APPENDICES

APPENDIX I

Teacher Interview Protocol

Teacher Interview Protocol

I . Introduction

This is part of a research study involving elementary science teaching. We'll be talking with 12 K-5 teachers to hear about how (and whether) teachers think about and teach writing in the context of science. We want to learn from a variety of perspectives--different grade levels and different schools. We'll be asking you to help us understand your thinking, as a classroom teacher, and your teaching approaches.

Before we start, do you have any questions?

II. Teacher Background Information

We want to start by getting some basic background information –

--Teacher's name?
--Years in teaching?
--In this school?
--At this grade level?
--How long involved in Seattle elementary science project?
--How much and what kind of training? [Summer institute? Other? For how many kits?]

III. Teaching approaches

1. Now we want you to give us a general picture of your classroom, and how science fits in…
   --What does your science program look like?
   --Have you begun to use the science kits?
   --How comfortable using a 'hands on' approach to teaching science?
   --What subject area are you most comfortable teaching?

2. We're especially interested in whether or not you have students doing any writing in connection with science. Let's start with the overall picture -

   - What are your general thoughts about where writing, and the teaching of writing, fits into your science curriculum? [Would you say writing is an absolutely critical component of science? Something you do if there's time? They're not connected?]

   [**Note to us:** If the teacher says she thinks the students should write but she doesn't really have them do it, we want to follow a line of questioning about her reasoning

and the conditions influencing her -- e.g....tell us more about why it's been a challenge to use the science notebooks...why you see the teaching of writing as belonging to a different curriculum area...whatever we can ask that will build on her story...]

- What do you generally want students to learn when you have them write in science?

3. Now we want to get a more specific understanding of your teaching approach. Suppose we were in your classroom and it's time to pull out the science notebooks. What would we see going on? Walk us through a real day when you use the science notebooks... If you've brought some examples of assignments, or of student writing, you can use them to talk us through...

[**Note to us**: We want to be sure to draw out of them the extent to which they say "go write in your note books" or whether they teach some kind of explicit lesson in relation to the writing, and if so, what that lesson is and how they teach it...]

--Where in the science lesson do you have students write? Why there?
--What sorts of tasks do you give them? [or: What sort of directions do you give?]
--What do you want students to get out of this? What are the purposes for the writing?
--What do you do as a teacher to help them achieve the purpose?
--To what extent do your strategies change for different students?
--Do students work on their writing by themselves? With other students? With you?

4. We'd also like to hear about how you examine what students write.

--What are you looking for / hoping to see?
-- Help us understand what's going on in these examples of writing that you have brought. What do you see? Tell us to what extent this student work is what you're after.
--What kinds of responses do students receive on these pieces of writing?

IV. Summary reflections

5. What do you think the benefits are for students of doing writing in science? [listen / probe for: Do you see any effect on learning in science? In improving writing? What else?]

6. What are other advantages, if any, of doing writing in science?

7. What challenges do you face in teaching writing in science? (e.g. how do you find the time?)

8. What resources have been most helpful to you in teaching writing in science at your grade level? What other resources or help would you need in order to feel more confident or strengthen approaches?

9. I'm sure we haven't thought to ask you everything. What else can you tell us that would help us understand your thoughts and approaches related to teaching writing in science?

APPENDIX II

Background Survey of 15 Teachers Participating in Notebook Study

Seattle Elementary Science Notebook Study—Spring 2002

Teacher Survey

1. Name _____ 2. School _____

3. Grade level this year _____

4. Years at this school _____ 5. Total years teaching experience_____

6. Which subjects are you responsible for teaching? *(Mark all that apply.)*

___Arts ___Foreign language ___Language arts ___Mathematics

___Physical Education ___Science ___Social studies Other _____

7. For which of the above subject areas do you have: *(List more than one if you wish.)*

- greater background and confidence in teaching? _____
- lesser background and confidence in teaching? _____

8. How would you describe the students in your class this year:

a. Compared to the general student population in my school, my class this year was: *(Mark one.)*

1) ____ less skilled on the whole
2) ____ about the same overall level and range of skill
3) ____ more skilled on the whole

b. For the most part, my students this year were performing: *(Mark one.)*

1) ____ substantially below grade level
2) ____ fairly close to grade level
3) ____ substantially above grade level
4) ____ the spread of skill varied too widely to generalize

c. How does the number of English Language Learners (ELLs) in your class this year compare to the number in the past? *(Mark one.)*

1) ____ significantly more ELLs in my class this year than in the past
2) ____ roughly the same number of ELLs in my class this year as in the past
3) ____ significantly fewer ELLs in my class this year than in the past

9. What year did you begin teaching science using district-adopted kits? _____

10. To what extent was a hands-on approach to teaching science different from how you taught science prior to using the kits? *(Circle one.)*

1	2	3	4	5
Hands-on science teaching was completely new to me		I had sometimes used hands-on approaches before		Not new—I had consistently taught hands-on science before

11. How many workshops/classes have you taken as part of the Seattle LSC Expository Writing and Science Notebooks Project? _____

12. To what extent were the particular teaching approaches you learned in these science writing workshops new for you? *(Circle one.)*

1	2	3	4	5
These approaches were completely new for me		I had sometimes used approaches to teaching writing in science like these before		Not new—I had consistently been teaching writing in science like this before

13. How consistently and fully have you put into practice the approaches you learned in these workshops this year? *(Circle one.)*

1	2	3	4	5
I have not used these approaches to teaching writing in science this year		I have used some of the approaches for some science lessons this year		I use these writing approaches fully as a regular component of my science teaching this year

14. Compared to previous years, how much writing did you ask your students to do in science this year?

1	2	3	4	5
Students wrote much less this year		Students wrote about the same this year		Students wrote much more this year

15. In what ways have the following acted as supports or barriers to your putting into practice these approaches to teaching writing in science? *(Circle one in each row.)*

	Very strong barrier	More barrier than support	Neutral or mixed factor	More support than barrier	Very strong support
My own knowledge and skill related to teaching writing in science this way.	1	2	3	4	5
My belief in the value of these approaches	1	2	3	4	5
Help from my school colleagues	1	2	3	4	5
Time allotted for teaching science	1	2	3	4	5
My students' skill level.	1	2	3	4	5
Emphasis given to science at my school	1	2	3	4	5
Emphasis given to writing at my school	1	2	3	4	5

Other support(s): _____

Other barrier(s): _____

16. How would you rate the overall value of the science writing workshops as professional development? *(Circle one.)*

1	2	3	4	5
The science writing workshops were of very little value to me		The science writing workshops were of some value to me		The science writing workshops were of great value to me

17. Compared to other professional development you have had in the teaching of writing in the last few years, how would you rate the value and usefulness of the science writing workshops?

____ N / A: I have not had other professional development in writing in the past few years

1	2	3	4	5
The science writing workshops were much less valuable and useful than other professional development in writing		The science writing workshops were of about the same value and usefulness as other professional development in writing		The science writing workshops were much more valuable and useful than other professional development in writing

18. Compared to other professional development you have had in the teaching of science in the last few years, how would you rate the value and usefulness of the science writing workshops?

____ N / A: I have not had other professional development in science in the past two years

1	2	3	4	5
The science writing workshops were much less valuable and useful than other professional development in science		The science writing workshops were of about the same value and usefulness as other professional development in science		The science writing workshops were much more valuable and useful than other professional development in science

19. In what ways have the science writing workshops affected your teaching of the science kits?

	Greatly diminished		Not affected		Greatly enhanced
My ability to motivate and engage students. . .	. . . 1	2	3	4	5
My ability to focus on major science concepts.	. . . 1	2	3	4	5
My ability to teach science as inquiry.	. . . 1	2	3	4	5
My ability to assess student learning	. . . 1	2	3	4	5
Other: _____	. . . 1	2	3	4	5

20. To what extent have you applied the approaches you learned from the science writing workshops to other subject areas that you teach?

1	2	3	4	5
I have not applied them to other subject areas		I have applied them somewhat to at least one other subject area		I have applied them extensively to other subject areas

If you rated this a "3" or higher, please list other subject area(s). _____

21. To what extent do you feel these approaches help students in the following ways?

	Not at all helpful to students		Somewhat helpful to students		Very helpful to students
Address Washington EALRs for science?	1	2	3	4	5
Address Washington EALRs for writing?	1	2	3	4	5
Prepare for the Seattle's Direct Writing Assessment?	1	2	3	4	5
Prepare for the WASL writing assessment?	1	2	3	4	5
Prepare for the WASL science assessment?	1	2	3	4	5

22. What other benefits are there of using these approaches in teaching writing in science?

What are the downsides, if any, of using these approaches in teaching writing in science?

23. What additional comments do you have?

THANK YOU!

****

Please provide the information below so we can send you a $50 stipend as a small token of appreciation for your contribution to this study.

Name _____ SSN _____- _____ - _____

Address _____

_____

Phone #, in case we have a question: _____

APPENDIX III

The Ratings Criteria:

- Definitions of the Three Criteria
- The Scaled Scoring Guide

Definitions of Scoring Criteria

There are three criteria:

I. CONCEPTUAL UNDERSTANDING
II. SCIENTIFIC THINKING
III. EXPOSITORY WRITING

I. CONCEPTUAL UNDERSTANDING

- **Understanding of "big ideas" of unit**

This criterion represents the extent to which the student demonstrates understanding of the core concepts that were introduced. There is typically (but not always) cumulative evidence as notebook entries progress. There is sometimes, though not always, a culminating entry that offers more summative evidence of understanding.

Conceptual understanding is often shown in through straightforward exposition, but it can also be shown through analogy or explication of a model, and / or a combination of graphic representation and explanation.

Culminating entries are sometimes, but not always, open-ended enough to invite students to apply conceptual knowledge to a problem or make connections among the concept and prior knowledge.

II. SCIENTIFIC THINKING

This criterion represents the extent to which students demonstrate use of skills and processes fundamental to inquiry, demonstrate ability to use those skills meaningfully to make meaning and use of data, and demonstrate the habits of mind and discipline of a scientist.

♦ Using inquiry skills and processes

This criterion represents the extent to which students demonstrate use of skills and processes fundamental to inquiry. Examples:

- asking their own questions about the phenomenon or the evidence they see
- observing carefully and recording observations thoroughly and accurately
- examining data and being able to identify results, for example, by comparing different data points

♦ Using evidence to draw inferences and support explanations

This criterion represents the extent to which students demonstrate ability to make meaning and use of data:

- To what extent do they form reasonable inferences from data?
- To what extent do they use appropriate evidence to support their conclusions / explanations?

♦ Demonstrating discipline perspective and "habits of mind"

This criterion represents the extent to which students demonstrate the somewhat elusive or subtle qualities of disciplined thinking or scientific habits of mind. For example, to what extent does the student demonstrate --

- intellectual honesty in reporting results, acknowledgement of errors?
- understanding of the nature and importance of a fair test?
- openness to the possibility of alternative explanations?
- understanding of the importance of controlling variables, and how variables influence results?

III. EXPOSITORY WRITING

The first three sub-criteria below are derived and synthesized from the Seattle Direct Writing Assessment (DWA) and the Washington Assessment of Student Learning (WASL) writing test.

- **Idea/content (Development)**

This criterion represents the extent to which the student demonstrates the ability to present information or an idea. It involves the ability to develop or elaborate on that idea or information with detail (such as pieces of evidence) that is both relevant and sufficiently full to serve the purpose of explanation.

- **Organization/Sequence**

This criterion represents the extent to which the writing demonstrates a clear and logical sequence of observations or ideas. It involves placing details in a logical order, and involves appropriate use of transition words.

- **Word choice**

This criterion represents the extent to which the student uses scientific vocabulary accurately. It also involves the accurate use of non-scientific words that enhance the clarity and fullness of the explanation.

The notebooks are not "final drafts." Rather, they are meant to create opportunities to learn and to develop skills. Conventions such as standard spelling and punctuation are not assessed.

****
These last two sub-criteria are also important to development of good expository writing, but they are not necessarily to be expected in non-final-draft pieces such as those in these notebooks. We include these because when they do appear, they should be acknowledged as reflecting writing development.

- **Voice/authority**

This criterion represents the extent to which the student demonstrates obvious command of the subject matter, and comfort and authority within the stance of the scientist. It may include self-reflection.

- **Sentence structure & variety**

This criterion represents the extent to which the student demonstrates command of a range of sentence structures (e.g., use of clauses to show comparison or causality), as well as the ability to vary sentence structure and length for greater clarity and development of ideas.

SEATTLE ELEMENTARY SCIENCE NOTEBOOKS STUDY
SCALED SCORING GUIDE

I. CONCEPTUAL UNDERSTANDING

1	2	3	4
LIMITED	**DEVELOPING**	**ADEQUATE**	**FULL**
Understanding of "big ideas" of unit Evidence of very limited understanding, e.g.: -sentence frames usually incomplete, or filled in non-sensically or inaccurately -questions not addressed	Understanding of "big ideas" of unit Evidence of partial but still incomplete understanding of major concepts. May be partly accurate and partly erroneous.	Understanding of "big ideas" of unit Evidence of "pretty close" understanding of key concepts: -may be some detail that is missing but still fairly solid understanding of central concepts -may be minor inaccuracies or inconsistencies -if there is a model or analogy, it may be somewhat incomplete or awkward. -may be some attempt at application of knowledge to new problem	Understanding of "big ideas" of unit Together, words and graphics demonstrate accurate and quite full grasp of the major concepts that were introduced. May include one or more of the following: -appropriate / accurate application of previous learning to new concepts and skills -extension of the new concept or skill to new problems or new phenomena

"0" Score: reserved for non-scorable notebooks where there is virtually no response: charts are empty, sentence starters are blank, questions are copied but there is no response

II. SCIENTIFIC THINKING

1	2	3	4
LIMITED	**DEVELOPING/PARTIAL**	**ADEQUATE**	**FULLY SKILLED/PURPOSEFUL**
Use of inquiry skills, processes	**Use of inquiry skills, processes**	**Use of inquiry skills, processes**	**Use of inquiry skills, processes**
Random, disconnected "bits" of activity with no apparent purpose	Evidence of use of some skills, but often lacking thoroughness or sense of purpose, e.g. -partial records -little if any questioning	Most skills used accurately for the most part. Can be minor inconsistencies or occasional lack of thoroughness	Thorough and purposeful use of skills to advance learning – e.g. -accurate and full observations, with complete records -questioning stance related to phenomena, evidence, problems -designing investigations to test questions
Using evidence to draw inferences, support explanations -virtually no connection between explanation and evidence	Using evidence to draw inferences, support explanations Can be some inference-making but with limited reasonableness / accuracy or use of evidence.	Using evidence to draw inferences, support explanations Makes inferences that are reasonable but may be partial, incomplete, in consistent in a minor way.	Using evidence to draw inferences, support explanations Demonstrates understanding of relationship between data and inference: -draws reasonable inferences from data -uses appropriate data fully to support explanations
Demonstrating discipline perspective, "habits of mind" No evidence of awareness: -inaccurate reporting -random questioning	Demonstrating discipline perspective, "habits of mind" Very limited awareness, lacking explicit understanding	Demonstrating discipline perspective, "habits of mind" Some degree of awareness, e.g. -Honest reporting -Some explicit awareness of fair test and notion of variables.	Demonstrating discipline perspective, "habits of mind" Clear understanding of, e.g.: -honest and accurate reporting -fair test -nature of variables and their relationship to investigation and inference

"0" Score: reserved for non-scorable notebooks where there is virtually no response: charts are empty, sentence starters are blank, questions are copied but there is no response

III. EXPOSITORY WRITING

1	2	3	4
LIMITED	DEVELOPING	ADEQUATE	FULLY FLUENT AND SKILLFUL
Idea/content (Development) -unclear statement of idea or information -absent or irrelevant detail, disconnected material **Organization/Sequence** -random order -absent or mis-used transition words **Word choice** -Missing key vocabulary, or inappropriate use - ********** **Voice/authority** **Sentence structure & variety**	**Idea/content (Development)** -Statement of idea or information discernable but may be incomplete -Minimal relevant detail **Organization/Sequence** -there is some apparent logic but inconsistent, mixed. -simplistic or partially inaccurate transition words **Word choice** -Mix of accurate and inaccurate use of key terms - ********** **Voice/authority** **Sentence structure & variety**	**Idea/content (Development)** -States idea or information clearly -Includes some relevant detail -May be minor inconsistencies or lack of fullness **Organization/Sequence** -Mostly logical sequence -May be some perfunctory, repetitive use of transition words, but basically sensible **Word choice** -Scientific vocab usually accurate, with minor inconsistencies -Vocab accurate but may be somewhat simplistic ********** **Voice/authority** -demonstrates some engagement **Sentence structure & variety** -varies sentence structure enough to show causation, comparison	**Idea/content (Development)** Has control of content:: -states information or idea clearly -develops fully with relevant evidence, explanation, details **Organization/Sequence** -Details are sequenced logically -Appropriate transition words are used to show logical connections **Word choice** -Scientific vocab used accurately. -Non-scientific vocab used effectively to clarify, explain ********** **Voice/authority** -Engaged voice, confidence with scientific stance. -May include self-reflection **Sentence structure & variety** Command of sentence style: -can use multiple types of clauses and structures to clarify and develop ideas

"0" Score: reserved for non-scorable notebooks where there is virtually no response: charts are empty, sentence starters are blank, questions are copied but there is no response

APPENDIX IV

The Ratings Criteria Illustrated in Student Work

The Ratings Criteria Illustrated in Student Work

This appendix contains excerpts from student notebooks. They reflect the types of evidence that indicate the presence of program goals in the students' work. They also illustrate the kinds of evidence that indicate different levels of competency related to the three criteria, i.e., progress students are making toward program standards with respect to Conceptual Understanding, Scientific Thinking, and Expository Writing.

We discuss single entries first, explaining how their contents match the ratings on the rubric. To put the single entries in perspective, they are from notebooks in which 20-30 pages, sometimes more, are filled with work done for one or two full science units. There is typically an entry per lesson, often with a combination of written work plus charts of quantitative and qualitative data, drawings of what was observed, or graphs that display results of trials. Following these brief excerpts we include a copy of a whole notebook from 3rd grade to illustrate the amount and type of work a whole notebook includes. We want to emphasize that these excerpts only give a flavor of the work; raters gave a single score on each criterion to reflect the quality of the entire body of work in a notebook.

We have transcribed the students' writing verbatim. We also indicate what kinds of charts, drawings, or graphs accompanied the writing as part of their scientific work. Photocopies of the selected entries—showing the writing and including relevant diagrams, charts, and drawings as they actually appear—follow the transcribed excerpts.

The table below reviews the range of scores for each of the three criteria:

Ranges of competence and skill reflected in the scoring guide

	Limited	Developing	Adequate	Full
Scale for each criterion	1	2	3	4
Range for total scores	3	6	9	12

A. Fifth grade samples

1. From a notebook with a total score of 12, *full* competence level

Below we show two consecutive entries taken from work on the 5th grade Models and Designs unit. The student is reporting how her group made a "humdinger," a contraption requiring knowledge of electrical circuits. Her explanation of the process—accompanied by detailed and labeled diagrams—is logically ordered and detailed enough that another person could replicate it, and it further conveys her engagement in the work. Additionally, the entry demonstrates the student's conceptual understanding of the major ideas of the lesson—both knowledge of circuitry and of the concepts of systems and sub-systems. This degree of competence matches level 4 on the rubric for Conceptual Understanding and Expository Writing.

1/17/02

To make our humdinger, first, we taped one end of wire which was attached to the motor to the circuit next to the battery. Then, to the other piece of wire which was coming out of the motor, we attached a piece of string. Now, when we pull the string the motor will run and when we release the string, the motor will stop. So far we got the hum-part down! Next, to get the bell to ring, we stuck two poles into the baseboard, rapped a rubber band around the poles, and hung the bell on the rubber band. When we let go of the string, we needed the bell to ring, so we threaded the string through the bell and through one of the holes in the baseboard. Now, when we pulled the string, the motor would hum and the bell would start to pull back. When we released the string, the bell would spring forward with the force of the rubber band and ring! We had made a humdinger!

(Link coming soon to sample of student notebook.)

5th grade "Humdinger" entries, continued

1/23/02

1. A humdinger is a system because when you pull the string, all the parts work together to make the hum, then a ding, or a whole. When you have a system, all the parts work together to make something happen.

2. The circuit and the string combined is a subsystem within my humdinger and the bell and the rubber band combined is a subsystem in my humdinger. When they are put together, they help the whole humdinger work. When you close the circuit by pulling the string, it makes the motor hum, and because the string is wrapped through the bell and the runner band, it pulls both back. When you release the string, it opens the circuit and the motor stops. It also releases the pressure on the rubber band and bell, so the bell springs forward and rings. That's how the two subsystems work together to make the humdinger work.

[the notebooks include diagrams of each subsystem]

2. From two 5th grade notebooks, showing contrast between high and low ratings

Below we show entries from two 5th grade notebooks where students are working on the Land and Water unit. Students are studying how moving water acts on different soils to create landforms and erosion.

a. From a notebook with total score of 6, at *developing* level

The first entry is from a notebook where the work matched the rating scale for a *developing* level, or a rating of "2" for conceptual understanding, scientific thinking, and skill in writing. The written entry is accompanied by a drawing that uses color to distinguish between water and soil and includes a minimal amount of detail and labeling to show the results of the experiment. The entry does not contain inaccuracies as much as it does only partial engagement in the scientific work and partial development of ideas and observations in writing.

> Feb 4-20-2002
>
> When we pourd the water in the cup it came out of the hole and made a stream in our soil. The soil began to disappear and rocks apeard in the soil's place.

b. From a notebook with total score of 12, at *full* competence level

In the next entry, in contrast, the writing (together with the very detailed and careful illustration) shows evidence of purposeful and engaged scientific thinking, understanding of relevant concepts, and ability to explain ideas and thinking fully:

2. Two 5th grade notebooks, contrast in ratings, continued

10/20/01

I predict when we use the cup with the larger hole it will form a stream much faster because the water will get out of the bottle and cup quicker. I also think it will have a bigger chance for a landslide because the velocity is faster.

11-1-01

My science team used a bigger holed cup in lesson ten than in lesson four. Also greater water flow affects the amount of erosion and deposision. Greater water flow makes more erosion because the velocity is faster. It helps because the water pushes away the soil and makes a bigger stream.

Water flow makes deposition change because it carries the soil down to the delta. Even the gravel and the gravel is heaviest so that is not likely. I noticed there was a landslide in lesson 4 but not in lesson 10. The length of the delta was 13 cm. compared to 12 cm. in Basic Stream. Therefore the delta is longer in Rushing River. I now know that higher velocity can do different things. I want to know what would happen if we had a 6 hole cup.

Photocopies of the 5st grade samples follow.

B. Third Grade Samples

1. From a notebook with a total score of 12, *full* competence level

In the following entry is taken from a culminating assignment following the sequence of lessons on the Sound unit . The student demonstrates conceptual understanding by applying what she has learned about sound to create a new musical instrument. Her explanation, combined with a fully labeled drawing, clearly and logically communicates how the instrument functions.

April 19, 2002

My instrument is called the Jug-Mug. My instrument also makes six distinct pitches. To make these pitches I change the tension and length. The materials I used to make this instrument are, a milk gallon, cap, and string.
My instrument demonstrates that tension and lenght affects pitch. Tension means how tight or loose something is. Lenght means how long or short something is. For example if I make the string really loose it will make a very low sound, but when I pull the string tighter it will make a high pitch sound. If I also make the string shorter it will make a high pitch sound, but if I make the string longer it will be a low pitch.

2. From two 3th grade notebooks, showing contrast between high and low ratings

The two entries below are from third grade notebooks part way through a unit on Sound. Students have already carried out tests of pitch and speed of vibration using tuning forks of varying lengths, and are now doing tests with a slide whistle.

a. From a notebook with total score of 11, very close to *full* competence on all criteria

This entry contains evidence that the student is using scientific skills of observation and measurement purposefully, and that she is able to explain what her data indicate in a organized and logical manner, drawing from both qualitative and quantitative data and using scientific vocabulary:

Contrast between higher and lower ratings on 3rd grade, cont.

Slide whistle graph

[The student has created a graph with Pitch of whistle on the x axis and length of air column on the y axis, with each level and unit of length identified.]

The graph shows the length of air columns and the pitchs they make. For instans the three cm. air column made the higest pitch while the 11 cm made the lowest pitch. Therefor, I think that the length of the air column is like the tuning forks. Because the longer the object the lower the pitch and the shorter the object the higher the pitch.

b. From a notebook with total score of 7, slightly above the *developing* level

The entry below contains evidence of developing conceptual understanding, with movement toward adequate use of inquiry processes and writing skills:

[The student has created a graph very similar to that of the student above. It has observations fully graphed, but has a minor inconsistency in axis labeling.]

October 17, 200

My graph shows leath. I measured leath. I head high pitch and low pitch. My graph shows leath of the columns.

October 22nd, 2001

I know because it makes a high and low sound. It makes a different pitch because of vibration and the vibration makes all the different sounds. When I pulled it out to 3 cm. It makes I higher so I found out

it keep geting lower ever tim I pull it out. At 11 cm it is lowest. So the length of the wisle well it pitch make th sound.

Photocopies of the 3st grade samples follow.

C. First Grade Samples

In the first grade unit called Balls and Ramps, students observe balls visually and then conduct a number of tests of their behavior (rolling and bouncing), in order to investigate the properties of balls and to learn how to conduct trials that test specific variables.

1. From two notebooks, showing contrast between different ratings

a. From a notebook receiving a score of 12, reflecting *full* competence

The two consecutive entries below contain evidence that this 1st grader uses observation and measurement skills purposefully, and is able to use quantitative and qualitative data to explain what the data indicate. The student also orders his writing logically with accurate transition words. In later entries the student shows understanding of how to conduct a fair test of bounciness by dropping balls from equal heights and counting bounces carefully; later entries also show understanding of which properties make balls better bouncers and rollers.

Each of these entries consumes a full notebook page:

1-10-02

They are the same because they are both spheres.
They are round. In addition they roll fast.
They are different because the ping pong ball is
white and the rubber ball is colorfull.

[The notebook then includes a full-page chart of data, where weights of two balls are recorded.]

1-15-02

The rubber ball wase more than the polystrene ball
because the rubber ball weighs 6 ½ cubes and the
polystrene ball weighs 2 cubes.

1. From two 1st grade notebooks with different ratings, continued

b. From a notebook receiving a score of 8, close to *adequate* level

The entry below contains evidence of developing writing skills and evidence of adequate conceptual ability to make reasonable claims—from data gathered carefully in a guided investigation—about behaviors of balls that indicate they are good bouncers.

I think a ball is a good bouncer when
is bounces srat *[straight]*.

I think a good bounces bounces High.

b. Seeing development in 1st grade work over time

The entries on the following page are from a student's work on the 1st grade unit on Weather, where students observe the weather outside their classrooms and record temperature and specific weather conditions. They also make predictions based on patterns they observe and make connections between the weather and their own behavior.

A comparison of the two entries illustrates student learning developing over time. The January 14 entry was done early in the unit. The writing (accompanied by a drawing of a figure standing among snowflakes) shows evidence of a partial but not yet adequate skill in observation and reporting. If the work in the notebook had stayed at this level, the notebook would have received a total rating of 6, at the *developing* level.

However, the March 18 and 19 entries (accompanied by a representation of a thermometer filled in accurately to reflect the reported temperature) show substantial

fluency and development in writing, as well as a deeper level of engagement with the ideas of the unit. Thus, the notebook as a whole showed how the student's learning and skills improved and developed over time. The notebook as a whole received a total score of 12, or *full* competence.

Seeing development over time, continued

1st grade – early entry in notebook

Jan 14, 2002

Today it was windy and cold. I felt wind.
I saw the trees movin

1st grade – later entries in same notebook

March 18

Today it is snowy. Because it is getting colder. And the snow is going to melt. Because it is getting wormer. Today it is 46° F. I felt the wind Blowing my hair and The Trees were moving and the snow was droping hard. The snow is little and it coud be big. Today it is cloudy. Maybe the snow is going to stick. The snow can't last forever Because the sun worms it up.

March 19

Today it is sprinkling outside. I wonder if it's going to be sunny Tomorrow. Today it is 30° F. it is very cold outside. I saw the trees were moveing. The tempecher will change tomorrow. I hope it will be Sunny tomorrow.

Photocopies of the 1st grade samples follow.

Whole Notebook: Third Grade

Both the Seattle raters and the independent panel assigned ratings of 4 on each criterion. The work in the notebook as a whole reflected the *full* level of understanding and skill for these criteria within that grade level.