented on the ongoing, reflective nature of assessment and the importance of an objective self-analysis. For example, Vincent wrote:

> You assess to look at what you have done so far. You check things that you had a tough time on. You look back and see the good and bad parts of the presentation. Be honest. You want to get a good feel for your work and if you aren't honest you will never know the truth.

School Library Media Specialist's Responses

The school library media specialist's written engagement in this study assumed two major forms—her responses to students' journal entries and her own weekly anecdotal logs. Both are discussed in this segment.

Journal responses

The coding team identified a total of 321 response statements from the school library media specialist, 217 and 104 responses respectively in the first and second cycles. The results are summarized in table 5. In both cycles, the school library media specialist responded with more statements that were facilitative than directive. In the first unit, 88.6% of her comments provided encouragement or requested clarification and elaboration. Similarly, 87.5% of her responses in the second cycle invited students to do deeper thinking about their initial responses. In short, the school library media specialist discovered that the power imbalance and authority role of the

instructor were minimized in the one-on-one interactions. Instead, her questions had many of the features of polite conversation in which participation is shared.

Table 5. Library Media Specialist's (LMS) Responses to Journals

Response type	Cycle 1 (N=217)	Cycle 2 (N=1047)
(S1) Elicit recall	15 (6.9%)	4 (3.8%)
(S2) Request clarification	47 (21.7%)	10 (9.6%)
(S3) Ask for summary	0	0
(S4) Request elaboration	34 (15.7%)	47 (45.2%)
(S5) Encourage expression of feeling	19 (8.8%)	8 (7.7%)
(S6) Provide positive feedback	77 (35.5%)	22 (21.2%)
(L1) LMS gives opinion	3 (1.4%)	2 (1.9%)
(L2) LMS expresses feelings	6 (2.8%)	4 (3.8%)
(L3) LMS provides information	16 (7.3%)	7 (6.7%)

The three response types most frequently reflected in the school library media specialist's entries were remarks that (1) requested restatement of original comments, (2) invited elaboration on vaguely described points, and (3) provided positive feedback. Examples of the school library media specialist's comments in these three categories follow:

- Requesting clarification (S2): "What did you mean when you said 'note taking is easy but hard to find it'? Did you mean that finding the information in the source was difficult or that finding the source itself was hard?"
- Requesting elaboration (S4): "Please share with me your thoughts as you went on the computer and actually searched for sites. Did you encounter any problems? How did you solve these problems?"
- Providing positive feedback (S6): "You got it! Exploration does help us decide what part of the topic we want to work on. I hope tomorrow's exploration activity will help you even further. Please let me know."

Anecdotal logs

Maintaining her own logs helped the school library media specialist in her ongoing assessment of student performance. Ideas for possible intervention strategies often grew out of comments made in the journals. Figure 2 shows two examples of journal comments and the school library media specialist's reflections and actions based on them.

Figure 2. Sample Journal Entries and Library Media Specialist's (LMS) Responses

Focus formulation phase	
Jayanne's entry	I kinda don't know what to do.
LMS's reflection	I spoke with J. and it seems to be the entire [information search] process that she is confused about so I have decided to spend time going over the process. Since she is not the only one who is fuzzy about the process, I am thinking of creating a wall mural that will show the phases of the process as stepping stones.
Collection and organization of information phase	
Gary's entry:	The way we take notes is we get the book with the subject we want, then we answer the question that we had. We take these notes because it helps us on the final product.
LMS's reflection	Reading Gary's journal, I realize anew that this is a very nonlinear process. I find that I am continuing to backtrack even as we move on to other steps. I thought students understood how to take notes and that they could explain why note taking was an important part of the total process. Their journals told us otherwise. Eileen [teacher] and I discussed this and we will experiment tomorrow with students creating mind maps of the note taking process. This will give us an opportunity to help them visualize the process and for us to talk about the value of note taking.

The logs also allowed the school library media specialist to express her personal feelings about the work in progress. Her emotions frequently paralleled those expressed by her students. When they were euphoric over exploring the various ancient civilizations, she was equally enthusiastic: "As I read their journals, I am really excited and I can't wait to respond to them. There are times when I want to kiss the disk on which the entries are saved!" When the students admitted they were frustrated over the tasks involved in searching for information, the school library media specialist revealed her own anxieties:

> Researching is a highly complex process. I guess that in the past, I wasn't so conscious of the entire research process. I just did the parts that the teachers requested—getting resources, teaching students how to cite their sources, etc. Because I am doing all phases of the process, I am really feeling overwhelmed.

In addition, the anecdotal logs provided the school library media specialist with a space for deeper reflection on her interaction with students. During the second unit, the school library media specialist observed:

> Perhaps the most exciting thing is that students are engaging us in conversations. Several of them actually wait for the library sessions and want to know if I read their last journal entries. They ask me what I thought, if I can help them, etc. Eileen [teacher] and I also notice that students are asking us more questions as we circulate among the tables. We

> think there is a definite connection between writing freely in their journals and students asking more questions in class. The relationship has become almost collegial with some of them.

A significant insight for her was the changing nature of the questioning. Accustomed to queries dealing with locating and retrieving information, the school library media specialist noted that students in this class asked more questions reflecting higher levels of thinking:

> Because I am teaching the same process to another class, I have a basis for comparison. I am finding that students, who are using the journals, ask more questions that are beyond how to find books and how to use the encyclopedias. Today, for example, I saw students totally focused on creating their end product. What struck me was the degree of problem solving they were doing so naturally. Just being part of a class that was holding discussions with me (as opposed to asking for approval) about the accuracy of different sites for information, the strategies used to handle technical production problems, and the appropriate language to use in the trading cards, absolutely refreshed me.

The team also acknowledged that it was impossible to track the progress of each child in a whole group setting. The journals, however, provided them with critical snapshots of all students. This increased engagement also sharpened the school library media specialist's awareness of individual development. In the entry below, she commented on the problem-solving capabilities of a student:

> Laura (a child who usually needs to be told what to do, how to do it, when to do it) called me over and said that she couldn't get the picture she scanned into her trading card. She told me all of the steps she had taken, and didn't know what else to do. I was impressed because she had taken steps to take care of the problem, and didn't just call on Eileen [teacher] or me to solve the problem. As we tackled the problem together, she came up with suggestions as to what else she might try.

In another instance, she noted a student's growing self-confidence in making decisions:

> Vincent (a quiet but capable student) wanted me to help him think of a noun that would be a combination of perseverance and trustworthiness. When I couldn't help him, he went to his thesaurus to see if he could figure out a word. Later he came to me and said he found the word "surpass." When I told him that this was a verb and not a noun, I asked him what he meant by surpass. He explained it to me and I asked, "Do you mean like an achiever?" He pointed his finger at me, grinned, and said, "Now that's a good word."

Toward the end of the second unit, the school library media specialist also commented on the increased interaction among students themselves:

> I am very pleased with the interaction that has been occurring within the teams and across teams at the different tables. There have been many discussions about the meanings of words, the sources explored, and the accuracy and completeness of the notes taken. Students are not participating in this type of interaction in the other class [doing a similar research assignment].

As one of the culminating activities, the school library media specialist invited students to comment on the merits of journal writing. A majority felt that the journals documented their progress as researchers. One student said, "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." Another student added, "We can tell you what problems we are having so you can help us. I know from experience that a lot of questions can be answered through the journal." In her own log, the school library media specialist affirmed that journal writing provided encouragement to reflect, evaluate, deal with uncertainty, and relate personal experiences to new learning:

> Journal writing with students seems to break down some of the natural barriers that get in the way of genuine interaction. Some of the students who tend to be reticent have really come alive. All of the students say they have improved in their skills. Many are able to give details supporting their improvement. In general they appear far more confident than they were in the beginning. They are realizing that doing research is a process consisting of many interlocking steps.

Conclusion

This study focused on the information search process students engaged in rather than the content knowledge they gained through their units of study. In the initial stages of this field-based study, the students made a high proportion of nonspecific comments about various phases of the process. Their entries offered little or no supporting information and often reflected fragmented understanding. In the second cycle, however, there was a shift toward developing more specificity and depth, including descriptions of actions and identification of feelings.

According to Mueller (1992), metacognition involves at least three critical stages: an awareness of one's own cognitive ability, a proficiency in explaining tasks that improve performance, and an ability to suggest alternative strategies when existing practice proves ineffective. Although students in this study demonstrated varying levels of progress, most of them became more aware of their thinking processes through journal writing. They made strides in paraphrasing and elaborating on steps in the information search process. They also grew in their ability to identify techniques for self-improvement. If a student knew that she had a poor memory for deadlines, for example, she created a time line. As they worked on their final products, many students employed fallback strategies when technical problems arose.

Students also discovered that feelings of confusion, disagreement, and surprise were an integral part of comprehension and evaluation. Because the journal was not viewed as a tool for grading, the students felt safe to take risks and experiment with form, style, and voice. As a result, students became more confident about their abilities to create meaning through writing.

In this study, the counseling role of the instructor took on a new dimension, as journals became a means for individualized expressions of feelings and cognition. The school library media specialist found that her responses, coupled with individual conferences, extended students' thinking and offered them more adequate ways of approaching their information problem-solving tasks. This discourse involved a continual effort to clarify, question, and elaborate on described experiences. Positive and constructive dialogue reinforced strong performance.

The research assignments involved a range of thinking strategies, some of which were unfamiliar or especially difficult for students. Reading the student journals made the school library media specialist and the teacher more acutely aware of the number of skills embedded in each step of the research process. They frankly admitted feeling overwhelmed by the enormity of the teaching challenge. The instructors concluded that explicit teaching of various skills had to include facilitative questioning, extensive modeling, and active demonstrations. Based on data from this study, the team agreed that visual and graphic modes of knowledge representations, work sessions that afforded guided practice and feedback, and strategies that reinforced self-assessment strategies were crucial to effective learning.

It would be inaccurate to claim that these elementary-grade students made a phenomenal leap from being novice searchers to independent learners through a few assignments. Their journal entries, however, were promising indications that they had taken the first steps in articulating new conceptions and new feelings about the information search process. For the school library media specialist, this process of reflective engagement was a chronicle of the winding journey to understand her own teaching and build interpersonal relationships with the children. For the child and adult learner, the experience was the basis for more rational action and thought. It provided opportunities for both partners to express the need to be understood and find out who they were in this context.

This study engaged a school team in action research, which allowed the practitioners to address specific learning concerns in their own school. While the findings cannot be statistically generalized, the insights and results can inform other school library media specialists and teachers immeasurably. According to Van Manen (1990), the very fact that practitioners as researchers have collected specific anecdotes, selected certain pieces of a discussion, or directly quoted a particular student, indicates they have attached critical meanings to those episodes. Participation in this research helped the Hawaii team see valuable connections and relationships in the information search process. They found themselves paying more attention to the affective aspects of teaching and learning. Importantly, they recognized the need for students to participate knowingly and actively in the meaning making process.

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