

## APPENDIX A

### Design of the Study

Our research questions were these:

1. To what extent is there evidence suggesting that the project is contributing to students in terms of their skill in expository writing, their understanding of important science concepts, and their ability to think scientifically and carry out scientific inquiry?
2. To what extent is this project pursuing an approach that is feasible for all elementary school teachers within the district?
  - a. What approaches to teaching science, and writing within science, are currently in use across the district?
  - b. To what extent is the project influencing the teaching of science, and of writing within science, throughout the district?

To address these we carried out a study with two distinct components. For question 1., we conducted an independent review of student notebooks; for question 2., we conducted a district-wide teacher survey. We describe the design of each below:

1. **Independent review of student notebooks.** Our purpose for the notebook study was to gather the perspectives of **outside reviewers** on the key features, the quality, and the educational significance of student work in science notebooks produced in classrooms where the program is quite fully implemented.

For this study, we drew a sample of 60 student notebooks, 20 from each of grades 1, 3, and 5. There were two sets of 10 notebooks from two classes at each grade level. The 10 notebooks were randomly selected from the class sets, stratified to include representative numbers of designated Special Education students and English Language Learners. The six schools have a range of characteristics, including student SES, academic profile, and location in Seattle. [See Appendix B.] The six teachers are all Lead Science Writing Teachers and, as such, can be considered “full implementers” of the Expository Writing and Science Notebooks program, though there are obviously some differences in their exact use of notebooks.

We devised two approaches to having these notebooks reviewed.

- a. **Independent teacher scoring and teacher reviews of student work.** We invited 15 teachers of grades K-5 who are not participants in the science writing program to assess the student work in the notebooks. Six of the teachers teach in the Seattle Public Schools, six are National Board certified teachers in Washington, and three are Puget Sound Writing Project fellows. The teachers are all experienced at teaching science and/or writing at the grade level they were reading, and several of them have had some experience teaching the same science units.

On one full day in May 2003, these teachers scored the notebooks on three criteria, using the scaled rubric that we created and piloted in the 2002 study. This rubric reflects the goals and standards of the Expository Writing and Science Notebooks Program. Each notebook was read and rated independently by two teachers. (We include the rubric in the Appendix; also, in the section of the report in which we report the results, we describe the criteria and ratings in detail.) We did not describe the writing curriculum or teaching strategies of the Expository Writing and Science Notebooks Program to the scorers because we did not want to bias them toward noticing specific features; rather, we asked them to apply the descriptors of the rubric to the work in the notebooks. We did, however, invite one Lead Science Writing Teacher from each grade to sit at each scoring table and to provide information about—and only about—the specific content of the science units so that readers would have a solid basis on which to assess conceptual development in the student work. Researchers from Inverness Research selected the anchor papers and served as table leaders.

Additionally, we conducted focus groups with these teachers at each grade level. We asked the teachers to give us their candid assessments and impressions of the work they saw in the notebooks, from their perspectives as classroom teachers. Here, our purpose was to ascertain their independent views as educational experts. In the findings sections, we include these teachers' comments alongside the comments of the other independent reviewers.

- b. Independent reviews of student notebooks by experts from within the Seattle district administration and outside the district. We invited 10 mid-level administrators from the Seattle Public Schools,<sup>1</sup> one SPS school board member, and 16 independent experts from other schools, universities, reform projects in other districts (and one other state), and reform projects that are regional and state-wide. These readers were selected as proxies for “the field,” i.e., as representatives of the larger science education (and writing education) community who, together, embody the standards and best practices related to teaching science and writing in science. Our purpose was twofold. Primarily, we wanted to gain an independent and expert perspective on the nature and qualities of the work in the student notebooks and, by extension, of the educational significance of this project *vis-à-vis* the standards of the science (and writing) education reform community. Secondly, we wanted to engage SPS administrators personally in examining the student work and reflecting on the significance of the program to the district *vis-à-vis* its own reform agenda.

On two days in May 2003, we held review sessions, with half the reviewers participating each day. We framed this study (for the reviewers) not as evaluation but rather as research. We stated that there is great interest in the field in exploring how the teaching of writing and science might serve one another and support student learning; we said further that the Seattle district had devised an experimental strategy for teaching writing in science in the elementary grades. We said that we had invited them there to examine some student work and to help us gain insight into the qualities of that work from their perspectives in the educational system. We told them that we had purposefully invited experts from a range of backgrounds and we wanted to gather their candid assessments and reflections.

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<sup>1</sup> The superintendent, chief academic officer, and head of professional development and curriculum were all scheduled to participate but none were able to do so when the time came.

Again, we did not describe the Expository Writing and Science Notebooks Program and its methods; we did, however, invite selected LSWTs to briefly summarize the conceptual content of the three science units.

We involved these reviewers in three activities:

- *Collective reading and whole group discussion of three notebooks*, one from each grade level. For purposes of this discussion, we selected the notebook that served as the anchor for level “3” on the rubric during the formal teacher scoring session. The scale of competence levels runs from 1 to 4, so the “3” notebooks reflected “adequate,” not “full,” competence. We asked the readers to respond to the following questions:
  - what are your first impressions of the student work in these notebooks, based on your beliefs about what is important in the learning of science and writing?*
  - what do you see in these notebooks that you believe is important vis-à-vis:*
    - conceptual understanding of the big ideas of the units*
    - scientific thinking and inquiry processes*
    - expository writing*
  - what is absent from these notebooks, based on your beliefs about what is important to student learning in science and writing?*
- *Independent reading of three full notebooks by each reviewer*. We prepared packets of three notebooks for each reviewer. Most reviewers read one notebook from each grade level, randomly selected from the sample. Two or three readers read three notebooks from the same grade level. For those reviewers who had special expertise in language acquisition or Special Education, we prepared a sample of notebooks created by students with those characteristics. Other reviewers also read notebooks by students with these characteristics, mixed in with other notebooks. (We did not identify the notebooks as having been written by students with these characteristics; rather, we simply gave them to the readers and left it to them to decide whether or not the student work revealed second language acquisition markers.) Each reviewer wrote comments about each of the three notebooks on forms we provided. (A copy of the comment form is in the appendix.)
- *Focus groups of SPS affiliates and non-SPS reviewers*. We asked the reviewers to tell us their overall impressions of the notebooks, after having read and analyzed several in detail, and we asked them to reflect on the educational significance of the notebooks as artifacts related to teaching and learning.

2. **Survey of elementary science teachers across the district.** Our purpose for the survey was twofold. First, we wanted to capture the extent of implementation in the district of hands-on science teaching and the teaching of writing in science. Second, we wanted to compare the practices of participants in the Expository Writing and Science Notebooks Program with those of non-participants. We sent surveys to 576 teachers in grades K-5, 278 defined as “participants” and 278 defined as “non/limited-participants.” The overall response rate was 53%, which is quite robust. Participants had a higher response rate of 61% vs. 48% for non/limited-participants.

Creating the two sample groups was not a straightforward task, so we describe our approach in some detail because it has implications for interpreting the findings. The Expository Writing and Science Notebooks Program has been in existence since 1999-00. In that first year, according to program records, 310 teachers participated in a total of 620 workshops, or 1.9 each. In the subsequent 3 years (2000-01, 2001-02, 2002-03), the program served a total of 576 distinct teachers, who averaged 2.2 workshops each. The data on participation from the first year is not included in an electronic database so we cannot ascertain how many of the 310 are included in the later group of 576. Nonetheless, we can infer that a significant majority of the district's ~950 elementary teachers have participated in at least one workshop.

Initially, we tried to define "participants" as those teachers who had taken three or more classes within the most recent two years (2001-02 and 2002-03). The program itself had strengthened the professional development in 2001-02 by adding curriculum strands for writing for each of the 3 units taught at each grade level; also, it seemed to us that the introductory workshop plus two (out of three) unit-based workshops would constitute a high degree of participation. The total number of teachers matching that description was quite small, however, which was problematic because we wanted the two samples (participants and non-participants) to be the same size and, together, to be sizable enough to capture a robust portrait of science teaching across the district. Ultimately, we defined "participant" as a teacher who had participated in 2 or more workshops within the past three years (2000-01, 2001-02, and 2002-03), and defined "non/limited-participant" as any teachers randomly selected from all elementary schools who were not already defined as participants. This method produced samples of 278 teachers in each group, for a total of 576. Within each group, the same number of teachers per grade level were sampled.

Defining the two groups in these ways had the potential to reduce the contrast between them, because two (or more) workshops in three years cannot be deemed "heavy" professional development; also, we knew that the group that we decided to call "non/limited-participants" included a sizable number of teachers who had participated in one workshop offered by the program within the past three years and perhaps a few who had taken two in four years.

**APPENDIX B.**

**Demographics of Schools from Which Student Notebooks were Sampled**

<b>School Name</b>	<b>Total Enrollment</b>	<b>Am Ind/Ak Native</b>	<b>Asian/Pac Is</b>	<b>Black</b>	<b>Hispanic</b>	<b>White</b>	<b>% FRDLCH</b>	<b>%ELL</b>	<b>4th Grade WASL - Writing (% who met standard)</b>
School A	403	1.2%	39.2%	32.8%	8.2%	18.6%	59.7%	29.3%	34.4%
B	294	2.0%	11.9%	15.0%	6.5%	64.6%	19.7%	2.7%	36.2%
C	429	3.3%	35.2%	15.6%	27.3%	18.6%	66.7%	31.5%	37.7%
D	459	2.0%	10.5%	8.5%	8.1%	71.0%	14.3%	1.3%	79.4%
E	374	0.5%	20.9%	7.5%	24.1%	47.1%	27.3%	24.1%	39.1%
F	315	2.9%	26.7%	54.3%	9.5%	6.7%	75.7%	26.2%	43.8%
Seattle School District	47,853	2.6%	23.3%	23.0%	11.0%	40.1%	41.9%	12.1%	50.8%

Source: <http://reportcard.ospi.k12.wa.us/Reports/demographics.aspx?schoolId=1107&reportLevel=School>  
Data based on October 2002 counts