



## APPENDIX D



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# Description of Data Collection

## Study Endorsements

Prior to school recruitment, study endorsements were solicited from many national professional organizations in an effort to encourage participation. In the fall of 2010, each organization was sent a letter briefly describing the study and asking for input on the survey instruments. The letter included a link to a website where representatives could view the surveys. The following organizations provided letters of endorsement, and their names were included on the study stationery.

American Association of Physics Teachers  
American Chemical Society, Education Division  
American Federation of Teachers  
Association of Mathematics Teacher Educators  
Association of State Supervisors of Mathematics  
Center for the Study of Mathematics Curriculum  
Council of State Science Supervisors  
National Association of Biology Teachers  
National Association of Elementary School Principals

National Association of Secondary School Principals  
National Catholic Education Association  
National Council of Supervisors of Mathematics  
National Council of Teachers of Mathematics  
National Earth Science Teachers Association  
National Education Association  
National School Boards Association  
National Science Education Leadership Association  
National Science Teachers Association

## Advance Notification

In January 2011, notification letters were mailed to the Chief State School Officers, advising them of the format and schedule of the study. Three weeks later, similar information letters were mailed to superintendents of districts in which sampled public schools were located. District officials were asked to contact HRI if they had any questions or concerns.

HRI identified 154 school districts in the sample that had a formal research approval process. HRI prepared and submitted research applications according to each district's requirements and then followed up with research coordinators throughout the approval process. Of the 154 districts, 114 approved the study. Those that declined cited lack of time and misalignment with the district's own research priorities as reasons.

## School Recruitment

In February 2011, a pre-survey packet was sent to the principal of each sampled school that had not refused participation at the district level. The pre-survey packet consisted of a cover letter from HRI describing the school's involvement, a one-page summary of the study, and instructions for logging on to the study website and designating a school contact person or "school coordinator." The school coordinator designation page was designed to confirm the principal's contact information as well as to obtain the name, title, phone number, and email address of the coordinator. As an incentive, school coordinators were offered an honorarium of

up to \$200 (\$100 for completing a teacher list and school questionnaire, \$15 for completing each program questionnaire (optional), and \$10 for each completed teacher questionnaire). Teachers were offered a \$25 honorarium for completing the teacher questionnaire.

A small percentage of schools responded to the letter by going to the study website and designating a coordinator. Anticipating the lack of response, HRI contracted with a telephone call center to follow up with non-responding schools. If a principal had not responded within two weeks of receiving the letter, the call center began calling the school. Generally, a series of telephone calls was needed to determine whether anyone had received the letter, to whom the task had been delegated, and whether or not that person was planning to complete it. In many cases, schools requested a re-mailing of the survey materials.

A few school officials directly refused to participate at this stage, generally citing competing priorities and overburdened teachers. When this occurred, telephone prompters attempted to change the principal's mind. Although this method was effective in some cases, most direct refusers did not change their mind.

Once a principal agreed to participate and designated a school coordinator, the coordinator was sent an automated email indicating that s/he had been designated by their principal as the survey contact and detailing the coordinator role in the study. Beginning in September 2011, each coordinator was asked to complete three initial tasks online: (1) submit a list of science and mathematics teachers; (2) designate individuals to complete program-level questionnaires; and (3) respond to the School Coordinator Questionnaire (a brief survey asking about school demographics). Coordinators were asked to complete these tasks within a two-week period and were sent the first installment of their honorarium (\$100) within four weeks of completion.

Non-responding coordinators received an email reminder three weeks after the initial email was sent. Following an additional week of non-response, coordinators were contacted by phone and prompted to complete the three tasks. After a series of eight reminder phone calls, a second reminder email was sent to each coordinator. One week later, if a coordinator had still not responded, the school principal was contacted and asked either to encourage the current coordinator to respond or to consider designating someone new to serve in this capacity.

Table D-1 summarizes the school participation rates by stratum. A total of 35 schools were identified as ineligible; due to either being closed or merged with another school to create a new school. In total, 1,504 schools chose to participate for the remaining 1,965 slots, an overall response rate of 77 percent.

**Table D-1  
School Participation, by Stratum**

	<b>Stratum 1</b>	<b>Stratum 2</b>	<b>Stratum 3</b>	<b>TOTAL</b>
Response Rate	80%	76%	70%	77%
Participated	819	359	326	1,504
Non-Response	207	111	143	461
Ineligible	19	6	10	35
<b>TOTAL</b>	<b>1,045</b>	<b>476</b>	<b>479</b>	<b>2,000</b>

The school coordinator questionnaire was programmed to check for the accuracy of certain information as it was submitted. For instance, the survey checked whether student enrollment overall matched student enrollment by race/ethnicity. Coordinators were asked to correct any mismatches before proceeding with the survey.

The teacher lists resulted in a file of 27,888 teachers. From this frame, a sample of 10,226 science and mathematics teachers was drawn. Seven teachers were sampled from each list, unless the list contained fewer than seven, in which case all were selected. The number of teachers sampled per school ranged from 1 to 7, with a mean of 6.8 teachers and a median of 7. Teachers were sampled on a rolling basis so that late responders to the pre-survey would not delay the main data collection effort.

## **Teacher and Program Surveys**

In January 2012, HRI staff mailed program and teacher questionnaire invitations by first class mail to 30 schools in the sample. This first small group served as a “soft launch” to test survey administration procedures and the functionality of the data collection website. After three weeks, additional mailings were sent to batches of 300–500 schools each week until the sample was exhausted. The packets contained:

- A personalized cover letter from HRI; and
- A “how to” page explaining how to access the online survey using unique login information.

Many of the individuals designated to respond for the program questionnaires were teachers and, consequently, had been randomly sampled to complete the teacher questionnaire as well. These individuals received both the teacher questionnaire invitation and the program questionnaire packet (mailed in separate envelopes). Because the program questionnaire requested information that the respondent was not likely to know, the mailing included a paper copy of the survey, so that respondents could gather data before completing the on-line version.

## Prompting Respondents

A series of steps was taken to increase the response rate, primarily through email follow-up with school coordinators. Reminder emails were sent to coordinators at schools with less than 100 percent response at three, five, seven, and nine weeks following the survey invitation mailing. Five weeks after the initial mailing, schools with no respondents received a phone call in addition to the reminder email. At seven weeks, any school with less than 50 percent completion received a phone call in addition to the reminder email. In some instances, schools indicated that they had not received survey invitations, in which case materials were re-mailed or re-sent via email.

During the survey administration phase, school coordinators were given access to a real-time “completion status report,” which summarized survey response for their school. The report listed the surveys to be completed at the school, the name of the person designated and/or sampled to complete each one, and whether the survey was “not started,” “started,” or “completed.” Coordinators were asked to use the report to follow up with non-respondents to encourage them to complete their questionnaires.

## Response Rates

A total of 2,505 completed program questionnaires were received out of the 3,008 possible, for a response rate of 83 percent. A total of 7,752 out of 10,012 eligible teachers<sup>1</sup> took part in the survey, for a response rate of 77 percent. Tables D-2 and D-3 provide response rate breakdowns for program heads and teachers, respectively.

**Table D-2**  
**Results of Program Questionnaires, by Stratum and Subject**

	<b>Sampled</b>	<b>Non-Response</b>	<b>Completed</b>	<b>Response Rate (Percent)</b>
<b>Stratum 1</b>	<b>1,638</b>	<b>290</b>	<b>1,348</b>	<b>82</b>
Science	819	144	675	82
Mathematics	819	146	673	82
<b>Stratum 2</b>	<b>718</b>	<b>134</b>	<b>584</b>	<b>81</b>
Science	359	56	303	84
Mathematics	359	78	281	78
<b>Stratum 3</b>	<b>652</b>	<b>79</b>	<b>573</b>	<b>88</b>
Science	326	42	284	87
Mathematics	326	37	289	89
<b>TOTAL</b>	<b>3,008</b>	<b>503</b>	<b>2,505</b>	<b>83</b>

<sup>1</sup> During data collection, it was determined that a small number of teachers were not eligible to participate in the study (e.g., after the school submitted its teacher list, the teacher retired, went on maternity leave, changed teaching assignment). These teachers are not included in the denominator when calculating response rates.

**Table D-3  
Results of Teacher Questionnaires, by Stratum and Subject**

	<b>Sampled</b>	<b>Non-Response</b>	<b>Ineligible</b>	<b>Completed</b>	<b>Response Rate (Percent)</b>
<b>Stratum 1</b>	<b>5,545</b>	<b>1,271</b>	<b>100</b>	<b>4,174</b>	<b>77</b>
Science	2,719	638	55	2,026	76
Mathematics	2,826	633	45	2,148	77
<b>Stratum 2</b>	<b>2,435</b>	<b>572</b>	<b>44</b>	<b>1,819</b>	<b>76</b>
Science	1,120	239	20	861	78
Mathematics	1,315	333	24	958	74
<b>Stratum 3</b>	<b>2,230</b>	<b>417</b>	<b>54</b>	<b>1,759</b>	<b>81</b>
Science	1,038	196	28	814	81
Mathematics	1,192	221	26	945	81
<b>TOTAL</b>	<b>10,210</b>	<b>2,260</b>	<b>198</b>	<b>7,752</b>	<b>77</b>

## Data Retrieval

The web-based format minimized the need for data retrieval. Critical items were identified during questionnaire development, and the surveys were programmed such that respondents could not proceed without answering these questions. In addition, the surveys were programmed with a number of “soft checks” for potentially incorrect responses. For example, on the School Coordinator Questionnaire, if the number of students in the various demographic categories did not sum to the total enrollment reported, the survey prompted coordinators to double check their numbers.

## Data Cleaning

Questionnaire responses were captured through the data collection website. Data were screened by researchers for missing data, out-of-range answers, and logical inconsistencies. After data-cleaning decisions regarding these issues were made, the data were updated to reflect the decisions. Additional variables needed for analysis were created using data from survey answers and other sources.

The data about instructional materials used (e.g., titles, ISBNs) were used to mine additional information about textbooks (e.g., the publisher, whether NSF funded the development of the materials) and to resolve inconsistencies in title and author information.