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Connecting the writing process in the science program through learning logs

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Abstract

Writing across the curriculum is an important trend in language programs. As children engage in the language processes within the functions of the content areas, they not only create meaning but extend their thinking-language abilities and their knowledge of science.

The writer as a third grade teacher used her students' learning logs in science as one guide to their writing instruction. This qualitative means gave much insight into students' application of writing tasks.

Connecting the Writing Process in the Science Program Through Learning Logs

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Abstract

Writing across the curriculum is an important trend in language programs. As children engage in the language processes within the functions of the content areas, they not only create meaning but extend their thinking-language abilities and their knowledge of science.

The writer as a third grade teacher used her students' learning logs in science as one guide to their writing instruction. This qualitative means gave much insight into students' application of writing tasks.

Language is essential to humans as functioning beings. Therefore, language learning is an essential part of the school program (Smith, 1983). How and when teachers nurture the learning of language tasks with their students is an important trend and issue in literacy programs.

One important trend involves bringing the different aspects of the language arts (listening, speaking, reading, and writing) across the curriculum to assist children in experiencing the language processes within the functions of language. Children learn language as they engage in the language processes (comprehension and composition) and use language to learn concepts and related vocabulary in the content areas. By interpreting and internalizing concepts, they connect new information to what they already know and create webs of meaning (Galda, Cullinan, Strickland, 1997). Thus, children can become naturally engaged in the functions of language across the curriculum (Bosma & Guth, 1995).

Value of Writing in the Science Area

An ever-growing need in science is to communicate effectively. Scientists must possess the ability to live and work in a world of language. Not only do they need to be able to read critically, but they must be able to record experiments, hypotheses, and conclusions for themselves and to be able to communicate them to others. Writing can serve as a valuable tool in supporting conceptual development in the science area (Roth, 1992; Calkins, 1991).

As students study in the science area, they revise their thinking, thus their ideas change, as scientists do in their investigations. Scientists are always searching for better explanations of the world around them and are open to changing their minds as new evidence becomes available. Students, as scientists, should be encouraged to change their explanations when they become aware that other explanations are more accurate and to value such change and growth in their thinking. Thus, thinking is an ongoing process that changes over time. Such ideas are consistent with children's writing programs if they emphasize writing as a process to create meaning (Rosaen, 1990).

When students are asked to write about their observations, reasoning processes, results of their engagement in the scientific tasks, or attitudes, they may be prompted to pay closer attention to details, organize data more logically, and structure their arguments in a more coherent way. As a result, they clarify their own understanding of science and hone their communication abilities (Rosaen, 1989).

Writing as well as reading extended across the curriculum nurtures children's literacy tasks and concepts specific to a content area. In the case of science, studies show that students do more writing in science than in any other content area. One example is recording observations (Galda, et. al., 1997). Science presents an almost inexhaustible choice of subject

matter for the different forms of writing students need to master: exposition, description, persuasion, narration, and poetry (Kober, 1993).

Many of the language arts and science tasks have a commonality, such as observing, questioning, discussing, and risk taking (Marshall, 1990). When integrating the language arts and science areas, ideas can be shared and explored with the expectation that the revision of ideas is a natural and valued part of learning. Using the science process of hypothesizing can be integrated and compared to the revision of ideas in a writers workshop lesson (Rosaen and Roth, 1993).

Writing needs to be done at other times during the school day, not just within the writing instructional time. Therefore, science can become a strong ally to children in the process of interpreting information in their writing. Writing, in turn, supports the uses of information in science (Graves, 1983).

Development of Writing and Science Abilities Through the Science Language Logs

A form of a journal called a learning log can encourage reflection and interaction in the science program through language. Walley (1991) states, "Children appear to accept writing in a learning log because it is associated with an established school subject" (p. 151). The information in learning logs can be recorded in numerical, narrative, and artistic forms (Graves, 1989).

Learning logs used in the science program can assist children in gathering and recording pertinent information. Through keeping logs, children can speculate and revise with the purpose of learning to observe, classify, and connect the known with the unknown, thus encouraging inquiry and clarifying thinking. The logs can also be used after a unit or an experiment is completed to compare what was learned to what was expected (Walley, 1991; Pallrand, 1996).

The social context in which the teaching of science and writing takes place is a powerful representation of what it means to be a writer or a scientist (Rosaen & Roth, 1993). Through learning logs, students can demonstrate their understandings by explaining phenomena. These explanations provide the teacher with information about how the students organize knowledge (Pallrand, 1996). During the sharing of ideas from the science logs, in small groups (writers workshops) or in a whole class, the process of receiving constructive feedback from the group members can extend learning in science. Sharing learning logs also can help students develop the ability to listen to other writers' abilities to express their ideas in text, to be able to respect them as authors, and to critique their pieces (Roth, Peasley & Hazelwood, 1992).

Science Learning Logs as a Means of Assessment in Writing and Science

Assessment of students' progress and instructional needs must be an on-going process to chronicle development. Such is the difference between assessing the product and assessing the process of learning over time. Assessment activities in which students are engaged help them reflect on and understand their own strengths and needs, and they can instill responsibility for their own learning. It is when students and teachers are collaboratively involved in assessment that the greatest benefit is achieved. Collaborative assessment strengthens the bond between student and teacher and establishes them as partners in learning. No single test, observation, or piece of student work can possibly capture the authentic, continuous, multidimensional, interactive requirement of sound assessment (Valencia, 1990; Tierney, Carter, & Desai, 1991). These logs provide teachers and parents with an organized, tangible record of individual writing progress (Hatch, 1991).

These logs are not folders with worksheets and homework, but children's personal narratives and reflections on what they are learning. The goal in all science learning should not be to teach students every important scientific fact but to keep alive and extend the strategies of the mind. It is a disservice to isolate learning into bits and pieces by requiring

students to transfer it to rote memory and multiple-choice tests (Martin, 1997).

Through these logs, each student's writing can be analyzed chronologically: What did the writing reveal about the student's understanding of the science concepts being studied or about the student's developing understanding of the nature of science and scientists' work? What did the writing reveal about student thinking? What purposes did the writing appear to serve for the student? Organized composition is not a priority at this time (Rosaen & Roth, 1993).

Writing responses in learning logs appear to represent three levels of ability and challenge, beginning with simple lists and short phrases. The second level of writing involves sentences and simple paragraphs, and the third is the more refined level of writing. The writing climate should be one of enthusiasm and acceptance in which precision in the use of the language elements (e.g., spelling, punctuation, and capitalization) is secondary to reflection and expression. Although form elements are of secondary importance to ideas in learning logs, teachers can note the progress in both content and form (Walley, 1991). Using the learning logs, students are free to participate because doubts about writing instruction do not control the classroom.

Implementation of Learning Logs in the Science Area

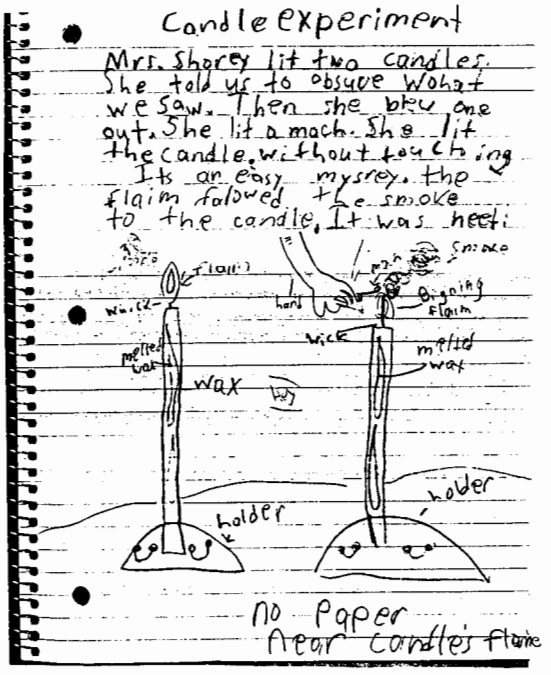
In my third grade program, the science learning logs were not only a means of integrating the language arts and science but were a valuable qualitative assessment source. In reading the students' logs, I had another means of understanding their progress and instructional needs in both areas.

In this paper, I will address the use of learning logs as one way to connect writing instruction and assessment. From the written responses in the logs that indicated instructional needs, the children were given instruction on specific writing tasks, usually in small groups.

The students took responsibility in recording experiment activities in their science learning logs. This opportunity for reflection allowed time for them to rethink their ideas and form solutions (see Figure 1).

Figure 1

Student's Reflection After a Class Experiment



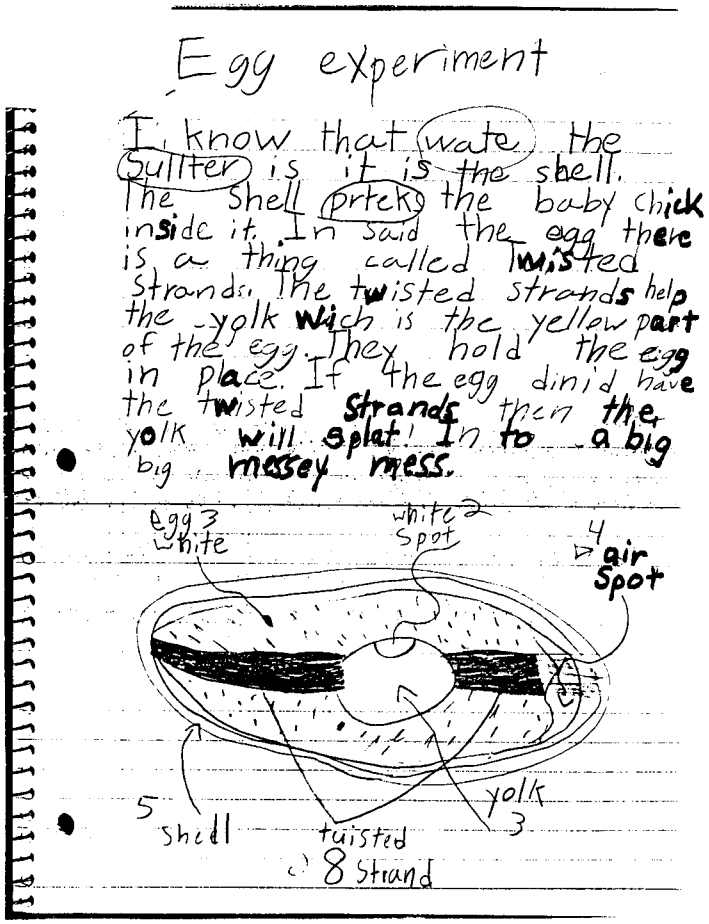
After reading this student's log, I was able to see that she understood the concept of the flame following the gas trail of smoke to relight the candle. She also was able to draw a diagram with labels to further explain the concept. The instructional needs for writing would focus on spelling and reminding her of the use of capital letters at the beginning of all sentences.

I discussed with the students the importance of writing clearly in their log entries, so someone else could read and interpret what they were saying. I was interested in their explanation of their involvement in the

science processes. The log entries helped me understand their thinking and understanding of the concepts in the science units. The idea of circling a word that they were unsure of the spelling was introduced during writers workshop. This technique transferred into the writing of their learning logs. Circling the unknown word provided the students with the ability to write their thoughts without getting caught up in the spellings of the words (see Figure 2).

Figure 2

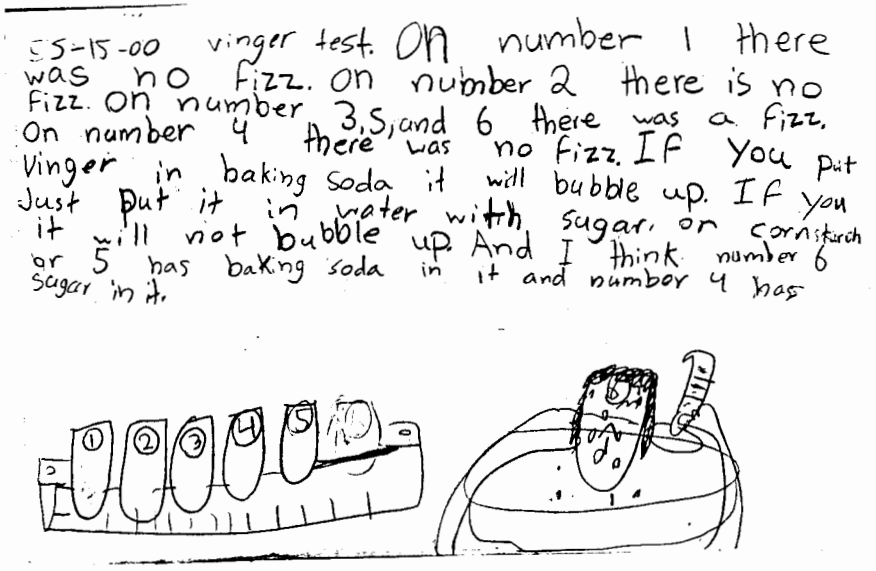
Student's Use of Circling Unknown Spelling Words in the Learning Log



Different forms of writing were included in the children's learning logs. The students recorded their observations and hypotheses and reflected on their experiences and findings. Depending on their writing ability, the students drew pictures, generated lists, wrote descriptions, kept research charts and recorded predictions and observations in their own words, explaining what had happened during the experiment or activity. For example, during the matter unit, the students were "matter detectives" attempting to solve the matter mystery solids by performing numerous experiments to gain clues into the behavior of the solids. It was necessary for the students to record information concerning the results of each experiment in order for them to solve the solid mystery. An example of a student's log entry is presented in Figure 3.

Figure 3

Student's Writing During the Solids Mystery Experiments



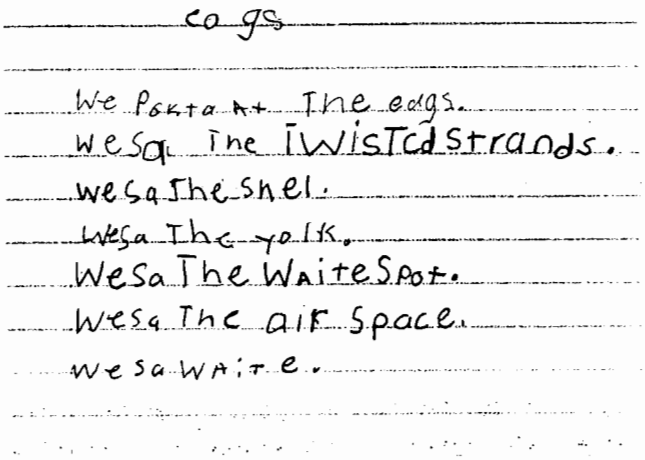
After reviewing this student's log, I concluded she understood that the mixing of vinegar and baking soda produced a fizz. She knew that the combination of vinegar with sugar or cornstarch produced a gas. The child attempted to use a diagram in her log but did not label it. I encouraged her to label her diagrams in her next entry as a means of explanation.

Some students found it difficult to express their thoughts in writing, so they began with a simple list (see Figure 4). Others were more capable of writing their reflections after an experiment was completed. For example,

a student chose to write about the egg experiment in a narrative fashion, using sentences and a diagram (see Figure 5).

Figure 4

Student's Beginning Attempt at Journal Writing, Using Simple Sentences



Eggs
We poked at the eggs.
We saw the twisted strands.
We saw the shell.
We saw the yolk.
We saw the white spot.
We saw the air space.
We saw white.

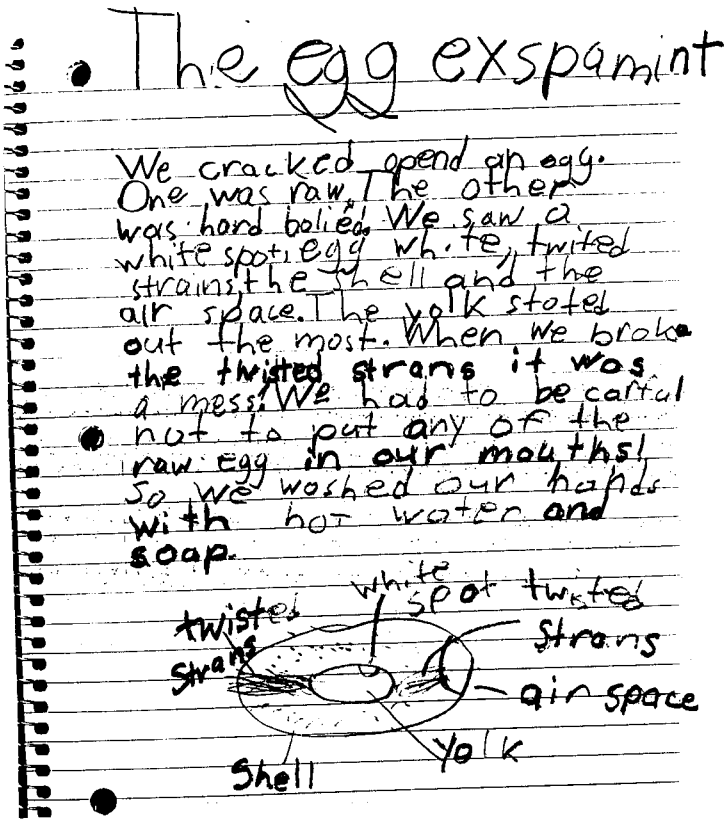
This student was in the beginning stages of writing about an experiment in her science log. She was able to use simple sentences to explain what she had observed during the experiment. Writing instruction was given on spacing between words and the use of capital letters in the correct places. Emphasis was placed on the science concepts, but writing instruction was given as a reminder to the student to write so others could read the entry easily.

This student's log entry was more advanced. She had carefully observed the parts of the egg and wrote her observations in sentence form, using correct spellings most of the time. She mentioned the importance of

cleanliness when working with raw eggs, which meant that she had learned more than just the parts of the egg and their purposes.

Figure 5

Student's Narrative Journal Entry

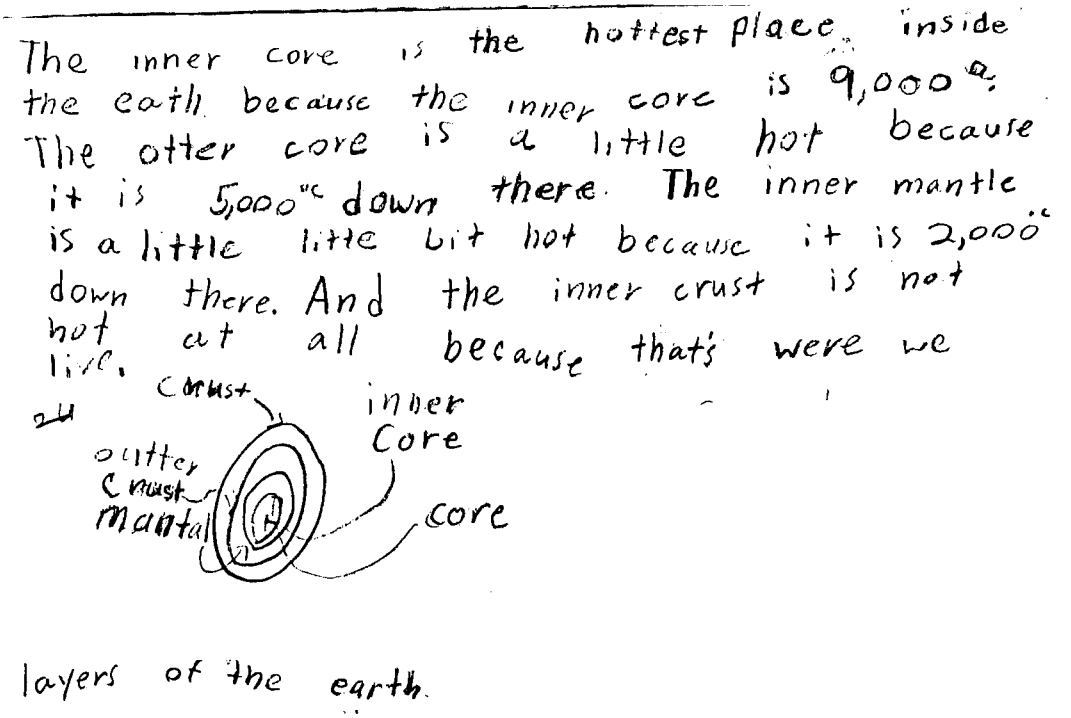


The students found that by using the writing process in science that their ideas were valuable and that sometimes their ideas were incorrect, but they were ideas in progress. They understood that they were using writing in science as a thinking tool and that scientists are allowed to change and modify their thinking. A student wrote in his log entry that we live in the inner crust and that it is not hot. After a student shared

this entry, I was able to address the information that was incorrect to prevent further misconceptions (see Figure 6).

Figure 6

Student's Incorrect Information in a Science Entry



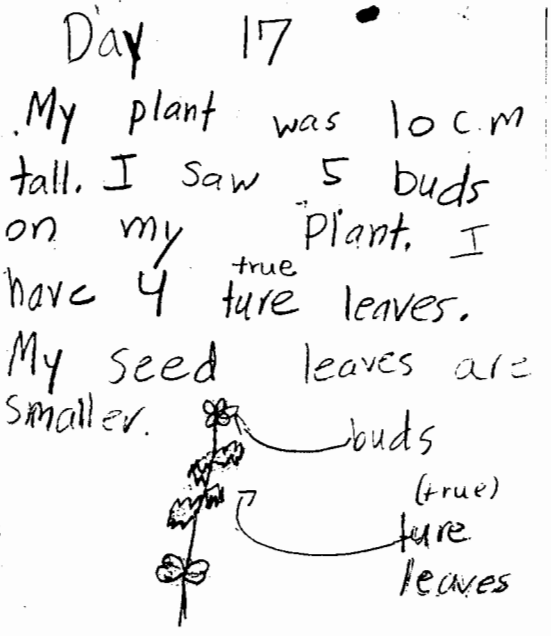
After reading this student's entry, the incorrectness of the science concept was discussed in class. Sentence structure was touched upon in the writing instruction for the student and the importance of clarity in meaning and correct spellings were also discussed.

During the plant unit, the students worked in groups, planting seeds that were fast-growing. They were able to observe their plants changing as they moved through the life cycle of the plant, going from seed, back to

seed again. I taught the students how to write a different type of science journal entry, which was more involved in the observing and recording, using diagrams and descriptions. The students observed and recorded how their plant looked and changed throughout the plant's life cycle. It was important for them to become familiar with the scientific terms for the parts of the plants and to accurately write and draw their observations (see Figure 7).

Figure 7

Student's Plant Observations and Recordings

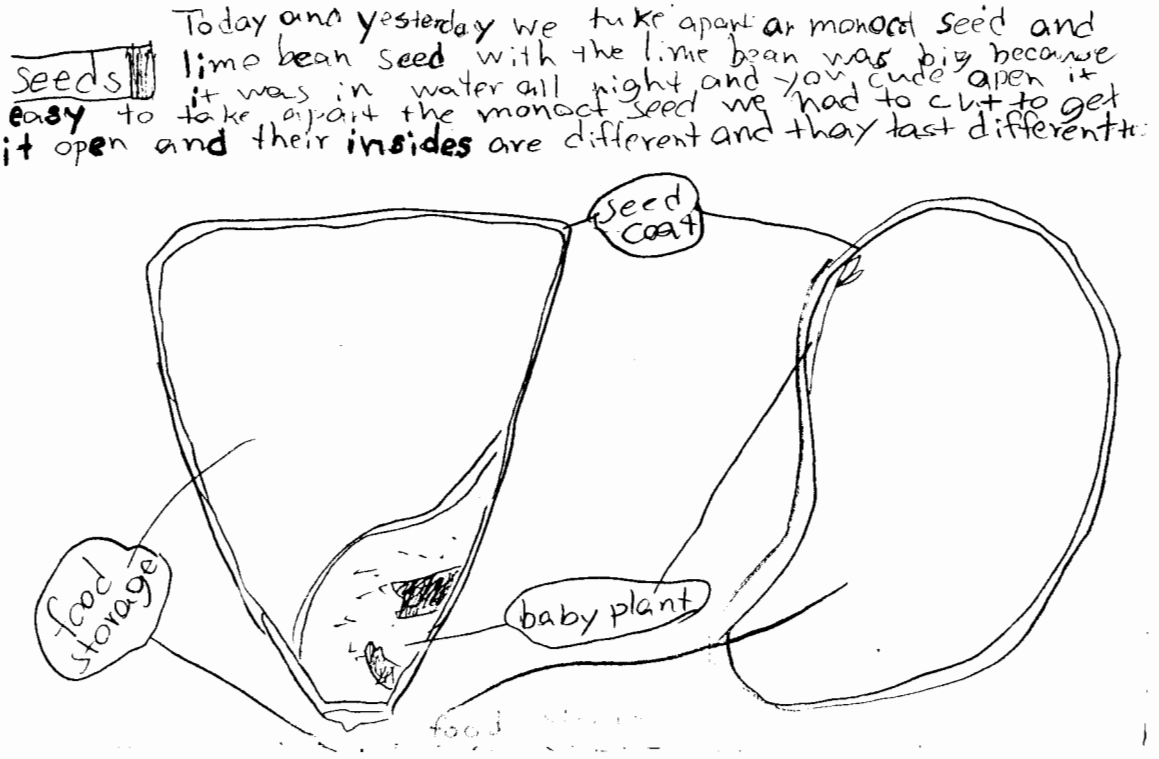


After reviewing this student's log entry, I could see that she was able to observe the plant and transfer her observations into writing, along with the use of diagrams. She knew the scientific terms for the two types of leaves on the plant. After the entry on Day 8, I visited with her about labeling the parts of the plant to facilitate easier reading.

In developing science learning log entries, I brought to the students' attention the importance of the use of drawings, or diagramming, to explain a concept, with labels. The student's log entry given in Figure 8 shows the use of diagram labels.

Figure 8

Student's Use of Diagram Labels



Students listened to each others science logs on sharing day as they listened to other forms of writing. They supported each other by being constructive rather than competitive. The same sharing of the students' science learning log ideas and hypotheses were compared to the redrafting of ideas in the writers workshop.

The students seemed comfortable with selecting ideas for their learning log entries. Many students expressed that they enjoyed writing in their logs. As the year progressed, the ideas expressed in their logs became more complete and accurate as well as more clearly stated. More and more correct form was used.

Conclusions

Connecting the writing process across the curriculum to the science area was viewed by my students and me as a positive qualitative assessment tool in the third grade classroom. Encouraging children to become creative risk-takers in their writing enabled them to internalize the writing process and to extend its use in content areas.

The learning logs gave me insight into the students' prior knowledge and enabled me to help them advance in their thinking-language abilities, along with identifying the students who did not comprehend the specific science concepts. I often found that students were going through a kind of re-thinking process, or in other words, were expanding knowledge that is self learning. I began to place more creditability in focusing on the insights that I gained from the student's reflections in their learning logs.

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