CHAPTER TWO
Data Collection and Analysis

Introduction

The *Inside the Classroom* study involved selecting a sample of lessons to be representative of all mathematics and science lessons in the United States; developing instruments to use in observing classrooms and interviewing teachers; training researchers in the use of those instruments; and collecting and analyzing the data. Information about these aspects of the study design and implementation is presented in the following sections.

Sample Selection

In designing this study, HRI was able to draw upon the nationally representative sample of schools that had been selected for the 2000 National Survey of Science and Mathematics Education. The target population for the National Survey school sample included all regular public and private schools in the 50 states and the District of Columbia; the only schools excluded were vocational technical schools, schools offering alternative, special, or adult education only, and pre-school/ kindergarten schools.

Using the Quality Education Data, Inc. database, HRI's sampling subcontractor (Westat) constructed a sampling frame for the National Survey of Science and Mathematics Education based upon all eligible records, creating strata based on grade span, census geographic region, and type of community. To ensure that the sample would represent the variation among schools in socioeconomic status, each stratum was sorted by the Orshansky percentile, which reflects the proportion of students whose family incomes are below the poverty line. Schools were then selected with probability proportional to size.

For *Inside the Classroom*, HRI selected a subset of 40 middle schools from the schools that participated in the 2000 National Survey of Science and Mathematics Education; at the same time, a replacement for each sampled school was designated in the event of refusal. To ensure that the 40 sites would be as representative of the nation as possible, HRI used systematic sampling with implicit stratification. The National Survey sample of middle schools was sorted by region (Northeast, South, Midwest, West), state, Orshansky percentile, and school size. Once the list of middle schools was sorted in this manner, a random starting point was chosen and every n^{th} one was selected so that every school had an equal probability of being included in the *Inside the Classroom* sample. When a middle school agreed to participate, HRI identified the elementary schools and high school(s) in the same feeder pattern and randomly sampled one of each. Thus, each site consisted of three schools—one elementary, one middle, and one high school.[3]

For classroom observations, a simple random sample was drawn from among the mathematics and science teachers in the sampled school. One class each of two science teachers and two mathematics teachers was to be observed in each school. The total sample was projected to be 480 teachers/lessons in 120 schools in 40 districts throughout the United States, evenly divided between mathematics and science and evenly distributed among the elementary, middle, and high school levels.

Data collection began in November 2000. Despite generous incentives and efforts to minimize both the burden and obtrusiveness of the study, HRI encountered some resistance in securing cooperation of the sampled sites. When roughly half of the project observations had been completed, HRI inspected the demographic characteristics of the observed sites to confirm that they were representative of schools in the nation. Noting some gaps, HRI drew a new random sub-sample of middle schools from the 2000 National Survey schools and hand-picked a sub-group of 14 sites (in addition to ones that were already in progress) that would round out the sample in terms of demographic characteristics.

Due to time and resource constraints, HRI ended the observation phase of the study in April 2002 having visited 31 sites. To reach this number, HRI contacted 86 sites. The disposition of sites is shown in Table 1. In each instance where a site refused, a replacement was chosen with similar demographic characteristics. Three of the 31 sites were sites of convenience. Of these, 2 were selected specifically to ensure adequate representation of large urban schools.

Table 1
Disposition of Contacted Sites

	Number of Sites
Contacted	86
Observed	31
Declined to participate	46
Did not respond	9

[3] Among the sites visited, there were five exceptions to this arrangement. In one, two elementary schools were included at the site: a K–2 school and a school containing only grades 3–5. At two sites, the high school declined to participate. In a fourth instance, the single grade K–8 school in a district was included as both an elementary and a middle school. In the fifth site, science was not included in the elementary curriculum so two additional teachers were observed at the middle school level.

Distribution of Observed Sites

Tables 2 and 3 show the grade level, urbanicity, and student demographics of the visited schools. For comparison purposes, data for all schools in the nation are included as well.[4] The majority of schools visited are classified as suburban, with the remainder about equally divided between urban and rural schools.[5] The sampled schools appear to slightly over-represent suburban schools and under-represent rural ones. In addition, large high schools appear to be over-represented. Otherwise, study schools on the whole are quite comparable to schools in the nation in terms of demographic characteristics, including race/ethnicity and percent of students qualifying for free/reduced lunch. (See Table 3.)

Table 2
Urbanicity of Schools

	Percent of Schools		
	Urban[†]	**Suburban**	**Rural**
Overall			
Observed	22	61	17
Nation	24	45	30
Elementary			
Observed	19	63	19
Nation	27	45	29
Middle			
Observed	20	67	13
Nation	22	50	28
High			
Observed	25	57	18
Nation	18	44	38

[†] Here, and throughout this report, "urban" includes both large and mid-size cities.

[4] Data for the study schools and all schools in the nation are tabulations of data from the National Center for Education Statistics' (NCES's) Common Core of Data. NCES has a fourth category of school level called "other." Of the 92 study schools, 2 (2 percent) fell in this category. Nationally, 8 percent of schools are classified as "other."

[5] While all schools at a site were part of the same district, schools within a district may vary in their urbanicity classification.

Table 3
School Size and Student Demographics

	Mean School Size	Mean Percent of Students					
		Free/Reduced-Price Lunch	American Indian/ Alaskan Native	Asian	Black	Hispanic	White
Overall							
Observed	797	40	1	4	23	11	61
Nation	513	41	2	3	16	15	64
Elementary							
Observed	472	46	0	3	27	11	58
Nation	440	45	2	3	16	16	63
Middle							
Observed	702	43	1	4	22	11	62
Nation	602	40	2	3	15	14	66
High							
Observed	1,288	29	0	4	21	13	62
Nation	742	30	2	3	13	12	70

Figure 1 shows the geographic distribution of observed sites superimposed on the population in the United States (darker shading corresponds to greater population). As expected, the *Inside the Classroom* sites are concentrated in the most populous states.

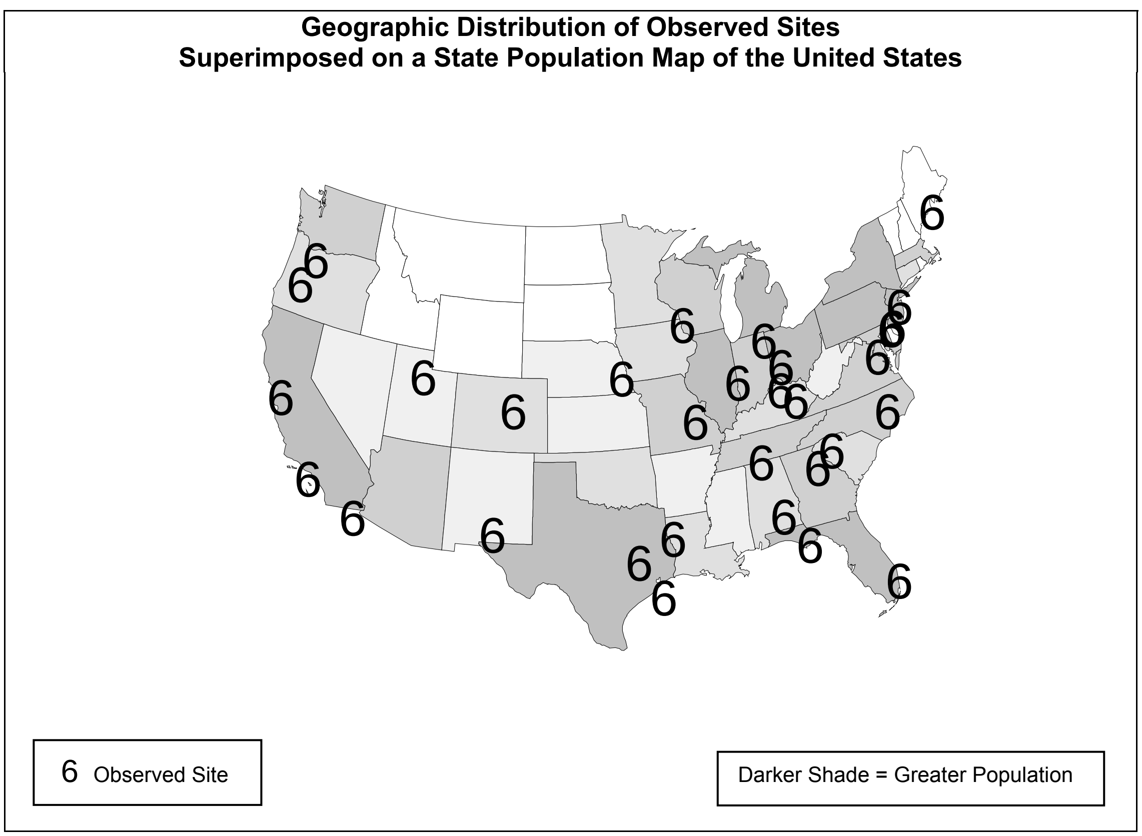

Figure 1

Characteristics of Observed Teachers

Tables 4 and 5 show demographic characteristics of the 364 observed mathematics and science teachers, respectively, with national data from the *Report of the 2000 National Survey of Science and Mathematics Education* (Weiss, et. al., 2001) presented alongside for comparison. In mathematics, teachers observed for the study are representative of teachers in the nation, with two exceptions. African-American elementary teachers and high school teachers with a Master's degree are over-represented in the sample of observed mathematics teachers.

In science, males are slightly over-represented among teachers observed at the middle and high school level. At the elementary level, observed science teachers are more likely than those in the nation to have a Master's degree. In general, however, the sample of observed science teachers is quite similar to the national population of science teachers.

Table 4
Characteristics of the Mathematics Teaching Force, by Grade Range

	Percent of Teachers					
	Grades K–5		Grades 6–8		Grades 9–12	
	Observed	National†	Observed	National†	Observed	National
Sex						
Male	6	7	21	28	49	45
Female	94	93	79	72	51	55
Race						
White	79	89	82	84	94	90
Black or African-American	15	3	10	10	2	4
Hispanic or Latino	6	5	4	4	2	2
Asian	0	0	0	1	0	1
American Indian or Alaskan Native	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0
Other	0	2	4	2	2	1
Age						
≤ 30 Years	24	20	26	24	12	16
31–40 Years	15	21	24	23	22	24
41–50 Years	33	30	33	27	24	29
51 + Years	28	28	17	26	41	30
Experience						
0–2 Years	21	18	22	19	8	13
3–5 Years	13	13	16	13	6	15
6–10 Years	15	15	20	13	22	14
11–20 Years	29	25	24	25	24	24
≥ 21 Years	23	29	18	30	39	34
Master's Degree						
Yes	42	42	41	43	69	51
No	58	58	59	57	31	49

† Data for K–5 and 6–8 teachers are special tabulations from the 2000 National Survey of Science and Mathematics Education, since the technical report categorizes teachers as K–4, 5–8, and 9–12.

Table 5
Characteristics of the Science Teaching Force, by Grade Range

	Percent of Teachers					
	Grades K–5		Grades 6–8		Grades 9–12	
	Observed	National†	Observed	National†	Observed	National
Sex						
Male	5	10	38	29	63	50
Female	95	90	62	71	38	50
Race						
White	85	87	87	85	85	88
Black or African-American	7	5	9	6	8	4
Hispanic or Latino	2	3	0	4	0	2
Asian	2	1	0	1	4	1
American Indian or Alaskan Native	0	0	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0
Other	2	3	4	5	2	3
Age						
≤ 30 Years	27	20	26	19	20	20
31–40 Years	7	19	26	26	24	23
41–50 Years	39	33	28	28	28	29
51 + Years	27	27	21	27	28	28
Experience						
0–2 Years	17	15	24	17	23	16
3–5 Years	15	15	13	15	17	16
6–10 Years	10	16	16	17	15	18
11–20 Years	22	27	22	24	23	21
≥ 21 Years	37	27	24	27	23	29
Master's Degree						
Yes	54	42	59	47	52	57
No	46	58	41	53	48	43

† Data for K–5 and 6–8 teachers are special tabulations from the 2000 National Survey of Science and Mathematics Education, since the technical report categorizes teachers as K–4, 5–8, and 9–12.

Distribution of Observed Classes

As noted earlier, teachers at sampled schools were selected randomly from among all teachers of mathematics and science in the school. Using class schedules for each of the selected teachers, an observation schedule was constructed for each site, a process that necessitated choosing classes based on constraints such as: (1) scheduling observers at one school for an entire day; and (2) limiting the observation period to three days at any site. Scheduling observations for elementary science proved especially challenging due to the relative infrequency with which the subject is taught in grades K–5.

Mathematics observations in grades K–8 were fairly evenly distributed among the grades. (See Table 6.) At the high school level, sampled classes generally follow patterns of course offerings in the United States; e.g., Review Mathematics classes were least likely to be observed and also least likely to be offered at the high school level (Weiss, et al, 2001).

Table 6
Mathematics Classes Observed

	Percent of Classes
Grades K–5	**(N=57)**
Kindergarten	11
1st Grade	16
2nd Grade	21
3rd Grade	14
4th Grade	16
5th Grade	12
Other (multi-grade) Elementary Mathematics	11
Grades 6–8	**(N=66)**
6th Grade, Regular	30
6th Grade, Accelerated	2
7th Grade, Regular	29
7th Grade, Accelerated	6
8th Grade, Regular	9
8th Grade, Enriched	12
Algebra 1, 7th or 8th Grade	5
Other Mathematics	8
Grades 9–12	**(N=61)**
Review Mathematics (e.g., Basic Math, Review Math)	3
Informal Mathematics (e.g., Pre-Algebra, Applied Math)	7
Formal Math Level 1 (e.g., Algebra I)	30
Formal Math Level 2 (e.g., Geometry)	16
Formal Math Level 3 (e.g., Algebra II)	18
Formal Math Level 4 (e.g., Algebra III, Pre-Calculus)	20
Formal Math Level 5 (e.g., Calculus, AP Calculus)	5
Probability and Statistics	2

With the exception of over-representation at the 3rd grade, science classes observed at the elementary level were well distributed among the grades. (See Table 7.) At the middle school level, General Science classes were the most likely to be observed and also the most likely to be taught in the United States. Observations at the high school level also generally mirror the prevalence of science course offerings in the nation (Weiss, et. al., 2001).

Table 7
Science Classes Observed

	Percent of Classes
Grades K–5	**(N=55)**
Kindergarten	9
1st Grade	13
2nd Grade	15
3rd Grade	25
4th Grade	18
5th Grade	11
Other (multi-grade) Elementary Science	9
Grades 6–8	**(N=64)**
General Science	75
Life Science	13
Earth Science	6
Physical Science	5
Integrated Science	2
Grades 9–12	**(N=61)**
1st Year Biology	21
2nd Year Biology (Advanced, AP)	11
1st Year Chemistry	15
2nd Year Chemistry (Advanced, AP)	3
1st Year Physical Science/Physics	25
Oceanography/Marine Science	2
1st Year Earth Science	7
Environmental Science	10
General/Coordinated/Integrated Science	7

Instrumentation for Observations and Interviews

As noted earlier, the *Inside the Classroom* study included data collected from both classroom observations and teacher interviews. Researchers were asked to take detailed field notes during the observations, including describing what the teacher and students were doing throughout the lesson, and recording the time various activities began and ended. They were asked to pay particular attention to certain aspects of the instruction, describing them in detail and including verbatim accounts of what transpired in these areas if possible. The selected focus areas included: the significance, accuracy, and developmental appropriateness of the mathematics/science content; the extent of intellectual engagement on the part of the students; the nature of the teacher questions and student responses; whether the lesson included appropriate sense-making/closure; and the extent to which the classroom culture encouraged all students to participate in the lesson.

The Teacher Interview

Following the observation, at a time convenient to the teacher such as a planning period or immediately after school, the researcher interviewed the teacher about the lesson using a fairly structured interview protocol. Researchers were asked to tape the interviews (with the approval of the teacher) for later transcription. (A copy of the Teacher Interview Protocol is included in Appendix A.)

Teachers were asked about the learning goals of the lesson (and the unit); the characteristics of the students in the class; and the instructional materials that were used to structure the lesson. They were also asked how well prepared they felt to teach the topic and to use the particular instructional strategies employed in the lesson. Finally, teachers were asked about the context in which they teach, and how that context influences how and what they teach, using the observed lesson as an example.

The Observation and Analytic Protocol

Researchers used their observation and interview field notes to complete a three-part "Observation and Analytic Protocol" which was then submitted to the HRI study coordinators. (A copy of the protocol is included in Appendix A.) Part One of the protocol focused on describing the instruction and assessing the quality of the observed lesson. Along with some basic descriptive information (e.g., subject, course title, and grade of the class), the researcher was asked to document the purpose of the lesson as described by the teacher, and how the class time was spent, including the number of minutes spent on instructional activities as opposed to "housekeeping," interruptions, and the like; and the percent of instructional time spent as a whole class, in pairs/small group work, and in individual work.

The majority of researcher effort was devoted to describing and assessing the quality of the observed lessons in each of four component areas: the lesson design; its implementation; the mathematics/science content; and the classroom culture. In each case, the researcher first rated the extent to which the lesson exhibited each of a number of characteristics of high quality instruction. For example, in the case of mathematics/science content, the observer rated the extent to which the content was significant and worthwhile; and the extent to which teacher-presented information was accurate; among other indicators.

After rating the individual indicators in a component area, the researcher was asked to provide a "synthesis rating" on a five-point scale, where 5 indicated the lesson was extremely reflective of current standards for mathematics/science education. The researcher was then asked to provide a brief description of the nature and quality of that particular component of the lesson, and to provide the rationale for the synthesis rating and evidence to support it, including examples/quotes illustrating the ratings of particular "focus indicators."

Following the ratings of the individual components of the lesson, the researcher was asked to consider the likely impact of the lesson as a whole on students' understanding of mathematics/science. Since the impact of a single lesson would be expected to be quite limited, researchers were asked to judge whether the lesson was likely to move students forward in each of a number of areas, to have a negative impact, or to have a neutral or mixed effect.

Areas of Potential Lesson Impact on Students

- Understanding of the discipline as a dynamic body of knowledge generated and enriched by investigation
- Understanding of important mathematics/science content
- Capacity to carry out their own inquiries
- Ability to generalize their learning to other contexts
- Self-confidence in doing mathematics/science
- Interest in/appreciation for the discipline

The final rating for each lesson was the overall "capsule rating," ranging from Level 1, "Ineffective Instruction," to Level 5, "Exemplary Instruction," based on the researcher's judgment of how likely the lesson was to enhance most students' understanding of the discipline and to develop their capacity to successfully "do" mathematics/science.

The researcher was then asked to provide a 1–2 page summary of the lesson and its quality, describing what happened in the lesson, and including enough rich detail that readers would get "a sense of having been there." Among the elements to be included were:

- Where the lesson fit in with the overall unit;
- The focus of the lesson;
- Instructional materials used;
- A synopsis of the structure and flow of the lesson;
- The nature and quality of lesson activities;
- The roles of the teacher and students in the intellectual work of the lesson; and
- The reasoning behind the capsule rating.

The second part of the Observation and Analytic Protocol asked the researcher to use the information provided in the teacher interview to document the extent to which each of a number of factors influenced the observed lesson. Within the policy domain, researchers used the teacher-provided information to document the extent to which state and district curriculum standards/frameworks; state and district science or mathematics tests/accountability systems; and the textbook/program designated for the class influenced the selection of topics, instructional materials, and/or pedagogy used in the lesson. In the area of support infrastructure, potential influences included the principal; parents/community; school board and district administration; teachers; and their professional development activities. The researcher also had the opportunity to document the influence of factors that were not specified in the interview protocol, but might have been mentioned by the teacher, e.g., national standards documents, school/district scheduling policies, and teacher evaluation systems.

This section of the protocol also asked the researchers to document the teacher's description of the students in the class, including the general ability level; the number for whom English is not their first language; and the number with learning disabilities and other special needs; and to describe how the student characteristics (cognitive abilities, learning styles, prior knowledge, attitudes towards mathematics/science, student absenteeism, and the like) may have influenced the selection of topics, instructional materials, and pedagogy for this lesson. A comparable section focused on the teacher, asking the researcher to use the interview data to describe how the teacher's background knowledge, skills, and attitudes may have influenced the lesson design. Also included in Part Two was the researcher's description of the physical environment of the classroom, including the size and "feel" of the room, the state of repair of the classroom facilities, and the availability of needed equipment and supplies.

The final section in Part Two of the protocol asked the researcher to consider how the various influences interacted, and to highlight those that were most salient in determining why the observed lesson was taught and how it was designed. Finally, Part Three asked the researcher to "put it all together," and to provide any additional information they wished to share that had not been requested in the protocol.

Researcher Training

Classroom observations were conducted by HRI staff along with a number of consultants selected for their knowledge of mathematics/science education and their expertise in conducting classroom observations. As noted earlier, the observation protocol used in this study was adapted from one developed by HRI for the evaluation of NSF's Local Systemic Change Initiative, and in most cases, the researchers had training and experience using that protocol in conducting classroom observations.

To ensure that all observers had a complete understanding of the purposes and procedures of the study, each researcher participated in a two-day training session conducted by the study coordinators. The research questions guiding the observations and interviews were reviewed, and the data collection instruments were introduced, along with an annotated guide to the Observation and Analytic Protocol that provided detailed definitions of the terms used in the protocol. Researchers then watched a series of videotaped mathematics and science lessons and read simulated interview transcripts, completed protocols and discussed their ratings. By the end of the training there was substantial agreement on ratings and on how to use the protocol to communicate the results of their observations and interviews.

Researchers were asked to send their first completed protocols to HRI as soon as possible after their first site visit. Two of the study coordinators reviewed the protocols—one looked at all of the mathematics protocols and the other at all of the science protocols—to ensure that the protocols were completed correctly, that the lessons were described in sufficient detail, and that the lesson ratings were consistent with the researcher's narrative descriptions. These initial protocols and others submitted throughout the study were returned to the researchers for additional detail and/or clarification as needed.

Data Collection

Once a school agreed to participate in the study, HRI identified a local contact to carry out the following tasks:

- Construct a list of mathematics and science teachers in the school;
- Serve as a liaison between sampled teachers and HRI;
- Help HRI plan an observation schedule for the school; and
- Troubleshoot any scheduling problems that arose while observers were on site.

In return, the local contact received a stipend of $200.

Observers typically spent three days on site, one day each at the elementary, middle, and high school. Each sampled teacher was observed for one class period. Later in the day, the observer interviewed the teacher using a structured protocol. In return for their participation, schools received a voucher for $200 ($50 per observed teacher) worth of mathematics and science materials.

Approximately one week after the observation, each teacher was mailed an abbreviated form of the questionnaire used in the 2000 National Survey of Science and Mathematics Education (Appendix A), allowing comparisons between results based on the observed sample and those based on the survey sample. Seventy-seven percent of observed teachers returned this questionnaire.

Data Analysis

Data from the completed Observation and Analytic Protocol were entered into a database for analysis. The following sections describe how the study team looked for patterns in the qualitative data, and the use of weighting procedures to ensure that the *Inside the Classroom* findings would be representative of mathematics and science classes throughout the United States.

Analysis of Qualitative Data

The research team read the observers' descriptions of the lesson designs to determine factors that distinguished designs judged to be effective from those judged to be ineffective. The same process was followed for each of the remaining component areas (implementation, mathematics/ science content, and culture) and for the final capsule descriptions of entire lessons. In all cases, there was no predetermined coding scheme; themes were developed as they emerged from the data.

As part of completing the observation protocol, field researchers had analyzed the teacher interview data and noted the factors that teachers said had influenced their selection of content, pedagogy, and instructional materials. The research team analyzed the evidence provided by the field researchers for each category, looking for themes in the nature of these influences. For example, teachers often talked about how the characteristics of the students in their classes influenced their instructional strategies. Themes within this category included addressing the needs of low ability, high ability, and heterogeneous groups as well as classes with high levels of absenteeism. It should be noted that it was difficult to separate pedagogy and instructional materials in these analyses. In interviews, teachers often discussed these lesson components as intertwined in their planning. Accordingly, pedagogy and instructional materials were combined into "instruction" in the analysis of these data.

Weighting of Quantitative Data

Data from the classroom observations and teacher interviews were weighted in order to yield unbiased estimates of all mathematics and science lessons in the nation. Each sampled teacher was assigned to a cell determined by the subject observed (mathematics vs. science), school urbanicity (rural vs. urban vs. suburban), and sample grade range (K–5 vs. 6–8 vs. 9–12). All sampled teachers in a cell were then given the same weight such that the sum of weights of the sampled teachers equaled the number of teachers in the nation in that cell. These weights were multiplied by the average number of science or mathematics classes taught by teachers in the nation. To avoid underestimating the standard errors used in tests of statistical significance, the weights were normalized, effectively returning the weighted N to the actual sample size.

Representativeness of the Classroom Data

As noted earlier, the 2000 National Survey of Science and Mathematics Education collected data from a large, nationally-representative sample of science and mathematics teachers. Teachers observed as part of *Inside the Classroom* completed a slightly shorter version of the questionnaire used in the National Survey, making possible a set of comparisons on the items that both groups answered.

Factor analysis of instructional practice items common to both the 2000 National Survey of Science and Mathematics Education and *Inside the Classroom* questionnaires was used to create a number of composite variables, which have the advantage of being more reliable than individual items. (Definitions of all composite variables and a description of how composite scores were computed are included in Appendix B.)

Data in Table 8 indicate that national estimates based on observed teachers are strikingly similar to those based on the National Survey in terms of the emphasis teachers give to different types of instructional objectives.

Table 8
Mean Scores on Composite Variables Related to Instructional Objectives in Mathematics and Science

	Estimates Based on:			
	Observed		National	
	Mean	S.D.	Mean	S.D.
Mathematics Objectives				
Mathematics Reasoning	89	12.7	90	12.6
Basic Mathematics Skills	72	20.2	72	21.6
Nature of Mathematics	55	17.3	57	19.9
Science Objectives				
Science Content	82	12.5	80	15.2
Nature of Science	54	21.7	56	22.0

As can be seen in Table 9, there were no substantial differences in estimates of instructional activities in mathematics. In science, national estimates based on the observed teachers are slightly higher than those based on the National Survey with regard to use of laboratory activities; all other estimates were equivalent to each other.

Table 9
Mean Scores on Composite Variables Related to Instructional Activities in Mathematics and Science

	Estimates Based on:			
	Observed		National	
	Mean	S.D.	Mean	S.D.
Mathematics				
Use of Traditional Practices	73	16.8	73	17.1
Use of Strategies to Develop Students' Ability to Communicate Ideas	73	15.5	73	14.3
Use of Calculators/Computers for Investigation	30	18.7	29	19.3
Science				
Use of Strategies to Develop Students' Ability to Communicate Ideas	72	13.5	70	15.8
Use of Laboratory Activities	71	17.4	65	17.7
Use of Traditional Practices	55	20.8	55	21.2
Use of Computers	19	17.4	16	16.7

Finally, an item on the questionnaire asked teachers to indicate the types of activities included in the lesson they taught just prior to completing the survey. Responses are shown in Tables 10 and 11. In mathematics, data from observed teachers appear to overestimate the frequency of small group work, while underestimating the occurrence of students reading about mathematics. In science, data from observed teachers overestimate the frequency of students doing hands-on/laboratory activities. In the vast majority of instructional activities, however, estimates based on the observed teachers and on the National Survey are essentially the same.

Table 10
Activities Occurring in the Most Recent Mathematics Lesson

	Estimates of Percent of Classes Based on:	
	Observed	National
Discussion	89	90
Students completing textbook/worksheet problems	78	79
Lecture	74	77
Students working in small groups	69	53
Students doing hands-on/manipulative activities	57	49
Students using calculators	34	34
Students reading about mathematics	12	20
Test or quiz	9	14
Students using computers	9	5
Students using technologies	6	2

Table 11
Activities Occurring in the Most Recent Science Lesson

	Estimates of Percent of Classes Based on:	
	Observed	**National**
Discussion	87	86
Lecture	67	62
Students working in small groups	59	55
Students doing hands-on/laboratory activities	63	54
Students completing textbook/worksheet problems	53	48
Students reading about science	36	38
Students using calculators	7	9
Test or quiz	7	9
Students using technologies	12	7
Students using computers	10	6

The fact that weighted estimates of the frequency of classroom practices based on *Inside the Classroom* data are generally equivalent to those based on the National Survey sample lends support to the idea that estimates of quality based on the observation data are an accurate depiction of what happens in the nation's mathematics and science classes.