Technical Report and User Guide for the Program for International Student Assessment (PISA)

2012 Data Files and Database with U.S.-Specific Variables

ies NATIONAL CENTER FOR EDUCATION STATISTICS
Institute of Education Sciences

Technical Report and User Guide for the Program for International Student Assessment (PISA)

2012 Data Files and Database with U.S.-Specific Variables

April 2014

David Kastberg
Stephen Roey
Nita Lemanski
Jessica Ying Chan
Gordon Murray
Westat

NCES 2014-025
U.S. DEPARTMENT OF EDUCATION

ies NATIONAL CENTER FOR EDUCATION STATISTICS
Institute of Education Sciences

U.S. Department of Education
Arne Duncan
Secretary

Institute of Education Sciences
John Q. Easton
Director

National Center for Education Statistics
John Q. Easton
Acting Commissioner

The National Center for Education Statistics (NCES) is the primary federal entity for collecting, analyzing, and reporting data related to education in the United States and other nations. It fulfills a congressional mandate to collect, collate, analyze, and report full and complete statistics on the condition of education in the United States; conduct and publish reports and specialized analyses of the meaning and significance of such statistics; assist state and local education agencies in improving their statistical systems; and review and report on education activities in foreign countries.

NCES activities are designed to address high-priority education data needs; provide consistent, reliable, complete, and accurate indicators of education status and trends; and report timely, useful, and high-quality data to the U.S. Department of Education, the Congress, the states, other education policymakers, practitioners, data users, and the general public. Unless specifically noted, all information contained herein is in the public domain.

We strive to make our products available in a variety of formats and in language that is appropriate to a variety of audiences. You, as our customer, are the best judge of our success in communicating information effectively. If you have any comments or suggestions about this or any other NCES product or report, we would like to hear from you. Please direct your comments to:

NCES, IES, U.S. Department of Education
1990 K Street NW
Washington, DC 20006-5651

April 2014

The NCES Home Page address is http://nces.ed.gov.
The NCES Publications and Products address is http://nces.ed.gov/pubsearch.

This publication is only available online. To download, view, and print the report as a PDF file, go to the NCES Publications and Products address shown above.

This report was prepared for the National Center for Education Statistics under Contract No. ED-IES-10-C-0047 with Westat. Mention of trade names, commercial products, or organizations does not imply endorsement by the U.S. Government.

Suggested Citation
Kastberg, D., Roey, S., Lemanski, N., Chan, J.Y., Murray, G. (2014). *Technical Report and User Guide for the Program for International Student Assessment (PISA)*. (NCES 2014-025). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved [date] from http://nces.ed.gov/pubsearch.

For ordering information on this report, write to
U.S. Department of Education
ED Pubs
P.O. Box 22207
Alexandria, VA 22304
or call toll free 1-877-4-ED-Pubs or order online at http://www.edpubs.gov.

Content Contact
Holly Xie
(202) 502-7314
holly.xie@ed.gov

Contents

Contents (continued)

List of Appendixes

Contents (continued)

List of Tables

Contents (continued)

List of Tables (continued)

Contents (continued)

List of Tables (continued)

Contents (continued)

List of Tables (continued)

List of Figures

Contents (continued)

1. Overview of PISA 2012

1.1 Introduction

The Program for International Student Assessment (PISA) is a system of international assessments that focuses on 15-year-old students. PISA core assessments measure the performance of 15-year-old students in mathematics, science, and reading literacy every 3 years. PISA also gathers information from students about their learning environment, educational experiences, and attitudes towards education. In addition, school principals provide information on school context and population. Analyses of PISA data provide information on the relative performance of students and on the differences between student environments, attitudes, and experiences within and across countries.

PISA, which began in 2000, is conducted every 3 years. Each PISA data collection cycle assesses one of three core subject areas in depth (considered the major domain), although all three core subjects are assessed in each cycle (the other two subjects are considered minor subject areas for that assessment year). Assessing all three subjects every 3 years allows countries to have a consistent source of achievement data in each of the three subjects while rotating one area as the primary focus over the years. In 2012 mathematics was the major domain, as it was during the 2003 cycle. The majority of the PISA 2012 results provide analogous information for mathematics, science, and reading. However, because mathematics was the major domain in 2012, more in-depth information is available for mathematics. For example, process and content subscores are provided for mathematics, but not for reading or science. In 2012 and previous years, all three subjects were assessed primarily through a paper-and-pencil assessment. However, additional computer-based assessments in mathematics, reading, and problem solving were introduced in 2012, as was a financial literacy assessment, all of which were optional for countries. PISA 2012 also collected information on students' backgrounds, attitudes towards mathematics, and learning strategies. School principals provided information on the school's demographics and learning environment. In 2012, 65 education systems including the United States, participated in PISA.

Figure 1. PISA administration cycle

Assessment year	2000	2003	2006	2009	2012	2015
Subjects assessed	READING Mathematics Science	Reading MATHEMATICS Science Problem solving	Reading Mathematics SCIENCE	READING Mathematics Science	Reading MATHEMATICS Science Problem solving	Reading Mathematics SCIENCE

NOTE: Reading, mathematics, and science literacy are all assessed in each assessment cycle of the Program for International Student Assessment (PISA). A separate problem-solving assessment was administered in 2003 and 2012. The subject in capital letters is the major domain for that cycle.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

The PISA 2012 main study in the United States consisted of four major elements: (1) a 2-hour student assessment of reading literacy, mathematics literacy, and science literacy; (2) a student questionnaire that required approximately 30 minutes to complete; (3) a school questionnaire to be completed by the principal or designee that also required approximately 30 minutes to complete; and (4) a 40-minute computer-based assessment that was completed by a subset of students who also took the paper-based assessment. The optional financial literacy assessment was included in the main paper-based assessment for countries that opted to participate (the United States participated in the financial literacy assessment in 2012). In addition to the United States, three states—Connecticut, Florida, and Massachusetts—also participated as separate education systems. The results for these three states are reported separately from the U.S. national findings. The 2012 main study for the states consisted of the same paper-based mathematics, reading, and science assessments as the 2012 main study for the United States. However, unlike the United States, the three states did not participate in the optional computer-based assessment or financial literacy assessment.

1.2 What PISA Measures

PISA assesses the application of knowledge in mathematics, science, and reading literacy to problems within a real-life context (OECD 1999). PISA's focus on 15-year-olds allows countries to compare learning outcomes as students near the end of compulsory schooling and seeks to answer the question, "What knowledge and skills do students have at age 15?" Thus, PISA does not focus explicitly on curricular outcomes and uses the term "literacy" in each subject area to indicate its broad focus on the application of knowledge and skills. For example, when assessing mathematics, PISA examines how well 15-year-old students can understand, use, and reflect on mathematics for a variety of real-life problems and settings that they may not encounter in the classroom. Scores on the PISA scales represent skill levels

along a continuum of literacy skills. PISA also provides ranges of proficiency levels for each subject area which describe what a student is typically capable of at each level (OECD 2006).

The PISA frameworks explain the theoretical underpinnings of the mathematics, science, and reading assessments and are described in detail in the *PISA 2012 Assessment and Analytical Framework* (OECD 2013a). The reading and science frameworks in the 2012 administration of PISA did not change from 2009. However, the mathematics framework was updated for the 2012 administration of PISA. The revised framework is intended to clarify the mathematics relevant to 15-year-old students, while ensuring that the items developed remain set in meaningful and authentic contexts, and defines the mathematical processes in which students engage as they solve problems. More specifically, the PISA mathematics assessment looks at four mathematical content categories and three mathematical process categories. The mathematical content categories include change and relationship, space and shape, quantity, and uncertainty and data. The mathematical process categories include formulate, employ, and interpret. For more detail on the frameworks, please see the *PISA 2012 Assessment and Analytical Framework* (OECD 2013a).

To provide valid estimates of an education system's population of 15-year-old students, PISA tests a sample of students that represents the full population of 15-year-old students in each education system. For all education systems, this population is defined as all 15-year-olds attending school, in grade 7 and higher. For the PISA 2012 assessment, 12 percent of the U.S. students were enrolled in the ninth grade, 71 percent were enrolled in the tenth grade, and another 17 percent were enrolled in the eleventh grade. In addition, the PISA target population includes students in all programs of study (e.g., academic, vocational). A minimum of 4,500 students from at least 150 schools was required in each education system. Countries were only allowed to exclude schools for approved reasons (e.g., schools in remote regions, special education schools). Similarly, schools were only allowed to exclude students for approved reasons (e.g., students with severe physical disabilities, students with intellectual disabilities, students with insufficient language experience). These restrictions allowed PISA to be as inclusive as possible. Overall estimated exclusions (including both school and student exclusions) were to be under 5 percent of the PISA target population. (For more information on permissible exclusions, see chapter 2; for details on the coverage of student populations, see OECD 2013b).

In addition to PISA, the United States also participates in several other student achievement assessments. These assessments include the National Assessment of Educational Progress (NAEP), Trends in International Mathematics and Science Study (TIMSS), and Progress in International Reading Literacy Study (PIRLS). These assessments differ from PISA in terms of purpose, scope, and design. For instance, NAEP tests 4th, 8th, and 12th grades in 12 different subject areas, while PISA tests 15-year-olds and

focuses on 3 different subject areas. While PISA allows countries to monitor their relative performance with other education systems, NAEP is a national assessment used to monitor trends in achievement specific to U.S. students only.

Although NAEP is a U.S.-only study, TIMSS and PIRLS provide an additional international perspective on the mathematics, science, and reading achievement of U.S. students. TIMSS allows the United States to compare the mathematics and science achievement of its 4th- and 8th-grade students with other education systems while PIRLS allows the United States to compare the reading achievement of its 4th-grade students with other education systems. However, both TIMSS and PIRLS still differ from PISA in that they are both curriculum-based. Unlike TIMSS and PIRLS, PISA does not focus on the link between achievement and classroom practices, but rather places emphasis on learning outside of school curricula that helps students apply processes and content to real-world context.

1.3 PISA 2012 Administration

PISA is coordinated by the Organization for Economic Cooperation and Development (OECD). PISA 2012 was carried out by the PISA International Consortium, led by the Australian Council for Educational Research (ACER) through a contract with the OECD. Technical standards and a series of manuals provided standardized procedures for all countries to follow. Sixty-five education systems participated in PISA in 2012. More than 490,000 students participated worldwide.

The National Center for Education Statistics (NCES) was responsible for the U.S. implementation of PISA. PISA 2012 data collection and associated tasks were carried out through a contract with Westat, Inc. and its subcontractor, Pearson PLC. Westat was responsible for project coordination, preparation of recruitment materials, and adaptation of the international instruments. Westat was also responsible for school and student sampling, recruitment of schools and students, and data collection, analysis, and reporting. Pearson was responsible for the printing of materials, data entry, and coding and scoring. The key personnel involved in data collection included a school coordinator (a school staff member designated by the principal), a test administrator, and one to two assistant administrators (both the test administrator and assistant administrators were Westat employees). Field managers and a field director (also Westat employees) oversaw data collection activities. Data collection occurred from October 2 through November 30, 2012, and the final report and data were released on December 3, 2013. In 2012, a total of 6,111 U.S. students and 162 U.S. schools participated. One caveat is that one school that met the OECD criteria for inclusion into the database did not meet the criteria to be included in response rate calculations, due to low student participation rate. This is reflected in the section on response rates later in this report.

Westat, and not NCES, was responsible for the implementation of PISA in the participating states of Connecticut, Florida, and Massachusetts. However, implementation was carried out in a similar manner. The main differences between the U.S. and states' implementation of PISA concerned the nonparticipation of states in the optional financial literacy and computer-based assessments. In 2012, a total of 1,896 students participated in 54 Florida schools, 1,697 students participated in 50 Connecticut schools, and 1,723 students participated in 49 Massachusetts schools.

1.4 Organization of This Document

This technical report and user guide is designed to provide researchers with an overview of the design and implementation of PISA 2012, as well as with information on how to access the PISA 2012 data. This information is meant to supplement that presented in OECD publications by describing those aspects of PISA 2012 that are unique to the United States. Chapter 2 provides information about sampling requirements and sampling in the United States. Chapter 3 describes participation rates at the school and student level. Chapter 4 describes the details of how schools and students were recruited, and chapter 5 provides information on instrument development. Chapter 6 describes field operations used for collecting data, and chapter 7 provides detail concerning various aspects of data management. Chapter 8 describes international activities related to data processing, scaling, and weighting. Chapter 9 describes the data available from both international and U.S. sources, and chapter 10 discusses some special issues involved in analyzing the PISA 2012 data.

2. Sampling

The PISA 2012 U.S. sample for the main study was selected using a two-stage design—a sample of schools and a sample of students within sampled schools. The two-stage sample design was implemented to attain an approximately self-weighting sample of students where each 15-year-old student in the United States had an equal probability of being selected for the study.

2.1 International Requirements

To provide valid estimates of student achievement and characteristics, the sample of PISA students had to be selected in a way that represented the full population of 15-year-old students in each education system. The international desired population in each education system consisted of 15-year-olds attending school, in grade 7 and higher. A minimum of 4,500 students from a minimum of 150 schools was required in each education system.

The international guidelines specified that within schools, a sample of 35 students was to be selected in an equal probability sample unless fewer than 35 students age 15 were available (in which case all students were selected). International standards required that students in the sample be 15 years and 3 months to 16 years and 2 months at the beginning of the testing period. In the United States, sampled students were born between July 1, 1996, and June 30, 1997.

The school response rate target was 85 percent for all education systems. A minimum of 65 percent of schools from the original sample of schools were required to participate for an education system's data to be included in the international database. Education systems were allowed to use substitute schools (selected during the sampling process) to increase the response rate once the 65 percent benchmark had been reached.

PISA 2012 also required a minimum participation rate of 80 percent of sampled students from schools within each education system. A student was considered to be a participant if he or she participated in the first testing session or a follow-up or makeup testing session. Data from education systems not meeting this requirement could be excluded from international reports.

PISA's intent was to be as inclusive as possible. Guidelines allowed for schools to be excluded for approved reasons (for example, remote regions, very small schools, or special education schools). Schools used the following international guidelines on student exclusions:

Students with functional disabilities. These were students with a moderate to severe permanent physical disability such that they could not perform in the PISA testing environment.

Students with intellectual disabilities. These were students with a mental or emotional disability and who had been tested as cognitively delayed or who were considered in the professional opinion of qualified staff to be cognitively delayed such that they could not perform in the PISA testing environment.

Students with insufficient language experience. These were students who met the three criteria of not being native speakers in the assessment language, having limited proficiency in the assessment language, and receiving less than 1 year of instruction in the assessment language

Overall estimated exclusions including both school and student exclusions were to be under 5 percent of the PISA target population.

2.2 School Sampling in the United States

The 2012 PISA school sample was drawn for the United States in July 2011. The sample design was developed to retain most of the properties of the 2009 national sample, and to follow international requirements as described in the *PISA 2012 Technical Report* (OECD forthcoming). The school universe includes all educational institutions that serve PISA-eligible students at age 15. For the United States, this included all public and private schools with grades 7 or higher that operate in the 50 states and the District of Columbia.

2.2.1 School Sampling Frame

The U.S. school sampling frame was developed from two national databases in the National Center for Education Statistics—public schools in the Common Core of Data (CCD, http://nces.ed.gov/ccd) and private schools in the Private School Universe Survey (PSS, http://nces.ed.gov/surveys/pss). These sources provide full coverage of all PISA-eligible students in the education system in the United States.

The PISA 2012 school frame was constructed using the 2008-2009 CCD and the 2009-2010 PSS, the most current data at the time of the PISA frame construction.

Eligible schools in the PISA 2012 school frame included 66,169 schools. These included schools operating in the 50 states and the District of Columbia, schools with grade 7 or higher, ungraded schools, Department of Defense (DoD) domestic schools, Bureau of Indian Affairs (BIA) schools, special education schools, vocational education schools, as well as schools in hospitals and treatment and detention centers. Schools in Puerto Rico and U.S. territories, DoD schools overseas, adult education institutions with no PISA-eligible students, and non-education institutions (e.g., homeschools, correspondence schools) were ineligible for the study.

2.2.1.a Enrollment of PISA-Eligible Students (ENR)

The number of PISA-eligible students (ENR) was estimated using grade enrollment and the proportion of 15-year-olds in each grade. Student enrollment was the reported enrollment for public schools and the average enrollment per grade for private schools. Missing enrollment data by grade were imputed using the average enrollment for the school or a minimum size of 20 students. For ungraded schools, the ENR was set at 14 students.

The percentage of 15-year-olds in each grade was estimated using the observed distribution of age-eligible students in PISA 2009 (Fleischman et al. 2010, table 2, p. 4). Table 1 shows the percentage distribution of ENR students by grade in PISA 2009 and the student enrollment, estimated number ENR, and percentage distribution of ENR students in the PISA 2012 school frame. Most 15-year-olds in the United States were high school students—68.5 percent in 10th grade, 20.3 percent in 11th grade, 10.9 percent in 9th grade, and 0.1 percent in 12th grade. Less than 1 percent of them were middle school students—0.1 percent in 8th grade and 0.1 percent in 7th grade.

For each school in the PISA 2012 school frame, the estimated ENR for each grade was a product of the student enrollment and the percentage ENR in PISA 2009. For example, for a school with an enrollment of 100 students in grade 10, the estimated ENR was 68.5 students. Likewise for a school with 100 students in grade 11, the estimated ENR was 20.3 students. For each school, the total ENR was the sum of the ENR in grades 7 through 12.

Table 1. Percentage of PISA-eligible students in 2009 and student enrollment, number, and percentage of PISA-eligible students in PISA 2012, by grade

	PISA 2009[1]	PISA 2012 School Frame		
Grade	Percent ENR	Number of students enrolled	Number ENR	Percent ENR
Total	100.0	24,266,307	4,062,052	100.0
Grade 7	0.1	3,997,449	4,062	0.1
Grade 8	0.1	3,984,921	4,062	0.1
Grade 9	10.9	4,070,005	442,764	10.9
Grade 10	68.5	4,039,948	2,782,506	68.5
Grade 11	20.3	4,087,222	824,596	20.3
Grade 12	0.1	4,086,762	4,062	0.1

[1]Highlights from PISA2009: Performance of U.S. 15-Year Old Students in Reading, Mathematics and Science Literacy in an International Context, table 2.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

The total estimated number of ENR students in the PISA 2012 school frame was 4,062,052 students. The Census population estimate of 15-year-old children during the 2009-2010 academic year was 3,985,714 children as of June, 2011 (http://www.census.gov/popest/data/intercensal/national/nat2010.html). The ENR estimated from enrollment data was 102 percent of the Census estimate. Since enrollment data were not reported by age, the Census estimate is a more reliable data source for the 15-year-old population in the United States.

For comparison, the percentage ENR in PISA 2012 was computed using the ENR by grade relative to the total ENR summed across grades in the school frame. This percentage distribution is fairly consistent with the distribution observed in PISA 2009.

2.2.1.b School Exclusions

A small fraction of PISA eligible schools were excluded in the United States because administration of the PISA assessment within these schools would not be feasible. The excluded schools were special education schools for students with physical disabilities, schools in hospitals, training centers, and detention centers. A total of 1,092 schools were excluded from sampling. The student loss as a result of these exclusions was estimated at 12,405 students, or 0.30 percent of the ENR.

2.2.1.c Stratification

Stratification was used for sample efficiency and to follow the sample design for the High School Longitudinal Survey (HSLS) 2012, an education survey to be held in the United States around the same period as PISA 2012. The explicit strata were formed by the following variables, shown in alphabetical order:

- Census region—Northeast, Midwest, South, and West; and
- School type—indicates whether the school is under public control (operated by publicly elected or appointed officials) or private control (operated by privately elected or appointed officials and derives its major source of funds from private sources).

Within each stratum, schools were sorted by

- gender;
- grade range—schools with 7th or 8th grade as highest grade, schools with 9th grade as highest grade, schools with grades 9 through 12 as highest grade, schools with grades 10 through 12 as highest grade, and all other schools;
- locality—urban-centric locale code, i.e., city, suburb, town, rural;
- race/ethnicity status— student population in the school is “15 percent and above” or “below 15 percent” Black, Hispanic, Asian, Hawaiian/Pacific Islander, American Indian and Alaska Native, and multiracial students;
- state; and
- estimated grade enrollment.

The following tables show the total number and percentage of ENR students and schools in the PISA 2012 U.S. school frame by Census region (table 2), school type (table 3), grade range (table 4), locality (table 5), race/ethnicity status (table 6), and by school type and region (table 7).

Table 2. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by region: 2012

Region	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	66,169	100.0
Northeast	720,399	17.7	12,221	18.5
Midwest	913,108	22.5	17,678	26.7
South	1,443,798	35.5	21,183	32.0
West	984,747	24.2	15,087	22.8

NOTE: Detail may not sum to totals because of rounding. Region of country is based on Census definitions.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 3. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by school type: 2012

School type	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	66,169	100.0
Public	3,724,960	91.7	44,954	67.9
Private	337,093	8.3	21,215	32.1

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 4. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by grade range: 2012

Grade range	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	66,169	100.0
Highest grade 07 or 08	7,408	0.2	31,533	47.7
Highest grade 09	22,918	0.6	1,411	2.1
High schools: Grades 09-12	3,408,863	83.9	16,449	24.9
High schools: Grades 10-12	167,226	4.1	1,688	2.6
Other	455,638	11.2	15,088	22.8

NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 5. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by locality: 2012

Locality	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	66,169	100.0
City	1,223,303	30.1	18,375	27.8
Suburb	1,400,701	34.5	17,398	26.3
Town	470,204	11.6	8,337	12.6
Rural	967,845	23.8	22,059	33.3

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 6. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by race/ethnicity status: 2012

Race/ethnicity status	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	66,169	100.0
15 percent and above	2,889,037	71.1	40,779	61.6
Below 15 percent	1,173,015	28.9	25,390	38.4

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 7. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by school type and region: 2012

School type	Region	ENR students	Percent	Schools	Percent
Total		4,062,052	100.0	66,169	100.0
Public	Northeast	626,347	15.4	6,942	10.5
Public	Midwest	842,461	20.7	12,404	18.8
Public	South	1,334,790	32.9	14,682	22.2
Public	West	921,362	22.7	10,926	16.5
Private	Northeast	94,051	2.3	5,279	8.0
Private	Midwest	70,647	1.7	5,274	8.0
Private	South	109,009	2.7	6,501	9.8
Private	West	63,385	1.6	4,161	6.3

NOTE: Detail may not sum to totals because of rounding. Region of country is based on Census definitions.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

2.2.2 School Sample

The U.S. sample used a two-stage design—a sample of schools and then students within sampled schools. The school selection probability was configured such that all enrolled age-eligible (ENR) students in the United States would have approximately equal probability of being selected in the sample. The target cluster size (TCS) for the U.S. sample was 50 ENR students in each school. This means that in each large school with at least 50 ENR students, the sample target is to sample with equal probability 50 ENR students at random. In each small school with fewer than 50 students, the target is to sample all ENR students with certainty.

The Australian Council for Educational Research (ACER) selected the U.S. school sample for PISA 2012. Detailed information on sampling steps can be found in the *PISA 2012 Technical Report* (OECD forthcoming). Very briefly, school sampling involved stratification, sample allocation by stratum, small school analysis, and selecting a systematic sample with probability proportional to a measure of size based on the TCS. For the small school analysis in 2012, the very small schools (VSS) were split into two groups, VSS1 and VSS2, as described below.

Table 8 shows the number of schools in the U.S. sample by stratum. The sample included 240 schools—19 very small schools (VSS1, ENR<=2), 16 very small schools (VSS2, 2<ENR<25), 11 moderately small schools (25<=ENR<50), and 194 large schools (ENR>=50). The sample allocation by stratum was proportional to the distribution of ENR students in each stratum. For the U.S. school sample, very small schools (VSS1) were undersampled by a factor of 4 and very small schools (VSS2) were undersampled by a factor of 2. Overlap control options were used to minimize sample overlap with the HSLS 2012 survey. The overlap control procedure is described in more detail later in this chapter.

2.2.2.a Measure of Size and Small Schools

The measure of size (MOS) for school sampling was set equal to the TCS for large schools and for moderately small schools. It was set to TCS/4 for very small schools because of the relatively large proportion of small schools in the U.S. (about 4 percent of ENR students were in VSS). The VSS schools were undersampled to reduce the administrative burden of handling small schools. Table 9 shows the estimated student yield from the U.S. sample by stratum and the parameters used to estimate student yield.

Table 8. Number of schools in the PISA U.S. school sample, by sampling stratum: 2012

Stratum		All schools	Very small schools (VSS1)	Very small schools (VSS2)	Moderately small schools (MSS)	Large schools
Total		240	19	16	11	194
Public	Northeast	32	0	0	0	32
Public	Midwest	49	4	2	3	40
Public	South	74	4	2	2	65
Public	West	52	3	2	3	44
Private	Northeast	9	2	2	1	4
Private	Midwest	9	3	2	1	3
Private	South	11	2	4	1	4
Private	West	4	1	2	0	2

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 9. Estimated student yield and estimation parameters for PISA U.S. school sample, by sampling stratum: 2012

Stratum		Estimated student yield	Proportion ENR from school					Mean ENR		
			VSS1 P1	VSS2 P2	MSS Q	Large R	Factor L= 1+ P/4	VSS2 (V1ENR)	VSS2 (V2ENR)	MSS (MENR)
Total		10,280	0.2	3.5	4.0	92.2	1.0192	0.3	11.6	36.5
Public	Northeast	1,600	0.2	0.7	1.6	97.5	1.0000	0.0	0.0	0.0
Public	Midwest	2,140	0.2	2.8	5.0	92.1	1.0152	0.3	14.0	36.9
Public	South	3,351	0.2	1.6	2.7	95.5	1.0096	0.4	12.3	37.2
Public	West	2,333	0.2	2.4	4.0	93.4	1.0137	0.4	11.9	35.9
Private	Northeast	259	0.4	17.9	9.4	72.3	1.0924	0.1	11.5	36.1
Private	Midwest	208	0.5	15.4	11.2	72.9	1.0808	0.1	10.4	37.3
Private	South	277	0.6	26.3	14.7	58.4	1.1357	0.2	10.4	35.2
Private	West	121	0.6	22.8	9.1	67.5	1.1189	0.2	10.4	34.8

NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

The *PISA 2012 Technical Report* (OECD forthcoming) shows the method for conducting the small school analyses and calculating the estimated student yield. For example, in stratum 2—public schools in the Midwest region—the percentage of ENR was *P1*= 0.2 percent in very small schools (VSS1), *P2*= 2.8 percent in very small schools (VSS2), *Q*= 5.0 percent in moderately small schools (MSS), and *R*= 92.1 percent in large schools. The small school sampling factor was *L= 1+ P/4*= 1.0152. The mean ENR was 0.3 for very small schools (V1ENR), 14.0 for very small schools (V2ENR), 36.9 for moderately small

schools (MENR), and 50 for large schools. The sample size allocation in this stratum was 49 schools—4 VSS1, 2 VSS2, 3 MSS, and 40 large schools. The number of students to sample from these schools was estimated by the product of the number of sampled schools and the mean ENR summed across the three school size groups: (4*0.3) (2*14.0) + (3*36.9) + (40*50)= 2,140 students. The total estimated student yield summed across the eight strata was 12,280 students.

2.2.2.b Overlap Control with HSLS 2012

The HSLS 2012 was held in the United States over the 2012 academic year, the same as PISA 2012. The school sample for the HSLS was already drawn, and school IDs for the sampled schools were made available to implement the overlap control method. The HSLS school frame included public schools only, not all of them were on the PISA school frame.

PISA adopts a modification of the Keyfitz (1951) approach for overlap control. The conditional probability of selection into PISA was determined to minimize the overlap between the two surveys. The *PISA 2012 Technical Report* (OECD forthcoming) describes this procedure in more detail. No PISA sampled schools overlapped with any HSLS schools.

2.2.2.c Substitute Schools

The *PISA 2012 Technical Report* describes the use of substitute schools for sampled schools that refused participation (OECD forthcoming). Although efforts were made to secure the participation of all schools selected, it was anticipated that not all schools would choose to participate. Therefore, as each school was selected in the sample, the two neighboring schools in the sampling frame were designated as substitute schools. The first school following the sample school was the first substitute and the first school preceding it was the second substitute. If an original school refused to participate, the first substitute was then contacted. If that school also refused to participate, the second substitute was then contacted.

There were several constraints on the assignment of substitutes. One sampled school was not allowed to be a substitute for another, and a given school could not be assigned to be a substitute for more than one sampled school. Furthermore, substitutes were required to be in the same explicit stratum as the sampled school. If the sampled school was the first or last school in the stratum, then the second school following or preceding the sampled school was identified as the substitute. If the first substitute school did not have the same implicit stratification values as the sampled school, the first and second substitute schools could

be switched. Under these rules, it was possible to identify two substitutes for each sampled school. An additional constraint was the overlap with HSLS schools. If any PISA substitute school overlapped with a HSLS school, the substitute would not be contacted for PISA. There were no such schools.

2.2.2.d Tabulations Within Subgroups for Frame and Sample

This section provides an overview of the frame and sample distribution by each of the stratification variables. Each table shows the total number and percentage of ENR students in the sampling frame (data shown in tables 2 through 7) and the total number and percentage of schools in the PISA 2012 school sample. By each stratification variable, the tables are—school type (table 10), Census region (table 11), grade range (table 12), locality (table 13), race/ethnicity status (table 14), and by school type and region (table 15).

Table 10. Number and percentage of students and schools included in the PISA U.S. school sample, by school type: 2012

	Frame		Sample	
School type	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	240	100.0
Public	3,724,960	91.7	207	86.2
Private	337,093	8.3	33	13.8

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 11. Number and percentage of students and schools included in the PISA U.S. school sample, by region: 2012

	Frame		Sample	
Region	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	240	100.0
Northeast	720,399	17.7	41	17.1
Midwest	913,108	22.5	58	24.2
South	1,443,798	35.5	85	35.4
West	984,747	24.2	56	23.3

NOTE: Detail may not sum to totals because of rounding. Region of country is based on Census definitions.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 12. Number and percentage of students and schools included in the PISA U.S. school sample, by grade range: 2012

	Frame		Sample	
Grade range	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	240	100.0
Highest grade 07 or 08	7,408	0.2	27	11.2
Highest grade 09	22,918	0.6	1	0.4
High schools: Grades 09-12	3,408,863	83.9	168	70.0
High schools: Grades 10-12	167,226	4.1	9	3.8
Other	455,638	11.2	35	14.6

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 13. Number and percentage of students and schools included in the PISA U.S. school sample, by locality: 2012

	Frame		Sample	
Locality	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	240	100.0
City	1,223,303	30.1	70	29.2
Suburb	1,400,701	34.5	82	34.2
Town	470,204	11.6	26	10.8
Rural	967,845	23.8	62	25.8

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 14. Number and percentage of students and schools included in the PISA U.S. school sample, by race/ethnicity status: 2012

	Frame		Sample	
Race/ethnicity status	ENR students	Percent	Schools	Percent
Total	4,062,052	100.0	240	100.0
15 percent and above	2,889,037	71.1	168	70.0
Below 15 percent	1,173,015	28.9	72	30.0

SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table 15. Number and percentage of students and schools included in the PISA U.S. school sample, by school type and region: 2012

School type	Region	Frame		Sample	
		ENR students	Percent	Schools	Percent
Total		4,062,052	100.0	240	100.0
Public	Northeast	626,347	15.4	32	13.3
Public	Midwest	842,461	20.7	49	20.4
Public	South	1,334,790	32.9	74	30.8
Public	West	921,362	22.7	52	21.7
Private	Northeast	94,051	2.3	9	3.8
Private	Midwest	70,647	1.7	9	3.8
Private	South	109,009	2.7	11	4.6
Private	West	63,385	1.6	4	1.7

NOTE: Detail may not sum to totals because of rounding. Region of country is based on Census definitions.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

2.2.2.e State School Samples

The state school samples were selected in Connecticut, Florida, and Massachusetts in public schools only. The school frame was identical to the national frame of public schools in those states. The rest of the design was similar to the national design where possible. There were no explicit strata, as the national strata did not apply to state samples. The frame was again implicitly stratified by grade range, locality, high/low race/ethnicity status, gender, and student enrollment. The MOS for each school was the same as in the national design. Substitute schools were assigned using the same procedure.

Each state sample was selected using a version of the Keyfitz procedure (Keyfitz 1951); Chowdhury, Chu, and Kaufman (2001) have described the implementation of the procedure to minimize overlap between one or more surveys. Ideally, the state samples would not include the schools that were previously selected as part of the PISA national samples. By following the Keyfitz procedure outlined in table 2 of Chowdhury, Chu, and Kaufman, the procedure allowed us to minimize the overlap with the PISA national and HSLS samples. By minimizing the overlap with the national sample, the assessed students could be included in only one study with proper probabilities. This was accomplished by partitioning the frame into the following four groups shown in order as in table 2 of the paper. The four groups were as follows:

1. Schools not selected for either the PISA national or HSLS samples;
2. Schools selected for the PISA national sample and not HSLS sample;

3. Schools selected for the HSLS sample and not PISA national sample; and
4. Schools selected for the PISA national and HSLS samples.

With this design, the method accomplished the goal of selecting the entire state samples from group 1 and none from the other groups. For the schools in groups 3 and 4, this was due to the sum of the school's probabilities of being selected for the state sample and the national sample was always less than one. In that case, their conditional probabilities are zero. Tables for the state samples are provided in appendix B.

2.3 Student Sampling in the United States

To achieve the required student yield of 35 assessed students per school (taking into account student exclusions and absences), the United States set a target cluster size (TCS) of 50 students per national school. The TCS for the main study was slightly larger than the TCS used on PISA 2009 in the United States to account for the financial literacy assessment. Out of the 50 students, 42 were sampled to take the paper-based mathematics, science, and reading literacy assessment. Out of these 42 students, 20 were subsampled to also take the computer-based assessment. The remaining eight students were sampled to take the financial literacy assessment. If fewer than 50 age-eligible students were enrolled in a school, all 15-year-old students in that school were selected. The U.S. national TCS and student sampling plans were approved by the international consortium.

In each of the three state samples, 42 students were sampled within each school. Since states did not participate in the financial literacy assessment, their TCS was smaller than the U.S. national TCS. In addition, since states did not participate in the computer-based assessment, states were not required to subsample their sample of 42 students. If fewer than 42 age-eligible students were enrolled in a school, all 15-year-old students in that school were selected. The state TCS and student sampling plans were also approved by the international consortium.

School coordinators were asked to provide lists of all 15-year-old students (defined as students with birth dates between July 1, 1996, and June 30, 1997) in their schools.

A total of 104,912 students were listed from the 315 participating schools. This included 51,745 students from 162 national schools, 25,988 students from 54 Florida schools, 14,297 students from 50 Connecticut schools, and 12,882 students from 49 Massachusetts schools. The average list size was 333 students. Once the list of students was received from a school, it was formatted for importing into KeyQuest, the sampling and data management software provided by ACER.

After importing the list from a school, the appropriate validation checks were run, the students were sampled, and the student tracking and session attendance forms were output from KeyQuest (exhibits 1, 2, and 3). Westat provided the lists of sampled students to schools 2 to 4 weeks before the scheduled testing date, depending on when the school provided the list of age-eligible students. A total of 13,902 students (an average of 44.1 per school) were randomly sampled for the paper-based assessment. This included 7,479 students from national schools, 2,268 students from Florida schools, 2,099 students from Connecticut schools, and 2,056 students from Massachusetts schools. A subsample of 3,114 students (an average of 19.2 per school) was randomly sampled from national schools only for the computer-based assessment.

Exhibit 1. Student tracking form

P12 - STUDENT TRACKING FORM

FID: VDT:

School Name	WESID	School Coordinator	Test Administrator	Date(s): Time(s): Location(s):

	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(10)	(11)	(12)	(13)	(14)
Line #	Student Name	Line #	Region	Stratum ID	School ID	Student ID	LST Line Number	Grade	Gender (F=1; M=2)	Birth Date (MM-YYYY)		Study Program	SEN	N/P PISA	CBA	COMMENTS
01		01														
02		02														
03		03														
04		04														
…		…														
…		…														
49		49														
50		50														
											TOTAL SEN & N/P					

Exhibit 2. Session attendance form

P12 - SESSION ATTENDANCE FORM – PAPER

FID: VDT:

School Name	WESID	Session ID	Test Administrator	Date	TEST: Total # ABSENT: _____ Total # ASSESSED: _____

	STUDENT DETAILS		SCHOOL DETAILS			STUDENT DETAILS		Instrument Allocation		ATTENDANCE*		
	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Line #	Student Name	Line#	Region	Stratum ID	School ID	Student ID	Grade	Booklet	STQ	Test	StQ	Comments
01		01										
02		02										
03		03										
04		04										
…		…										
…		…										
49		49										
50		50										

* Comments to add into column 11:

- If a student was partially present (Code 2) during the 2 hours of the test session, please record the length of time he or she was absent.
- If a student was present or partially present for Test (Codes 1 or 2) but was absent for Questionnaire part, please confirm this.
- If a student was present or partially present for Test (Codes 1 or 2) but left the test booklet blank, please make a note.

Codes to enter into column 9: 1 – present; 0 – absent; 2 – partially present (absent for > 10 min)

Codes to enter into column 10: 1 – present; 0 – absent.

Do NOT use code 2 in column 10.

Exhibit 3. Session attendance form—CBA

P12 - SESSION ATTENDANCE FORM – CBA

FID: VDT:

School Name	WESID	Session ID	Test Administrator	Date	TEST: Total # ABSENT: _____ Total # ASSESSED: _____

	STUDENT DETAILS					SCHOOL DETAILS			STUDENT DETAILS		ATTENDANCE		
	(1)				(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Line #	Student Name	Line #	Comp #	FIDr#	CBA ID	Region	Stratum ID	School ID	Student ID	Grade	Test	Comments*	Password

*If a student was partially present during the 30 minutes of the CBA session, please record in this column the length of time he or she was absent.

Codes to enter into TEST column:

0 – absent (not due to technical problems)
1 – present
2 – partially present (absence not due to technical problems)
3 – partially present (absence due to technical problems)
4 – absent (due to technical problems)

3. Response Rates

As described in chapter 2, PISA 2012 international requirements stipulated that the school response rate target needed to be 85 percent for all education systems. A minimum of 65 percent of schools from the original sample of schools were required to participate for an education system's data to be included in the international database. Education systems were allowed to use substitute schools (selected during the sampling process) to increase the response rate once the 65 percent benchmark had been reached.

PISA 2012 also required a minimum participation rate of 80 percent of sampled students from schools within each education system. A student was considered to be a participant if he or she participated in the first testing session or a follow-up or makeup testing session. Data from education systems not meeting this requirement could be excluded from international reports.

The PISA 2012 standards also required that nonresponse bias analyses needed to be conducted if school response rates were less than 85 percent. NCES standards for assessment surveys stipulated that a nonresponse bias analysis is required at any stage of data collection with a weighted unit response rate less than 85 percent. The U.S. national sample required a nonresponse bias analysis, but the state samples did not require a nonresponse bias analysis. The national nonresponse bias analysis is provided in appendix I.

The response rates presented in this chapter reflect the OECD criteria for inclusion and exclusion into the national data base and inclusion as a participant in the response rate report. One school met the criteria for inclusion into the database but the low participation rate caused it to be excluded as a participant in the response rate report. Thus, 162 schools are included in the US data base but only 161 are treated as participants in the OECD response rates.

The below information pertains to the U.S. national sample. Response rate tables for the state samples are provided in appendix B.

3.1 School Participation

Table 16 provides the response status of original and substitute schools. Of the 161 participating schools, 139 schools were original schools and 22 schools were substitutes. At the close of recruitment, no substitute schools were in a pending status and 368 had no contact. The unweighted and weighted school response rates before and after replacements are shown in table 17.

Table 16. PISA U.S. schools by response status: 2012

Response status	Original		Substitute[1]		Total	
	Number of schools	Percentage of schools	Number of schools	Percentage of schools	Number of schools	Percentage of schools
Total schools	240	100.0	478	100.0	718	100.0
Total eligible schools	207	86.3	109	22.8	316	44.0
Participating	139	67.1	22	20.2	161	50.9
Refusal	68	32.9	87	79.8	155	49.1
Ineligible/closed/excluded	33	13.8	1	0.2	34	4.7
Other (pending, no contact)	0	0.0	368	77.0	368	51.3

[1] One substitute school was assessed but is marked here as ineligible/closed/excluded and is not included in the data, as the original school for this substitute participated.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table 17. PISA U.S. school response rates: 2012

	Unweighted response rate percentage	Weighted response rate percentage[1]
Before substitution	67.15	67.09
After first substitute	76.33	76.26
After second substitute	77.78	77.21

[1]Students at one substitute school were assessed but are not included in the data, as the original school for this substitute participated.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

3.2 Student Participation

Table 18 reports the participation status of students to be assessed for the paper-based and computer-based assessment, including categories of nonparticipating students as defined by PISA. For the paper-based assessment, a total of 581 students (7.8 percent of students sampled) were coded as nonparticipating due to special education needs or having been withdrawn from school. For the computer-based assessment, a total of 232 students (7.5 percent of students sampled) were coded as nonparticipating due to special education needs or having been withdrawn from school. Students excluded because of special education needs were considered nonparticipating, as were students who were homeschooled or who had withdrawn. However, refusals were reported under students to be assessed because the calculation of the response rate includes in the denominator students who were absent and refused.

Table 18. Status of sampled U.S. PISA students: 2012

	Number of students	Percentage of students
Paper-Based		
Total students sampled	7,429	100.0
To be assessed	6,848	92.2
Non-participation[1]		
Functional disability	37	0.5
Cognitive disability	213	2.9
Insufficient language ability	62	0.8
Ineligible for population	1	0.0
Withdrawn	268	3.6
Computer-Based		
Total students sampled	3,094	100.0
To be assessed	2,862	92.5
Non-participation[1]		
Functional disability	12	0.4
Cognitive disability	82	2.7
Insufficient language ability	24	0.8
Ineligible for population	0	0.0
Withdrawn	114	3.7

[1]Student nonparticipation numbers are reported only for schools that are counted as a participant in OECD response rates.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table 19 reports the participation status of students to be assessed. For the paper-based assessment, of the 7,429 students sampled, there were 6,848 students to be assessed. A total of 6,094 students were assessed, with 504 students absent and 250 students not assessed due to parent refusal. For the computer-based assessment, of the 3,094 students sampled, there were 2,862 students to be assessed. A total of 2,515 students were assessed, with 243 students absent and 104 students not assessed due to parent refusal. The unweighted student response rate for the computer-based assessment before and after replacement was 88 percent and the overall unweighted student response rate before and after replacement was 89 percent.

Table 19. Participation status of U.S. PISA students to be assessed: 2012

	Number of students[1]	Percentage of students
Paper-Based		
Total students to be assessed	6,848	100.0
Assessed	6,094	89.0
Absent	504	7.4
Parent refusal	250	3.7
Computer-Based		
Total students to be assessed	2,862	100.0
Assessed	2,515	87.9
Absent	243	8.5
Parent refusal	104	3.6

[1]Students at one substitute school were assessed but are not included in the data, as the original school for this substitute participated.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table 20 reports the participation status of students to be assessed by original and substitute schools. Although the use of substitute schools increased the sample size for schools and students, it did not increase the response rate. For the paper-based assessment, of the 7,429 students sampled, there were 5,994 students to be assessed in original schools and 854 students to be assessed in substitute schools. A total of 5,335 students were assessed in original schools, with 446 students absent and 213 students not assessed due to parent refusal. A total of 759 students were assessed in substitute schools, with 58 students absent and 37 students not assessed due to parent refusal. The overall unweighted student response rate for both original schools and substitute schools was 89 percent. For the computer-based assessment, of the 3,094 students sampled, there were 2,496 students to be assessed in original schools and 366 students to be assessed in substitute schools. A total of 2,190 students were assessed in original schools, with 221 students absent and 85 students not assessed due to parent refusal. A total of 325 students were assessed in substitute schools, with 22 students absent and 19 students not assessed due to parent refusal. The overall unweighted student response rate was 88 percent for original schools and 89 percent for substitute schools.

Table 20. Participation status of U.S. PISA students to be assessed, by original and substitute schools: 2012

	Original schools		Substitute schools[1]	
	Number of students	Percentage of students	Number of students	Percentage of students
Paper-Based				
Total students to be assessed	5,994	100.0	854	100.0
Assessed	5,335	89.0	759	88.9
Absent	446	7.4	58	6.8
Parent refusal	213	3.6	37	4.3
Computer-Based				
Total students to be assessed	2,496	100.0	366	100.0
Assessed	2,190	87.7	325	88.8
Absent	221	8.9	22	6.0
Parent refusal	85	3.4	19	5.2

[1]Students at one substitute school were assessed but are not included in the data, as the original school for this substitute participated.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

4. School and Student Recruitment

4.1 Overview

The PISA 2012 Main Study recruitment was planned to begin one year prior to the PISA 2012 data collection window, beginning in September 2011 and ending in the summer of 2012. New features in PISA 2012 created new challenges for recruiting. These new features included a separate CBA assessment, state benchmarking, and collecting information for an NCES followup study. The general approach taken with schools was to contact them beginning at the start of the 2011 academic year, one year in advance of the data collection for PISA in 2012. As in past rounds of PISA, this early contact was believed to be necessary for schools to get PISA on their calendars. The second element to the recruitment of schools was to offer an incentive structure that paid schools, school coordinators and students. Under this incentive structure, schools and school coordinators were each paid $200, and students received $25 and 4 hours of community service for participating in the paper-based session and an additional $15 if they were selected and participated in the computer-based assessment.

Despite this incentive structure, there was a general resistance of schools to participate in PISA, and this required the employment of several approaches to build the school response rate. Examples of such approaches include contacting states, districts, and education organizations for letters of endorsement, using contacts in state education departments to assist in recruiting, making in-person visits to certain refusing schools, developing a website to assist with recruiting schools and facilitating participation, and offering an increased incentive amount later in the recruitment window. Resistance from schools also required the recruitment period to extend well beyond what was planned.

Table 21. Summary of U.S. PISA school recruitment activities: 2012

Date	Activity
July 2011	School sampled selected
Mid-September 2011	School recruitment training
Mid to Late -September 2011	State and district packages sent
Early-October 2011	School packages sent to principals and school recruitment began
October, 2011- February 2012	Special district approval in required districts
Early-November 2012	School recruitment ended

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012

4.2 Recruitment Training

Five recruiters with experience in gaining cooperation were hired to recruit schools for the PISA main study. Each gaining cooperation recruiter (GCR) was responsible for approximately 48 schools. The GCR training for gaining cooperation was designed to incorporate a large amount of independent study along with distance training via a two-day webinar. This training took place on September 15 and 19, 2011.

One week before training, each GCR received a manual containing specific procedures for completing their work as well as gaining cooperation techniques tailored to the PISA study. GCRs also received a home study memo that included several exercises designed to familiarize the GCRs with the PISA procedures in advance of the online training sessions.

The WebEx delivered PowerPoint presentations that walked GCRs through an introduction to PISA, and overview of their role, materials for their assignment, contacting schools, security and confidentiality, conversion techniques, using the online Field Management System (FMS), and administrative procedures. A few days after training, the Field Manager followed up with each GCR to ensure that all questions had been answered and GCRs were ready to proceed with recruitment activities.

4.3 Recruitment of Schools

During the last week of August, PISA information packages were sent to the state commissioners and testing directors, district superintendents, and district test directors via Federal Express. The information packages contained:

- letter from the NCES Commissioner;
- PISA 2012 study brochure;
- summary of activities for schools;
- study timeline; and
- a guide to locating information about PISA (including sample items and results).

Westat identified twenty-six districts (12 percent of districts with original schools) that required explicit approval before schools could be contacted. Formal research requests were prepared and sent to these districts. This process for gaining district approval was different in each district, and in some districts

approval did not come until July, 2012. Fortunately, once approved, many districts assisted with getting the school(s) to participate.

In addition, NCES called specific state assessment directors to alert them of PISA and discuss the participation of the selected schools in their state. Further NAEP state coordinators (NSCs) in each state with sampled schools were sent a folder of materials with a cover letter alerting them that PISA was beginning school contact. In addition, these materials were posted in electronic form on NAEP Network. Both test directors and NSCs from several states contacted Westat asking to know the sampled schools. Once the test directors and NSCs completed an affidavit of nondisclosure, Westat provided them with information on the sampled schools.

School packages were mailed to principals in mid-September with phone contact from recruiters beginning a few days after the mailing. Recruiters began contacting schools in October, 2011 and continued working their assignments until the summer of 2012 when the recruitment period began to wind down. Over the course of the recruitment period recruiters, Westat project staff, NCES, state and district level school officials, and other recruiting contact resources engaged in efforts to achieve a satisfactory school response rate in hopes of improving the U.S. school response rate from PISA 2009. All recruitment materials can be found in appendix C.

4.3.1 Contacting States, Districts and Schools

The school sample for the main study was drawn in July, 2011. The contact information for each state, district, and school office was then verified and additional contact information was gathered for key personnel such as state and district superintendents, state and district testing directors, and school principals. Contact of states and districts began in September 2011. School contacts began with the initial mailing in October 2011. The mailing sequence for states, districts and schools was:

- state mailing: September 7, 2011;
- district mailing: September 21, 2011; and
- school mailing: October 7 and October 14, 2011.

4.3.1.a State Contact

Westat sent an information package to the state superintendent identical to the package sent to the state assessment coordinator, with the exception of also including a PISA FAQ. The state contact was an informational contact with implied consent.

States were also sent an affidavit of nondisclosure in order to request a list of districts and schools that have been sampled in their state. Once the affidavit was received, Westat sent via email an encrypted zip file containing the school sample information to the state contact who originally made the request. A file password was sent in a separate e-mail.

4.3.1.b District Contact

District superintendents and test administrators were sent similar packages to that of the states. Generally, districts were not actively recruited. However, our experience with the field test showed that it was advantageous to allow GCRs to conduct a courtesy call with all districts a few days after the delivery of the package. This alerted the district to the delivery of the packet of information and provided the GCR the opportunity to answer any questions about the study. For the main study, 160 districts were contacted.

4.3.1.c Special Handling Districts

Special handling districts are those that require a formal review and approval of the study prior to allowing school contact. Westat compiled a list of known special handing districts across the nation and submitted a complete proposal to each of these districts. The PISA 2012 main study required 26 proposals for the original sampled schools. Of those, 7 districts rejected the proposal and refused to participate in the study. The reasons for refusal were almost universal and centered on a loss of instructional time for students and/or policies of not participating in non-mandated, voluntary studies.

4.3.1.d Initial School Contact

In October 2011, schools were contacted with an initial request to participate and received a PISA information package. Following the mailing of the package, the GCR began attempts to contact the

school to begin gaining cooperation. In their contact(s) they verified the receipt of the recruitment package by the school and discussed participation of the school.

The GCR recorded other information such as specific issues or questions the school had regarding participation and the general disposition of the school in both the school folder and the FMS. These were reviewed in the weekly calls with the field manager, particularly with initial refusals in order to generate strategies to convert the schools.

4.3.2 Reasons for School Refusal to Participate

The most prevalent reasons for refusal were time burden and lack of staff. There was significant push-back from many refusing schools because of the length of the PISA assessment and class time students would lose.

A secondary reason, somewhat related to time burden was a lack of staff to support PISA in the school. Some schools were very limited in staff time and availability and stated this as their main reason for refusing. Also, staff turnover caused some schools to drop out because the decision-maker that had initially agreed to participate in the 2011 academic year was no longer at the school when school began in the fall of 2012. While the result in loss of schools for this reason was minimal, staff turnover was very common and required re-recruiting of the school in many cases.

Another reason for non-participation given by refusing schools was the amount of testing currently in place for the target population of 15-year old students, which are mostly 10th graders in the United States. For example, Texas and Michigan were two states where this was a cited issue. Many schools in Texas were difficult to recruit because of the new State of Texas Assessments of Academic Readiness (STAAR) assessment program. Michigan reportedly had a state testing window that conflicted with the PISA assessments; while some schools obliged when explained the flexibility of scheduling a PISA assessment and how few students would be assessed, others remained steadfast in their decision not to participate.

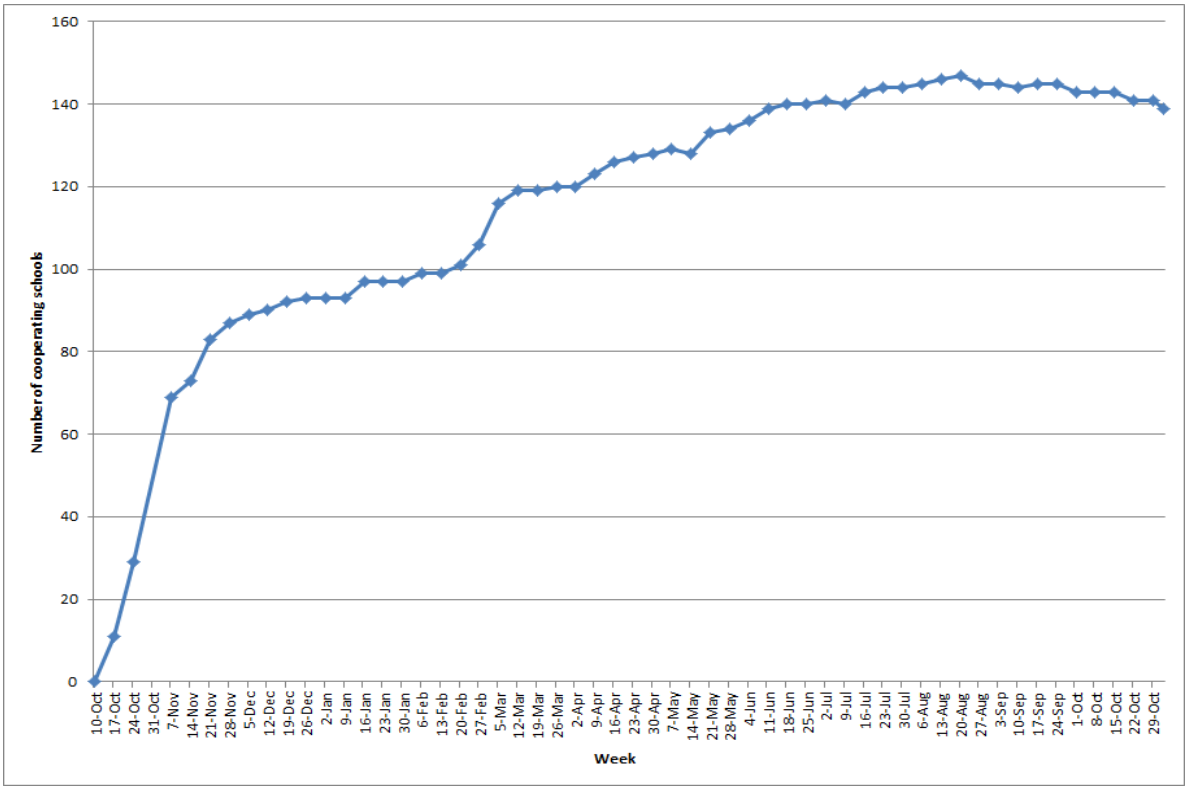
School attrition was another factor impacting school participation. Later in the summer of 2012, as recruitment staff were attempting to verify the assessment schedule of the participating schools, some schools that had initially agreed to participate withdrew their participation. The reasons tended to involve the reasons stated above, particularly turnover in staff, as well as the pressures from newly added testing. Seven schools withdrew their participation.

4.3.3 Solutions and Approaches Used With Refusing Schools

Several approaches at the school, district, and state levels were implemented to increase participation. PISA recruiters began making personal visits to schools in February, 2012, and these visits continued through the end of the academic year. Westat employed a visit or home office contact with district personnel on several occasions, and NCES made contact at the state level. In addition, Westat e-mailed status updates to state level officials that sent in the affidavit requesting their state's PISA sample. This email was targeted at states that were especially difficult to recruit and proved fruitful in some cases. In July 2012, those original schools that were still pending were offered an increased school incentive of $800. Forty-five schools were offered this increased incentive and 7 schools accepted.

Figure 2 shows the school cooperation by each week of recruitment from the first status report on October 10, 2011 to final report on November 2, 2012. PISA showed 147 schools (70 percent) participating on August 20. That number reduced by seven as the data collection was carried out.

Figure 2. PISA 2012 original school participation by week



SOURCE: Program for International Student Assessment (PISA) 2012.

4.3.4 Final Results of School Recruitment

Recruitment of schools closed on November 2, 2012, 57 weeks after the official start of the recruitment period. Table 22 provides the response status of original and substitute schools.

Table 22. PISA 2012 school type by response status

	Original schools		Substitute schools		Total schools	
	Number	Percent	Number	Percent	Number	Percent
Total eligible	240	100.0	114	100.0	354	100.0
Participating	139	57.9	23	20.1	162	46.0
Refusal	68	28.3	87	76.3	155	43.8
Ineligible/closed	33	13.8	1	0.9	34	9.6
Other (Pending, No Contact)	0	0.0	3	2.6	3	0.8

SOURCE: Program for International Student Assessment (PISA) 2012.

Of the 162 participating schools, 139 schools were original schools (67 percent original unweighted response rate) and 23 schools were replacements (78 percent overall unweighted response rate). The original response rate satisfied the international requirement of obtaining 65 percent of original sample schools.

4.4 Student Recruitment

Once the student sample was selected within a school, PISA staff worked with the school coordinator to obtain parental consent, and school coordinators distributed student invitations to participate (provided in appendix D). Study recruiters and test administrators also worked with school coordinators to answer any student or parent questions, including sharing the PISA Fact Sheet for Parents (provided in appendix D).

There were three levels of parent consent: (1) explicit consent (parent consent agreement was required); (2) implicit consent (parents could opt out of study by returning a form); and (3) notification (parents were informed of the study). The level of consent used was determined by school or district requirements.

5. Instrument Development and Distribution

5.1 Test Instrument Design

The 2012 assessment instruments were developed by international experts and PISA consortium test developers. The assessment included items developed by the consortium's test developers as well as those submitted by participating education systems. Representatives of each education system and PISA subject-matter expert groups reviewed these items for relevance to PISA's goals and for possible bias. All participating education systems field-tested the assessment items in spring 2011.

The final paper-based assessment consisted of 85 mathematics items, 44 reading items, 53 science items, and 40 financial literacy items allocated to 17 test booklets. In education systems that did not administer the optional financial literacy assessment, such as Connecticut, Florida, and Massachusetts, there were 13 test booklets. Each booklet was made up of four test clusters. Altogether there were seven mathematics clusters, three reading clusters, three science clusters, and two financial literacy clusters. The mathematics, science, and reading clusters were allocated in a rotated design to 13 booklets. The financial literacy clusters in conjunction with mathematics and reading clusters were allocated in a rotated design to four booklets. The average number of items per cluster was 12 items for mathematics, 15 items for reading, 18 items for science, and 20 items for financial literacy. Each cluster was designed to average 30 minutes of test material. Each student took one booklet, with about 2 hours' worth of testing material. Approximately half of the items were multiple-choice, about 20 percent were closed or short response types (for which students wrote an answer that was simply either correct or incorrect), and about 30 percent were open constructed responses (for which students wrote answers that were graded by trained scorers using an international scoring guide). In PISA 2012, with the exception of students participating in the financial literacy assessment, every student answered mathematics items. Not all students answered reading, science, and/or financial literacy items.

A subset of students who took the paper-based assessment also took a 40-minute computer-based assessment. In the United States, the computer-based assessment consisted of problem solving and an optional computer-based assessment of mathematics and reading. The computer-based assessment consisted of 168 problem-solving items, 164 mathematics items, and 144 reading items allocated to 24 forms. Each form was made up of two clusters that together contained 18 to 22 items. Altogether there were four clusters of problem solving, four clusters of mathematics, and two clusters of reading. The problem-solving, mathematics, and reading clusters were allocated in a rotated design to the 24 forms. Each cluster was designed to average 20 minutes of test material. Not all education systems participated

in the computer-based assessment. Connecticut, Florida, and Massachusetts did not participate in the computer-based assessment. Other education systems only administered the computer-based problem-solving assessment (education systems that administered only the problem-solving assessment followed a different rotation design).

In addition to the cognitive assessment, students also completed a 30-minute questionnaire asking about themselves, their attitudes, and their experiences in school. There were three possible forms for the student questionnaire. All three forms had a common set of core questions that were asked of all students. Two of the three forms contained additional questions that were administered to two-thirds of students. Principals in schools where PISA was administered also completed a 30-minute questionnaire about their schools.

5.2 Assessment Materials Development

The materials for PISA 2012 in the United States included (1) 17 different test booklets; (2) 24 computer-based assessment forms; (3) a school questionnaire; (4) 3 different student questionnaire forms; (5) a test administrator manual and an assistant administrator manual; (6) a school coordinator handbook; (7) 4 separate coding guides for test items assessing reading literacy, mathematics literacy, science literacy, and financial literacy; and (8) 3 online coding control scripts for computer-based reading, mathematics, and problem solving. Source versions of all instruments were prepared in English and French and translated into the primary language or languages of instruction in each education system. NCES adapted the questionnaires, test booklets, coding guides, online coding control scripts, and administration manuals and handbooks for use in the United States. Even in countries where English is the primary language of instruction, adaptation was needed to ensure that the materials used spelling and vocabulary that were most commonly used in the United States (but did not change meaning) and that reflected the actual U.S. administration plans. This involved (1) changing spellings and vocabulary into common U.S. usage (e.g., changing “lift” to “elevator and “biscuits” to “cookies” for the United States); (2) adding a limited number of U.S. national items to the school and student questionnaires (e.g., adding items on racial/ethnic groups to the student questionnaire); and (3) adapting the administration manuals and handbooks to follow the U.S. plans for data collection. The materials for PISA 2012 in the states of Connecticut, Florida, and Massachusetts were the same, except the states had 13 test booklets, as they did not administer the financial literacy assessment, and states did not have any computer-based assessment forms.

These adaptations were checked and reviewed by the international consortium through an iterative process that occurred from November 2011 to March 2012. After the adaptations had been approved by the international consortium, the final versions of the 17 test booklets, 24 computer-based forms, 3 student questionnaire forms, and the school questionnaire were produced and submitted to the two consortia for a "final optical scan." The coding guides, online control scripts for the computer-based assessment, and the manuals and handbooks were all negotiated, reviewed, and submitted in a similar manner.

5.3 Preparation of Instruments

The PISA 2012 data collection instruments for the United States consisted of 17 test booklets, 24 computer-based assessment forms, 3 student questionnaire forms, and the school questionnaire. The PISA 2012 data collection instruments for the separate U.S. state education systems of Connecticut, Florida, and Massachusetts included 13 test booklets, 3 student questionnaire forms, and the school questionnaire. The student questionnaire was specially adapted to make it scannable. Copies of the school questionnaire and student questionnaire are included in appendix E.

A detailed process for the review of test booklets, forms, and questionnaires was conducted by study staff and NCES to ensure a high quality of printed products. This process began with reviews of electronic copies of instruments and then reviews of hard-copy versions (for the test booklet and questionnaires). Numerous electronic and hard-copy drafts were produced and reviewed by study staff and NCES. The final versions of all instruments were approved by NCES in June 2012.

5.4 Packaging and Distribution of Materials to Field Staff

Final printed books and questionnaires were sent to a packaging facility, where security barcode labels were applied to the test booklets and the booklets were bundled.

To identify each test booklet, each booklet was assigned a barcode ID number. The barcode ID numbers were printed on labels and then applied to the front cover of each test booklet. The barcodes were tracked for security purposes to ensure that all booklets sent out were returned. Each document type was also assigned an inventory number.

The test booklets were then spiraled into bundles. Bundles of 13 booklets were created and spiraled in booklet 1 through 13 in barcode sequence order. Two bundles of four financial literacy booklets were created separately from the main test booklets but were interleaved with the main test booklet by field staff when preparing the booklets for assessment day. In addition, extra bundles of each of the 13 booklets were created for use by test administrators. Due to random booklet start design, a bulk supply of booklets was needed to supplement each bundle. The booklet type to be used was randomly assigned by the KeyQuest system and printed on the session attendance form. Each bundle had a header sheet that indicated the bundle number and a range of the booklet IDs within the bundle. Student and school questionnaires were also spiraled and bundled. Since there were three different forms for the scannable student questionnaires (forms A, B, and C), five consecutive sequences of forms A through C were spiraled for a total student questionnaire bundle size of 15, i.e., A, B, C, A, B, C. An additional bulk supply of questionnaires was also supplied to field staff.

Field staff were given separate materials for the computer-based assessment. Each test administrator was assigned 25 flash drives, 20 assessment machines, 1 administrative laptop, and 1 MiFi device. Each assessment machine consisted of a laptop, a mouse, and cords. Each flash drive contained all 24 forms of the computer-based assessment. The computer-based assessment used a Mozilla Firefox platform to run and administer the assessment on the flash drive. The form to be used was designated by a randomly assigned password by the KeyQuest system, which when entered, routed the student to the appropriate form.

A customized packing list was created for each test administrator. Each test administrator was also assigned specific bundle numbers. This enabled study staff to identify where the test booklets should be at any time during the assessment.

The distribution effort included the packaging and mailing of test booklets, student and school questionnaires, computer-based assessment materials, and other assessment-related materials to test administrators. The test administrators were sent a supply of bulk materials in addition to a session box for each PISA assessment scheduled.

The packing and distribution efforts were the same for the education systems of Connecticut, Florida, and Massachusetts, except that field staff for these separate education systems were not given materials for the computer-based assessment or financial literacy booklets.

6. Field Operations

Data collection consisted of four major elements:

- a school questionnaire requiring approximately 30 minutes that was sent to schools prior to data collection and collected during the testing visit;
- a core paper-based student assessment administered in a 2-hour testing session, with a short break in the middle;
- a computer-based student assessment administered in a 1-hour testing session to a subsample of students; and
- a student questionnaire taking approximately 30 minutes for students to complete.

Data collection for Connecticut, Florida, and Massachusetts consisted of the above elements minus the computer-based student assessment and the optional financial literacy assessment (part of the paper-based assessment for the main U.S. sample).

6.1 Preassessment Contacts with School Staff

Each participating school was required to designate a staff member to serve as school coordinator. School coordinators were responsible for arranging the logistics of the assessment with PISA staff. School coordinators were an integral part of the data collection process from beginning to completion. School coordinators received a school coordinator handbook to use in preparing for the assessment. A significant portion of this document provided instruction on assembling a list of students and identifying students with special needs.

The primary responsibilities of the school coordinator were scheduling the assessment and providing a list of eligible students to PISA for sampling. The international version of the handbook instructed schools to include a special needs code on the list of PISA eligible students. The United States adapted this by sampling the students first and then asking that students with special needs be identified from the sampled students listed on the student tracking form, combining this step with determining nonparticipation. This reduced the burden on the school by significantly reducing the number of students that needed to be evaluated. In many cases, school coordinators were required to consult other student records or meet with special education staff to identify these students' specific needs and whether or not they could participate.

Prior to the assessment, each school coordinator was contacted at least five times.

1. Beginning in mid-August 2012, school coordinators were sent an initial mailing containing the school coordinator handbook and a cover letter outlining the process for assembling and submitting a list of students to the study.

2. This mailing was followed by an email outlining the process in more detail and describing options for the submission of the list of students. An electronic student listing form was attached in this email.

3. After the student list was received, study staff processed the list following PISA guidelines and using the required international sampling software, KeyQuest. This process resulted in the production of a student tracking form (STF) indicating which students in the school had been chosen to participate. Once the STF was complete, an email was sent to school coordinators notifying them that their STF was available for download from the secure MyPISAUSA.com website. The email explained the next steps of identifying students with any special education needs (SEN), indicating any students who would not be able to participate (either due to an SEN, parent refusal, or the student transferring out of the school), solidifying arrangements for the assessment, and discussing parent consent and the importance of student participation.

4. A follow-up email was sent the day after the mailing had been received. This email reviewed the SEN and participation information and consent materials. The consent letters requested by the school were attached to this email with the direction that schools could use these items as a template and change as necessary to meet the needs or requirements of the school.

5. An in-person preassessment visit was scheduled and conducted by PISA staff typically 2 weeks prior to the scheduled assessment. Following the guidance provided by the Preassessment Contact Booklet, test administrators (TAs) reviewed the logistics for assessment day (e.g., room location, school entry procedures), the student tracking form, and anticipated student response (e.g., known parent or student refusals, SEN exclusions). In state PISA schools, the final contact prior to the assessment was made via preassessment calls conducted by the test administrators approximately 1 week before the assessment. Using a state-adapted version of the Preassessment Contact Booklet, the test administrator reviewed with the school coordinator the same things as their national counterparts.

As a general rule, test administrators were instructed to make a courtesy call to the school coordinator 1 to 2 days before the assessment. The courtesy call was implemented to determine if student participation was a problem and if the test administrator could assist in any way and to cover any last-minute questions or concerns with the school coordinator.

In many cases, additional contacts were made in fielding questions from school coordinators via the toll-free telephone line or the project email. These contacts generally dealt with questions or clarifications about student sampling. Almost all of the student lists required some level of verification or further contact with the school.

6.2 Data Collection Training

Training for data collection was held August 23-25, 2012, at the Westat headquarters in Rockville, Maryland. Twenty-two TAs attended this training—one for each work area and two troubleshooters. One week before training, each test administrator received a test administrator manual containing the instructions for preassessment work and for conducting the assessment in schools. Test administrators were given 4 hours of home-study time to familiarize themselves with the PISA procedures. The test administrators also completed a short quiz prior to training. This was designed to take the test administrator through the manual and become familiar with specific information about PISA procedures.

Simultaneously, 14 state PISA TAs were trained using the same training structure and elements used in the national training, aside from the CBA and financial literacy components that were only delivered to the national TAs. The state training was a day less than national training due to these differences. The training agendas are provided in appendix C.

Day 1 focused on an introduction and overview of the study, the materials required, the tracking forms, their completion, the preassessment call with the school coordinator, and booklet and questionnaire labeling. Day 2 focused on the assessment day activities, including arriving at the school and setting up the assessment area, administering the assessment, packing the session boxes for return, and distributing student incentives. Day 3 (national TAs only) focused on the procedures and activities associated with administering the computer-based assessment. Throughout the training the importance of maintaining security of materials and the confidentiality of respondents was emphasized.

Since only TAs attended the in-person training, they were responsible for training their assistant administrators (AAs) prior to the start of the first assessment in their areas. Each test administrator was supplied with training scripts and necessary exercises. Prior to the assistant administrator training, each AA was supplied with an assistant administrator manual, similar to the test administrator manual, but focusing primarily on the assessment day activities. The test administrators were instructed to spend approximately 1 day training the assistant administrators.

6.3 Data Collection Approach

The study employed 22 national test administrators, one assigned to each work area. Test administrators were assigned to one of two field managers who coordinated and monitored their work. During the testing period, test administrators reported to their field manager almost on a daily basis. To assist test

administrators, 44 assistant administrators were hired to create three-person assessment teams. These assistants assisted in labeling forms, transporting computer equipment, setting up the testing areas, and monitoring students during the testing sessions.

The study employed six Florida state TAs and four state TAs in both Massachusetts and Connecticut. Since states did not participate in the national option of computer-based assessment (CBA), each state TA was paired with one AA to create a two-person team. The state teams performed the same tasks as national teams, aside from those associated with the CBA.

Test administrators were responsible for

- familiarizing themselves with the test administrator manual;
- successfully completing training prior to the start of assessments;
- training assistant administrators;
- conducting preassessment calls with school coordinator within 2 weeks of the assessment;
- conducting follow-up contacts with school coordinator 1-2 days before the assessments to ascertain if any problems with student attendance;
- ensuring that each student received the correct testing materials;
- administering the test(s) in accordance with the internationally-specified instructions, including following the administration script;
- ensuring the correct timing of the testing sessions;
- completing the session administration form;
- recording student participation on the session attendance form;
- ensuring that the test booklets, student questionnaires, student tracking form (STF), session attendance form and session report form, and completed school questionnaire, were returned to Pearson typically within 24 hours;
- reporting any issues or problems with the assessment to the field manager immediately after the assessment; and
- updating the Field Management System (FMS) with final student counts and changes from the STF, notes on the assessment, tracking numbers of the session boxes and disposition code for the school.

The paper-based assessment administration consisted of three segments. The students were assessed in two segments, each 1 hour long. These were to be administered on the same day, with a short break of approximately 5 minutes in between. After the second hour the students took a short survey on calculator use and effort. They then received another break and were administered the student questionnaire in the third segment. This questionnaire took approximately 30 minutes.

The CBA administration occurred in a single segment composed of two consecutive parts: a practice session of approximately 20 minutes, and the assessment, which lasted approximately 40 minutes. Students were told to bring something to read in case they finished early.

The timing of the paper-based assessment sessions was as follows:

Activity	**Time**
Distributing the materials and reading the general directions	10-15 minutes (approximately)
The assessment booklet	1 hour (exactly)
Short break	No more than 5 minutes
The assessment booklet	1 hour (exactly)
Short survey	Up to 5 minutes
Break	No more than 10 minutes
The student questionnaire	35 minutes (approximately)
Collecting the materials and ending the session	3-5 minutes (approximately)
Total	3 hours (approximately)

The timing of the computer-based assessment sessions was as follows:

Activity	Time
Distributing student logins and introducing the test	5 minutes (approximately)
Computer-based assessment practice session	20 minutes (approximately)
Completing the computer-based assessment	40 minutes (exactly)
Ending the assessment session and collection of data	10 minutes (approximately)
Total	1 hour 15 minutes (approximately)

6.4 Data Collection Activities

The PISA 2012 data collection was administered between October 2 and November 30, 2012. The initial data collection window of 6 weeks, from October 2 to November 16, was extended by the PISA consortium in response to unforeseen weather conditions caused by Hurricane Sandy that affected the northeastern United States. Table 23 shows the number of national assessments that were completed in each month. All of the assessments were conducted during school hours.

Table 23. PISA school assessments for U.S. and state schools, by month: 2012

Sample group	PISA 2012 assessment month		Total school assessments
	October	November	
National[1]	107 (66%)	55 (34%)	162
Connecticut	22 (45%)	27 (55%)	49
Florida	54 (100%)	0 (0%)	54
Massachusetts	28 (57%)	21 (43%)	49

[1]One substitute school was assessed but is not included in the data, as the original school for this substitute participated.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

School assessments for states were similar to the U.S. data collection efforts. However, due to early scheduling in Florida and geographic location, data collection in Florida was not affected by Hurricane Sandy.

Makeup sessions were scheduled only if the schools had a very low student response rate or if the logistics of holding a makeup were favorable and the response rate was below 85 percent. Twenty-five makeup sessions were conducted in the national sample. Table 24 below describes makeup sessions for PISA 2012 in detail by sample group.

Table 24. PISA make-up sessions for U.S. and state schools: 2012

Sample Group	Identified makeup schools/ total schools	Make-up needed (%)	Schools where makeup completed/make ups needed	Completed makeup (%)
National[1]	28/162	17	25/28	89
Connecticut	12/50	24	8/12	67
Florida	11/54	20	11/11	100
Massachusetts	6/49	12	6/6	100

[1]One substitute school was assessed but is not included in the data, as the original school for this substitute participated.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

7. Data Management

7.1 Receipt Control

Assessment booklets, student questionnaires, school questionnaires, session attendance forms, and student tracking forms were received by Pearson from schools October 9 through November 30, 2012, via UPS 2-day delivery for the initial shipments and UPS overnight delivery for the final week of assessments. The school ID, receipt date, and the return shipper's tracking number were recorded in Pearson's Oracle receipt system. Pearson's project staff sent receipt reports to Westat on a weekly basis.

The school boxes were forwarded to Pearson's data prep area. Using specifications provided by Pearson's project staff, data prep staff checked each school's materials using the student attendance form (SAF) returned with the booklets. They verified that all student booklets and student questionnaires for students listed on the SAF had been returned to Pearson; information coded on the booklet covers matched the SAF, i.e., school number, student ID, and participation status; the school questionnaire had been returned; and all tracking materials had been returned.

Once a school's material had been verified as complete, assessment booklets and questionnaires were sorted into separate work units and batched by assessment/questionnaire and placed on carts. Each cart was assigned a batch number. This number facilitated the internal tracking of the batches. Each batch type had its own unique control sheet which listed all of the workstations (departments) the group of work needed to pass through.

Pearson used a computerized system to track the documents through each processing step, enabling project staff to easily locate materials for a particular school. This mainframe system was accessible throughout the Pearson facility, enabling staff to instantly determine the status of all work in progress. The system efficiently carried the planning and control function to first-line supervisory personnel so that key decisions were made properly and rapidly. Daily reports were run to show the number of documents processed.

7.2 Data Entry

Depending on the PISA document, one of two methods was used to transcribe the paper-based PISA student data to a computerized form. For the first method, the data from the student questionnaires was collected using Pearson's scanning equipment. Optical-scanning equipment was used to scan the student

questionnaires. These scanners are capable of capturing not only optical mark recognition (OMR) data but also images of constructed-response items in a single scan pass. The open-ended and multiple-choice data from the student test booklets and school questionnaire were collected using Pearson's Kodak scanning equipment. In addition, occupational coding occurred during the processing of the student questionnaires.

For the second method, CBA-only data was uploaded to TA laptops from password-protected thumb drives and transmitted to Westat via a securely connected Westat-developed software for preparation and review. Westat used the information from the CBA for receipt control (participation status, completion, potential errors in ID assignments or assessment processing). This data was sent to the Australian Council for Educational Research (ACER) directly via a secure FTP transmission. This process did not occur for the states, as they did not administer CBA.

Coding of the paper-based and computer-based open-ended constructed-response items were coded by qualified professional scorers at Pearson's scoring facility in Mesa, Arizona, from January 7 through January 23, 2013. ACER's online coding system (OCS) was utilized to capture these codes. The OCS was used for the first time in the PISA 2012 field test. The below describes in detail the data capture, editing, and coding for the PISA 2012 materials.

7.2.1 Data Capture

The scanning process for data capture from the assessment booklets and questionnaires was the first point at which booklet-level data were directly available to Pearson's computer system. The use of optical-scanning equipment allowed Pearson to capture images of the multiple-choice items to be keyed, the auto-coded constructed-responses, and student responses that were loaded in to ACER's online coding system. These scanners recognize the multiple-choice response ovals present in the documents and gridded by the students. The constructed-response items were also captured (i.e., occupational responses). These responses were keyed and verified the same way as the assessment booklets.

7.2.2 Editing

The editing process depended on the PISA document, which was the second point at which booklet-level data was available to Pearson's computer system. One of two methods was used to transcribe PISA student data to an electronic form; scanned images of the multiple-choice responses from the assessment booklets were displayed for key entry/verification/editing on a PC since no OMR ovals were present in the documents. The constructed-response items were also captured (i.e., occupational responses). The optical-scanning equipment recognized the multiple-choice response ovals present in the student questionnaires. The data from the assessment booklets and questionnaires were edited according to specifications supplied by the software development staff based on the PISA international codebook. PISA software development staff created key-from-image/editing specifications based on the actual booklets and questionnaires and the international codebooks.

The data values entered were coded as numeric values. Unmarked fields were coded as dashes. Fields with multiple marks were coded as asterisks. The data values for the item responses were returned as numeric codes. The multiple-choice single response format items were assigned codes depending on the position of the response alternative; that is, the first choice was assigned the code 1, the second 2, and so forth. The mark-all-that-apply items were given as many data fields as response alternatives; the marked choices were coded as 1 while the unmarked choices were recorded as dashes. The dashes and asterisks were converted to valid codes identified in the international codebook. Some of the auto-coded item responses had to be converted from either numeric to alpha or vice versa, depending on the international codebook.

7.2.3 Booklet Accountability

Pearson used a booklet accountability system to track all secure distributed booklets. Prior to the distribution of PISA materials, unique booklet barcode numbers were created and applied to each assessment booklet. The barcode numbers were grouped and assigned to a bundle number. Bundle slips/headers were printed with the barcode numbers and the appropriate books/barcodes were wrapped with the bundle slip.

Using the bundle file, bundles were then assigned to particular schools. This assignment was recorded in the Materials Distribution System. When shipments arrived at Pearson from the field, all used booklets were submitted for processing and a "processed documents" file was maintained. Unused or unassigned booklets were sent to another Pearson facility for security scanning. The barcode file from these unused

books and the processed documents file were later compared to the original bundle file for individual booklet matching. A list of unmatched booklet identification numbers was printed in a report to confirm non-receipts of individual booklets.

Questionnaire and test booklet batches were forwarded to the Iowa City warehouse at Pearson. Each stack was strapped and stored by batch to allow it to be easily located, if needed later. This information was recorded in the tracking system for easy retrieval. All unused materials received were inventoried and sent to the Pearson warehouse for storage while awaiting authorization from NCES to salvage them.

7.2.4 Occupational Coding

Trained Pearson project staff viewed the actual written responses on a PC screen and entered in the appropriate ISCO-08 occupational code. This process eliminated paper (reports) and additional key entry activities, as was done in the field trial and PISA 2009. Eight project staff members were utilized for the coding of the occupational responses. Since each response needed to be coded twice, Pearson's optical scoring system routed each response to two separate project members. The system alerted and escalated the response to a third person or project manager if the codes did not match. The project manager made the final decision on the correct code. After coding was complete, the codes were uploaded into a mainframe file. Pearson's development staff formatted the files based on the international codebook and sent them to Westat.

7.2.5 Capturing Coded Open-Ended Student Responses

To code the paper-based constructed-response items in mathematics, reading, science, and financial literacy, Pearson was required to send .PNG format image files of each completed assessment booklet to ACER. Due to the size of each file, Pearson uploaded the files to a password-encrypted hard drive and sent signature-required to ACER on December 12, 2012.

Westat was responsible for sending the constructed-response items for computer-based mathematics, reading, and problem-solving assessments to ACER. Westat test administrators uploaded the encrypted data from each student's flash drive in the field to Westat's server via secure VPN connection after each assessment. Westat's server transmitted this data to ACER securely.

ACER implemented two new validity reports that were run before coding began. Report #1 verified the completeness of the files by checking that each student identified as completing a booklet had all the required pages present. Report #2 compared the student IDs received by ACER against the attendance codes on the Session Attendance Forms. Any discrepancies were fixed by Westat and Pearson.

ACER uploaded the student constructed-response items for computer-based mathematics, reading, and problem solving for the national sample to ACER's OCS system on January 3, 2013. Since states did not participate in the CBA, this process was not needed for states.

7.2.5.a Lead Coder Training

Two coding supervisors were responsible for organizing and managing the online coding operation. This included arranging the lead coder trainings, providing the ACER-supplied coding guides, assigning users, allocating items, and monitoring overall progress. These supervisors also attended the international coder training held in Salzburg in February 2012.

The coding supervisors trained nine lead coders on the items that each lead coder then trained to their teams during the coding window from January 2 through January 4, 2013. The coding supervisors modeled the training style of the PISA trainers in Salzburg. The lead coders were responsible for training items, monitoring the quality of individual coder's work, answering coder questions, and escalating content questions/issues to the appropriate coding supervisor. Any unresolved questions were sent to the ACER's Coder Query Service. Pearson did participate in this service.

7.2.5.b Coder Training/Coding

Nine teams of four coders were hired for the coding of the 2012 main study. All coders signed an affidavit of nondisclosure before training and coding began. An overview of PISA along with coding guidelines, inter-rater reliability, rater expectations, coder bias, and age-level considerations regarding PISA items were discussed on the first day. All teams were also trained on how to use the OCS.

Coders were given approved coding guides for the items they coded, along with workshop materials. The coders read through the item assigned to them, discussed the item, and coded the example responses first before doing the actual coding. The coders also practiced coding actual items; the codes were reset before actual coding began.

7.2.5.c ACER's Online Coding System

The OCS was developed specifically to facilitate coding of the constructed-response items, eliminate the need for separate data entry and booklet batching/handling, and to simplify data cleaning.
The OCS included several features designed to enhance coding quality: reliability statistics (provided averaged and buffered "disagreement figures), allocation parameter (controlled the percentage of responses by each coder), review (coder was unsure how to code the response), control scripts (responses provided by ACER and coded for consistency in coding), and spot checking (lead coder would check the coders work).

Several reports were also available to assist with monitoring the coding process. This helped the quality and pace of the coding on a daily basis. These reports indicated the total number of responses to be coded, those responses that were already coded, and the remaining number to be coded. They also provided reliability statistics, items under review by the lead coder, and inconsistent coding. Reliability statistics are provided in appendix G.

7.3 Data Confidentiality Safeguards

The Education Sciences Reform Act of 2002 explicitly requires that NCES protect the confidentiality of all those responding to NCES-sponsored surveys so that no individual respondent can be identified. More specifically, NCES Standard 4-2, *Maintaining Confidentiality* (NCES, 2002), provides guidelines for limiting the risk of data disclosure for data released by NCES. Data disclosure occurs when an individual respondent has been identified through the use of the survey item responses and other external data sources. The following discussion describes the procedures used to reduce the risk of data disclosure for PISA 2012, in accordance with the guidelines specified in NCES Standard 4-2.

All students and schools participating in the PISA do so with the assurance that their identities will not be disclosed. Confidentiality procedures in place included the following: (1) all employees with access to the data signed affidavits of data confidentiality; (2) questionnaires were sealed by students after completion; and; (3) names of students and schools were removed by field staff from the assessment booklets, the questionnaires and all other related materials, and replaced with unique identification numbers. In addition to data collected directly from schools and students, additional information was used during the PISA sampling, data collection, and weighting processes and these variables were also considered as part of the review to determine disclosure risk levels.

In order to ensure respondent privacy, Westat prepared the requisite Disclosure Analysis Plan (DAP) that described the procedures that would be undertaken to adhere to the rules established by the IES Disclosure Review Board (DRB). Data could not be provided to any international entity (Australian Center for Education Research - ACER) or released to the public until the IES DRB approved the DAP and the implementation of the DAP. IES DRB approval was contingent on ensuring data security and respondent privacy while also ensuring data quality and limited data distortion.

Thus, prior to the school questionnaire and student questionnaire files being uploaded into Keyquest (where data were transmitted to ACER), study staff conducted disclosure analyses to determine if individual schools or students could be identified using data from other publicly available data sources. While no public data collections identify students by name, three publicly available data collections do identify schools by name. These are: the Common Core of Data (CCD), a detailed public school listing; the Private School Survey (PSS), a detailed private school listing; and, the QED data collections produced by Quality Education Data, Inc., a privately owned education research firm. The QED data contain a school-based file that provides demographic information for both public and private schools along with the names of the schools. Thus, there is some possibility that schools at least, and perhaps students as well, could be identified if comparisons of these data sets with the PISA data set allowed the identification of schools.

It might be possible to identify PISA schools by taking variables from the PISA school data and searching the publicly available data files for schools with a matching profile. The variables in the PISA data files were obtained from responses to the school and student questionnaires and from sampling files, school matching analyses were undertaken using probabilistic matching algorithms approved by the IES Disclosure Review Board (DRB) for use in disclosure analyses. These algorithms identify schools with a determinant potential for identification. In order to eliminate the risk for school identification, elements of the data from schools identified as “disclosure risks” were perturbed using IES DRB-approved procedures that minimize data distortion. After perturbation, the data were re-analyzed to ensure that the de-identification of the school data was successful.

An additional measure, also required by the IES DRB, was taken to reduce further the risk of disclosure of an individual respondent. This measure is referred to as “random data swapping”. In data swapping, data records are paired with other records on the file using selected characteristics, and potentially identifying variables are swapped between pairs of records. The background questionnaire data (school and student) were involved in the swapping. The software used for the random data swapping is a sophisticated system that conducts and measures data changes in the swaps in order to minimize any

impact on data usability and reliability. This method is an effective way of keeping as much valuable data as possible while protecting respondent identity. The IES DRB reviewed the results of the random data swapping procedures (pre- and post-swapping percentage distributions and correlations to ensure that data quality was maintained and approved the results. The data were uploaded to ACER and subsequently disseminated to the public.

7.4 Data Editing and File Delivery

Pearson provided data files of the multiple-choice responses from the assessment booklets, student questionnaires, and school questionnaires; the auto-coded responses from the assessment booklets; responses to the session report form; and the occupational codes. These were all formatted based on the international codebooks to Westat on December 6, 2012, via a secure website.

The data delivery to ACER consisted of two steps. First, sampling files were exported from KeyQuest and sent to the sampling group within the PISA consortium. These files contained the school participation and the student tracking, session participation and session timing information for the students. A series of verification checks were run, inconsistencies were corrected or explained, and the files were sent to the consortium.

The second set of data was the assessment booklet, student questionnaire, and school questionnaire responses. The requisite validation checks were run. These included consistency checks between student demographic variables from the questionnaire, such as gender and birth date, and the values in the administration data gathered from the school. Once the validation checks for this submission were complete, the data were sent to ACER.

After receipt, ACER implemented some additional data checking procedures and asked for clarification on a few selected items. Westat provided responses, and ACER made some final editing changes to the dataset.

8. Processing, Scaling, and Weighting

8.1 International Data File Cleaning and Editing

The Australian Council for Educational Research (ACER) applied two procedures to ensure that data cleaning was standardized and validated among all participating education systems for PISA 2012. The first procedure was a set of automated and systematic edit checks. Prior to successful data submission, all national data had to pass through a series of ACER's automated and systemic edit checks. National project managers had to ensure that all data met all requirements for proper data structure and that the identification system within and between files was consistent and correct.

The second cleaning process was the identification of logical errors/inconsistencies and specific edit questions by ACER that were shared with the national data managers. The national data managers reviewed the data and provided ACER with revisions to coding or solutions to anomalies to resolve the inquiries. The audit trail and final results of the data cleaning processes were documented by ACER and shared with the national project managers for final questionnaire data review. ACER compiled background univariate statistics and preliminary classical and Rasch item analysis for final national data manager review of the assessment items. PISA 2012 also included an optional computer-based assessment (CBA) for the United States. These data were verified by the national centers to ensure that they linked back correctly to the student IDs. Since the CBA data did not require range or edit checks, national centers sent the data directly to ACER's data processing center.

8.2 Missing Data

PISA does not impute missing information for questionnaire variables. The international database and the U.S. database contain four kinds of missing data codes that are used across all countries. "Missing" data occur when a respondent is expected to answer an item but gives no response. Responses that are "invalid" occur in multiple choice items for which an invalid response is given. An item is coded "not applicable" when it is not possible for the respondent to answer the question (e.g., an assessment item not included in the student's booklet or an item to be skipped based on a previous item). Finally, test booklet items that are "not reached" are consecutive missing values starting from the end of each test session. All four kinds of missing data are coded differently in the PISA 2012 database.

8.3 Weights for U.S. Data

The use of sampling weights is necessary for the computation of statistically sound, nationally representative estimates. Survey weights adjust for the probabilities of selection for individual schools and students, for school or student nonresponse, or for errors in estimating the size of the school or the number of 15-year-olds in the school at the time of sampling. Survey weighting for all education systems participating in PISA 2012 was carried out by Westat as part of the PISA consortium.

The internationally defined weighting specifications for PISA 2012 included base weights and adjustments for nonresponse. The school base weight was defined as the reciprocal of the school's probability of selection. (For substitute schools, the school base weight was set equal to the base weight of the original school it replaced.) The student base weight was given as the reciprocal of the probability of selection for each selected student from within a school.

These base weights were then adjusted for school and student nonresponse. The school nonresponse adjustment was done individually for each education system using the implicit and explicit strata defined as part of the sample design. In the case of the United States, two variables were used for stratification: school control and Census region. The student nonresponse adjustment was done based on school's explicit stratum; within the final school nonresponse adjustment cells, grade and gender were also used to define nonresponse adjustment. Trimming factors at the school and student levels were used to reduce the size of large weights, since large weights can substantially increase sampling variance. All PISA analyses were conducted using these adjusted sampling weights.

The state sample base weights were similarly adjusted for school and student nonresponse. However, because the state samples did not have any explicit strata, the school nonresponse adjustment was done only using the implicit strata defined as part of the sample design. The student nonresponse adjustment was done within the final school nonresponse adjustment cells, and grade and gender were also used to define nonresponse adjustment. Trimming factors at the school and student level were also used to reduce the size of large weights, since large weights can substantially increase sampling variance. All analyses for states were conducted using these adjusted sampling weights.

8.4 Scaling of Student Test Data

For PISA 2012, the final paper-based assessment consisted of 13 booklets for mathematics, reading, and science items for both the United States and the three states—Connecticut, Florida, and Massachusetts—that participated as separate education systems. The United States also participated in the optional financial literacy assessment. Four additional booklets were used for financial literacy, resulting in a total of 17 test booklets for the paper-based assessment for the United States. In addition, since the United States chose to conduct the optional CBA, a subset of U.S. students completed the CBA in addition to the paper-based assessment.[1] The final CBA consisted of 24 forms. Scaling techniques were used to establish a common scale for all students. Item response theory (IRT) was used to estimate scores for reading, mathematics, and science literacy, as well as for mathematics literacy subscales: content (change and relationship, space and shape, quantity, and uncertainty) and process (formulating, employing, and interpreting).[2]

IRT identifies patterns of response and uses statistical models to predict the probability of answering an item correctly as a function of the student's proficiency in answering other questions. With this method, the performance of a sample of students in a subject area or sub-area can be summarized on a simple scale or series of scales, even when students are administered different items.

[1] Connecticut, Florida, and Massachusetts did not participate in the financial literacy or computer-based assessments.
[2] The combined mathematics literacy scale is made up of all items in the seven subscales. However, the combined mathematics scale and the seven subscales are each computed separately through item response theory (IRT) models. Therefore, the combined mathematics scale score is not the average of the seven subscale scores.

9. The PISA 2012 Data

9.1 PISA 2012 International Datasets

Data from PISA 2012 for all countries can be obtained from the OECD website at http://pisa2012.acer.edu.au/. Problem solving data and results will be available in April, 2014 and financial literacy data and results will be available in July, 2014. Users can either select to download entire files, choose only selected variables, or run simple queries. Files available for download include the following (note that the parent questionnaire, the information communication technology questionnaire, education career questionnaire, and reading for school questionnaire were not administered in the U.S.):

- **Questionnaires**
  - Student questionnaire
  - School questionnaire
  - Parent questionnaire
  - Information communication technology (ICT) questionnaire
  - Education career (EC) questionnaire
  - Reading for school (RFS) questionnaire
- **Codebooks**
  - Codebook for student questionnaire data file
  - Codebook for school questionnaire data file
  - Codebook for parent questionnaire data file
  - Codebook for cognitive item response data file
  - Codebook for scored cognitive item response data file
- **SAS control files**
  - SAS syntax to read in student questionnaire data file
  - SAS syntax to read in school questionnaire data file
  - SAS Syntax to read in parent questionnaire data file
  - SAS Syntax to read in cognitive item response data file

- SAS syntax to read in scored cognitive item response data file

- **SPSS control files**
  - SPSS syntax to read in student questionnaire data file
  - SPSS syntax to read in school questionnaire data file
  - SPSS syntax to read in parent questionnaire data file
  - SPSS syntax to read in cognitive item response data file
  - SPSS syntax to read in scored cognitive item response data file

- **Data sets in TXT format (compressed).** *Note that some of these files are very large.*
  - Student questionnaire data file
  - School questionnaire data file
  - Parent questionnaire data file
  - Cognitive item response data file
  - Scored cognitive item response data file

- **Compendia.** *The compendia provide the distribution of students according to the variables collected through the student, information communication technology, parent, and school questionnaires. The performance means per category are also provided.*
  - Compendium for the student questionnaire
  - Compendium for the school questionnaire
  - Compendium for the parent questionnaire
  - Compendium for the ICT and EC questionnaire
  - Compendium for the RFS questionnaire
  - Compendium for the cognitive item responses

9.2 U.S. National Data Files

Data collected in the United States for PISA 2012 can be downloaded from the international site or from the NCES website at http://nces.ed.gov/surveys/pisa/datafiles.asp. The files on the international website contain data for all countries, including the United States (national sample). The NCES files include data

for the national sample in the United States only; data for Florida, Connecticut, and Massachusetts are available via a restricted-use license. The U.S. data are as follows:

Student data

- The data are contained in US_ST12.TXT. This file contains questionnaire items and derived variable and index scores based on the student questionnaire; plausible values for overall mathematics, mathematics subscales, science scale, and the reading scale from the assessment; and student sampling weights and replicate weights. There are 4,978 cases in this file. Since the data are hierarchical (students are clustered with schools), each student record contains identification variables that enable the user to merge the school data with the student data, using the variable SCHOOLID.
- An SPSS syntax file, US_ST12.SPS.
- An SAS syntax file, US_ST12.SAS.
- A codebook file (US_PISA2012_Student_CB.HTML) that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

School data

- The data are contained in US_SC12.TXT. This file contains items from the school questionnaire, derived variables and index scores based on the school questionnaire, and the school sampling weight. There are 162 cases in this file. The variable SCHOOLID can be used to merge school data with the student data.
- An SPSS syntax file, US_SC12.SPS.
- An SAS syntax file, US_SC12.SAS.
- A codebook file (US_PISA2012_School_CB.HTML) that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

Scored cognitive (assessment) item data

- The data are contained in US_ASSESM12.TXT. This file contains scores of student responses to each item in the assessment. Data are in two response formats: (1) valid scores = 0, 1; 0 = no credit, 1 = full credit; and (2) valid scores = 0, 1, 2; 0 = no credit, 1 = partial credit, 2 = full credit. Also note that unlike the international files, there is no cognitive item response file (unscored responses). The majority of the items have not been released, so there is little descriptive information about them.
- An SPSS syntax file, US_ASSESM12.SPS.

- An SAS syntax file, US_ASSESM12.SAS.
- A codebook file (US_PISA2012_Student_Assessment.HTML) that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

U.S. questionnaires

- Three versions of the U.S. student questionnaire were administered in 2012: MS12_StQ_FormA_ENG_USA_final.PDF, MS12_StQ_FormB_ENG_USA_final.PDF, and MS12_StQ_FormC_ENG_USA_final.PDF.
- The U.S. version of the school questionnaire is in the file: MS12_ScQ_USA_final.PDF

PISA 2012 Technical Report and User Guide

This document contains information on the administration of PISA in the United States.

9.3 National and International Variables

The U.S. national data contain both the "international variables" (questionnaire and assessment variables used by all countries) and a few "national variables" (questionnaire variables adapted or used only in the United States). Note that the same assessment items were used by all countries. There are also some variables that appear in the international files that are missing for the U.S. cases. These include three questionnaires not used in the United States: the parent questionnaire, the information communication technology (ICT) questionnaire, and the education career (EC) questionnaire. Variables used only in the United States and those not used in the United States are shown in tables 25 and 26, respectively.

Table 25. Variables used only in the United States: 2012

Variable name	Questionnaire item wording
Student Questionnaire	
RACETHC	Race/ethnicity derived from Q.4 and Q.5
ST07N01	Have you ever repeated a grade? (in Kindergarten)
ST119A01	What is the highest grade or level of school you expect to complete?
ST26Q15	Which of the following are in your home?...Cable or satellite TV service
ST26Q16	Which of the following are in your home?...A high-speed Internet connection
ST26Q17	Which of the following are in your home?...A musical instrument
School Questionnaire	
SC53A01	Approximately what percentage of students at this school last year were eligible for free or reduced-price lunches through the National School Lunch Program?
SC54A01	About how many students in the 10th grade in your school have a first language that is not English?

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table 26. Variables not used in the United States: 2012

Variable name	Questionnaire item wording
Student Questionnaire	
ST02Q01	Which one of the following programmes are you in?
School Questionnaire	
SC01Q13	Do you have the following grade levels in your school? Grade 13

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

International Variables Recoded From U.S. Questionnaire Variables

Three international questionnaire items on the student questionnaire and one on the school questionnaire needed to be rewritten to be applicable for U.S. questionnaires, and thus required international recoding.

- The international question ST05Q01 (Did you attend <ISCED level 0>?) was adapted into two U.S. questions ST05N01 and ST05N02 ("Did you attend pre-school?" and "Did you attend kindergarten?"). The U.S. values were recoded in ST05Q01 to reflect international values.
- The international questions ST07Q01, ST07Q02, and ST07Q03 ("Have you ever repeated a grade? in grades 1-6/in grades 7-9/in grades 10-12") were adapted into four U.S. questions ST07N01, ST07N02, ST07N03, ST07N04 ("Have you ever repeated a grade? in Kindergarten/in grades 1-6/in grades 7-9/in grades 10-12"). The U.S. values were recoded in ST07Q01, ST07Q02, and ST07Q03 to reflect international values.
- The international questions ST13Q01 and ST17Q01 ("What is the highest level of education completed by your mother/father?") included five options, one of which (ISCED level 3B, 3C) was not relevant in the United States. Thus the U.S versions of these variables (ST13N01 and ST17N01) have four valid responses rather than five and have different value labels than the international versions.
- The international questions SC33N01 through SC33N12 ("Regarding your school, who has a considerable responsibility for the following tasks?") collapsed categories of regional and local education authorities while the U.S. version adapted different value labels than the international version that are relevant in the United States.

9.4 Variable Names

The variable names created by the SPSS and SAS syntax files are those used in international data sets. It should be noted that the variable names do not necessarily correspond with the question numbers on the student and school questionnaires. For convenience, variable item numbers are listed to the right of each question on the questionnaires.

9.5 Derived Variables

The international contractors for PISA have developed a number of derived variables for use in their analyses, and these variables have been included in the student and school files. They appear after the questionnaire variables and have variable names that do not contain numerals. Explanations of several of these variables are included in appendix E, which is abstracted from the second volume of the

international report (OECD 2013c). A more complete explanation of these variables will be provided in the international *PISA 2012 Technical Report* (forthcoming).

10. Using the PISA 2012 Data Files

10.1 Special Considerations—Plausible Values and Replicate Weights

Three aspects of PISA's design need careful attention in any analysis. The first stems from the sample design. The use of sampling weights is necessary for the computation of statistically sound, nationally representative estimates when random sampling is not employed. Although schools and students had known probabilities of selection, these probabilities were unequal. Adjusted survey weights adjust for the probabilities of selection for individual schools and students, for school or student nonresponse, and for errors in estimating the size of the school or the number of 15-year-olds in the school at the time of sampling. Thus, to generalize to the population sampled, analyses will need to apply the sampling weights provided in the file.

The second aspect to be considered also stems from the sampling design and involves the calculation of standard errors. Since the sample design is complex (a two-stage, stratified cluster design), most software packages, operating on the assumption of a simple random sample, will produce biased estimates of standard errors. To use the replicate weights contained in the data file, one must use special procedures to produce unbiased estimates of the standard errors. These procedures involve the use of Fay's method of balanced repeated replicates (BRR) with 80 replicates and the Fay coefficient set to 0.5 to estimate the standard errors and are described in detail in the *PISA Data Analysis Manual: SPSS, Second Edition* (OECD 2009a). These procedures can be implemented in several stand-alone software packages (WesVar, AM, and SUDAAN, for example) by specifying Fay's method of BRR. However, they can also be implemented in SPSS or STATA using the macro posted on the NCES website, or in SAS using the information provided in the *PISA Data Analysis Manual: SAS, Second Edition* (OECD 2009b).

The third aspect arises from the design of PISA's performance variables and the use of plausible values in analysis. In PISA, as in many national and international assessments, students are not administered every assessment item. Each item has missing student responses, though these are missing by design. Thus, it is not possible to estimate scores for individual students. Instead, the results of individual students are aggregated to produce a set of scores for groups of students (e.g., all U.S. 15-year-old students or U.S. 15-year-old female students). The distribution of scores indicates a set of plausible values, which represent a range of abilities for a certain group of students.[3] For analysis purposes, PISA data sets include sets of five plausible values for each of the PISA 2012 scales. Thus, if any analysis were to be undertaken with

[3] For theoretical and empirical justification of the procedures used, see Mislevy (1988). For more information about the methodology used in PISA see OECD (forthcoming).

any of the PISA scales, it should be undertaken five times, once for each plausible value. The results would then be averaged, and any significance tests would have to be adjusted for variation between the first five sets of results. A special provision also needs to be made in the estimation of the standard errors and is best done using the SPSS, STATA, or SAS macro developed for this purpose. Again, these issues are discussed in the *PISA Data Analysis Manual: SPSS, Second Edition* (OECD 2009, pp. 103-115) and *PISA Data Analysis Manual: SAS, Second Edition* (OECD 2009b, pp.105-118).

10.2 Nonresponse Bias

Detailed analyses were conducted to determine if nonresponse at either the school or questionnaire item level resulted in apparent biases in the results. The results indicated that school nonresponse to the study resulted in limited apparent bias of results. (The full nonresponse bias analysis report is included in appendix I.)

10.3 Merging School and Student Data

The PISA sample was designed to yield a representative sample of 15-year-old students enrolled in schools; the school sample was designed to optimize the selection of these students. In these circumstances, it is usually recommended that the school data be disaggregated across students and school attributes be treated as "student characteristics" for the purposes of analyses. This disaggregation can be accomplished by merging the school-level data to the student file using SCHOOLID and the resulting file analyzed at the student level using the replicate weights (W_FSTR1– W_FSTR80).

References

Allen, N.L., Donoghue, J.R., and Schoeps, T.L. (2001). *The NAEP 1998 Technical Report* (NCES 2001–509). U.S. Department of Education. Washington, DC: National Center for Education Statistics.

Chowdhury, S., Chu, A., and Kaufman, S. (2000). Minimizing Overlap in NCES Surveys. *Proceedings of the Survey Methods Research Section, American Statistical Association*, pp. 174-179.

Fleischman, H.L., Hopstock, P.J., Pelczar, M.P., and Shelley, B.E. (2010). *Highlights from PISA 2009: Performance of U.S. 15-Year-Old Students in Reading, Mathematics, and Science Literacy in an International Context* (NCES 2011-004). U.S. Department of Education, National Center for Education Statistics, Washington, DC: U.S. Government Printing Office.

Keyfitz, N. (1951). Sampling with Probability Proportional to Size: Adjustment for Changes in Probabilities. *Journal of the American Statistical Association 46*: 105-109.

Mislevy, R.J. (1988). Randomization-based Inference About Latent Variables From Complex Samples. *Psychometrika 56*(2): 177-196.

Organization for Economic Cooperation and Development (OECD). (2006). *Assessing Scientific, Reading and Mathematical Literacy: A Framework for PISA 2006*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2008). *School Sampling Preparation Manual: PISA 2009 Main Study (Version Two: May 2008)*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2009a). *PISA Data Analysis Manual: SPSS, Second Edition*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2009b). *PISA Data Analysis Manual: SAS, Second Edition*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2011). *School Sampling Preparation Manual: PISA 2012 Main Study*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2010a). *PISA 2009 Results: What Students Know and Can Do – Performance in Reading, Mathematics and Science (Volume I)*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2010b). *PISA 2009 Results: Overcoming Social Background – Equity in Learning Opportunities and Outcomes (Volume II)*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2010c). *PISA 2009 Results: Learning to Learn – Student Engagement, Strategies and Practices (Volume III)*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2010d). *PISA 2009 Results: What Makes a School Successful? Resources, Policies and Practices (Volume IV)*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2010e). *PISA 2009 Results: Learning Trends – Changes in Student Performance Since 2000 (Volume V)*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (forthcoming). *PISA 2012 Technical Report.* Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2013a). *PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving, and Financial Literacy.* Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2013b). *PISA 2012 Results: What Students Know and Can Do – Performance in Mathematics, Reading and Science (Volume I).* Paris: Author.

Organization for Economic Cooperation and Development (OECD). (2013c). *PISA 2012 Results: Excellence through Equity – Giving Every Student the Chance to Succeed (Volume II).* Paris: Author.

Organization for Economic Cooperation and Development (OECD). (forthcoming). *PISA 2012 PSIA 2012 Technical Report.* Paris: Author.

U.S. Department of Education, National Center for Education Statistics (NCES). (2002). *Restricted-Use Data Procedures Manual.* Washington, D.C.: Author.

Appendix A. State Sampling Tables

Table A-1. Number and percentage of students and schools included in the PISA Connecticut school sample, by grade range, locality, and race/ethnicity status: 2012

Grade range	Locale	Race/ethnicity status	Frame		Sample	
			ENR	Percent	Schools	Percent
Total			43,415	100.0	54	100.0
Highest grade 07 or 08	City	15 percent and above	20	0.0	—	†
Highest grade 07 or 08	City	Below 15 percent	—	†		0.0
Highest grade 07 or 08	Urban fringe	15 percent and above	26	0.1	—	†
Highest grade 07 or 08	Urban fringe	Below 15 percent	22	0.1	—	†
Highest grade 07 or 08	Town	15 percent and above	—	†		0.0
Highest grade 07 or 08	Town	Below 15 percent	—	†		0.0
Highest grade 07 or 08	Rural MSA	15 percent and above	3	0.0		0.0
Highest grade 07 or 08	Rural MSA	Below 15 percent	8	0.0		0.0
Highest grade 09	City	15 percent and above	8	0.0		0.0
Highest grade 09	City	Below 15 percent		0.0		0.0
Highest grade 09	Urban fringe	15 percent and above	3	0.0		0.0
Highest grade 09	Urban fringe	Below 15 percent		0.0		0.0
Highest grade 09	Town	15 percent and above		0.0		0.0
Highest grade 09	Town	Below 15 percent		0.0		0.0
Highest grade 09	Rural MSA	15 percent and above		0.0		0.0
Highest grade 09	Rural MSA	Below 15 percent		0.0		0.0
High schools: grades 09-12	City	15 percent and above	10,736	24.7	12	22.2
High schools: grades 09-12	City	Below 15 percent	257	0.6	—	1.9
High schools: grades 09-12	Urban fringe	15 percent and above	11,950	27.5	14	25.9
High schools: grades 09-12	Urban fringe	Below 15 percent	10,136	23.3	11	20.4
High schools: grades 09-12	Town	15 percent and above	668	1.5	—	†
High schools: grades 09-12	Town	Below 15 percent	1,718	4.0	—	†
High schools: grades 09-12	Rural MSA	15 percent and above	1,175	2.7	—	†
High schools: grades 09-12	Rural MSA	Below 15 percent	5,312	12.2	6	11.1
High schools: grades 10-12	City	15 percent and above	71	0.2		0.0
High schools: grades 10-12	City	Below 15 percent		0.0		0.0
High schools: grades 10-12	Urban fringe	15 percent and above	70	0.2		0.0
High schools: grades 10-12	Urban fringe	Below 15 percent	—	†		0.0
High schools: grades 10-12	Town	15 percent and above	—	†		0.0
High schools: grades 10-12	Town	Below 15 percent		0.0		0.0
High schools: grades 10-12	Rural MSA	15 percent and above		0.0		0.0
High schools: grades 10-12	Rural MSA	Below 15 percent	28	0.1		0.0
Other	City	15 percent and above	366	0.8	—	†
Other	City	Below 15 percent		0.0		0.0
Other	Urban fringe	15 percent and above	341	0.8		0.0
Other	Urban fringe	Below 15 percent	103	0.2	—	†
Other	Town	15 percent and above	30	0.1		0.0
Other	Town	Below 15 percent	108	0.2		0.0
Other	Rural MSA	15 percent and above	102	0.2		0.0
Other	Rural MSA	Below 15 percent	146	0.3		0.0

— Not available.
† Not applicable.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table A-2. Number and percentage of students and schools included in the PISA Florida school sample, by grade range, locality, and race/ethnicity status: 2012

Grade range	Locale	Race/ethnicity status	Frame		Sample	
			ENR	Percent	Schools	Percent
Total			196,012	100.0	55	100.0
Highest grade 07 or 08	City	15 percent and above	84	0.0		0.0
Highest grade 07 or 08	City	Below 15 percent	—	†		0.0
Highest grade 07 or 08	Urban fringe	15 percent and above	182	0.1		0.0
Highest grade 07 or 08	Urban fringe	Below 15 percent	16	0.0		0.0
Highest grade 07 or 08	Town	15 percent and above	21	0.0		0.0
Highest grade 07 or 08	Town	Below 15 percent	3	0.0		0.0
Highest grade 07 or 08	Rural MSA	15 percent and above	60	0.0		0.0
Highest grade 07 or 08	Rural MSA	Below 15 percent	9	0.0		0.0
Highest grade 09	City	15 percent and above	19	0.0		0.0
Highest grade 09	City	Below 15 percent		0.0		0.0
Highest grade 09	Urban fringe	15 percent and above	34	0.0		0.0
Highest grade 09	Urban fringe	Below 15 percent	16	0.0		0.0
Highest grade 09	Town	15 percent and above	53	0.0		0.0
Highest grade 09	Town	Below 15 percent		0.0		0.0
Highest grade 09	Rural MSA	15 percent and above	—	†		0.0
Highest grade 09	Rural MSA	Below 15 percent		0.0		0.0
High schools: Grades 09-12	City	15 percent and above	43,452	22.2	13	23.6
High schools: Grades 09-12	City	Below 15 percent	1,750	0.9		0.0
High schools: Grades 09-12	Urban fringe	15 percent and above	88,526	45.2	25	45.5
High schools: Grades 09-12	Urban fringe	Below 15 percent	6,632	3.4	—	†
High schools: Grades 09-12	Town	15 percent and above	6,096	3.1	—	†
High schools: Grades 09-12	Town	Below 15 percent	1,051	0.5		0.0
High schools: Grades 09-12	Rural MSA	15 percent and above	30,195	15.4	9	16.4
High schools: Grades 09-12	Rural MSA	Below 15 percent	4,741	2.4	—	†
High schools: Grades 10-12	City	15 percent and above	424	0.2		0.0
High schools: Grades 10-12	City	Below 15 percent	12	0.0		0.0
High schools: Grades 10-12	Urban fringe	15 percent and above	438	0.2		0.0
High schools: Grades 10-12	Urban fringe	Below 15 percent	139	0.1		0.0
High schools: Grades 10-12	Town	15 percent and above	393	0.2		0.0
High schools: Grades 10-12	Town	Below 15 percent	18	0.0		0.0
High schools: Grades 10-12	Rural MSA	15 percent and above	163	0.1		0.0
High schools: Grades 10-12	Rural MSA	Below 15 percent	—	†		0.0
Other	City	15 percent and above	2,166	1.1		0.0
Other	City	Below 15 percent	—	†		0.0
Other	Urban fringe	15 percent and above	3,456	1.8	—	†
Other	Urban fringe	Below 15 percent	770	0.4		0.0
Other	Town	15 percent and above	941	0.5		0.0
Other	Town	Below 15 percent	219	0.1	—	†
Other	Rural MSA	15 percent and above	2,595	1.3		0.0
Other	Rural MSA	Below 15 percent	1,332	0.7	—	†

— Not available.
† Not applicable.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

Table A-3. Number and percentage of students and schools included in the PISA Massachusetts school sample, by grade range, locality, and race/ethnicity status: 2012

Grade range	Locale	Race/ethnicity status	Frame		Sample	
			ENR	Percent	Schools	Percent
Total			73,160	100.0	54	100.0
Highest grade 07 or 08	City	15 percent and above	25	0.0		0.0
Highest grade 07 or 08	City	Below 15 percent		0.0		0.0
Highest grade 07 or 08	Urban fringe	15 percent and above	43	0.1	—	†
Highest grade 07 or 08	Urban fringe	Below 15 percent	47	0.1	—	†
Highest grade 07 or 08	Town	15 percent and above	—	†		0
Highest grade 07 or 08	Town	Below 15 percent	—	†		0
Highest grade 07 or 08	Rural MSA	15 percent and above		0.0		0
Highest grade 07 or 08	Rural MSA	Below 15 percent	15	0.0	—	†
Highest grade 09	City	15 percent and above		0.0		0.0
Highest grade 09	City	Below 15 percent		0.0		0.0
Highest grade 09	Urban fringe	15 percent and above	6	0.0		0.0
Highest grade 09	Urban fringe	Below 15 percent		0.0		0.0
Highest grade 09	Town	15 percent and above		0.0		0.0
Highest grade 09	Town	Below 15 percent		0.0		0.0
Highest grade 09	Rural MSA	15 percent and above		0.0		0.0
Highest grade 09	Rural MSA	Below 15 percent		0.0		0.0
High schools: Grades 09-12	City	15 percent and above	13,010	17.8	9	16.7
High schools: Grades 09-12	City	Below 15 percent	430	0.6		0.0
High schools: Grades 09-12	Urban fringe	15 percent and above	19,882	27.2	13	24.1
High schools: Grades 09-12	Urban fringe	Below 15 percent	23,012	31.5	17	31.5
High schools: Grades 09-12	Town	15 percent and above	500	0.7		0.0
High schools: Grades 09-12	Town	Below 15 percent	210	0.3		0.0
High schools: Grades 09-12	Rural MSA	15 percent and above	1,851	2.5	—	†
High schools: Grades 09-12	Rural MSA	Below 15 percent	8,334	11.4	6	11.1
High schools: Grades 10-12	City	15 percent and above	9	0.0		0.0
High schools: Grades 10-12	City	Below 15 percent		0.0		0.0
High schools: Grades 10-12	Urban fringe	15 percent and above		0.0		0.0
High schools: Grades 10-12	Urban fringe	Below 15 percent		0.0		0.0
High schools: Grades 10-12	Town	15 percent and above		0.0		0.0
High schools: Grades 10-12	Town	Below 15 percent		0.0		0.0
High schools: Grades 10-12	Rural MSA	15 percent and above		0.0		0.0
High schools: Grades 10-12	Rural MSA	Below 15 percent		0.0		0.0
Other	City	15 percent and above	1,835	2.5	—	†
Other	City	Below 15 percent		0.0		0.0
Other	Urban fringe	15 percent and above	1,119	1.5	—	†
Other	Urban fringe	Below 15 percent	1,067	1.5	—	†
Other	Town	15 percent and above	19	0.0	—	†
Other	Town	Below 15 percent	541	0.7		0.0
Other	Rural MSA	15 percent and above	10	0.0		0.0
Other	Rural MSA	Below 15 percent	1,191	1.6		0.0

— Not available.
† Not applicable.
SOURCE: U.S. 2012 PISA School Sample, Final Report.

Appendix B. State Response Rate Tables

Table B-1. Number and percentage of PISA Connecticut schools, by response status: 2012

Response status	Original		Substitute		Total	
	Number of schools	Percentage of schools	Number of schools	Percentage of schools	Number of schools	Percentage of schools
Total schools	54	100.0	85	100.0	139	100.0
Total eligible schools	51	94.4	0	0.0	51	36.7
Participating	50	98.0	0	NA	50	98.0
Refusal	1	2.0	0	NA	1	2.0
Ineligible/closed	3	5.6	0	0.0	3	2.2
Other (pending, no contact)	0	0.0	85	100.0	85	61.2

NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-2. Number and percentage of PISA Florida schools, by response status: 2012

Response status	Original		Substitute		Total	
	Number of schools	Percentage of schools	Number of schools	Percentage of schools	Number of schools	Percentage of schools
Total schools	55	100.0	110	100.0	165	100.0
Total eligible schools	54	98.2	0	0.0	54	100.0
Participating	54	100.0	0	NA	54	100.0
Refusal	0	0.0	0	NA	0	0.0
Ineligible/closed	1	1.8	0	0.0	1	1.9
Other (pending, no contact)	0	0.0	110	100.0	110	66.7

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-3. Number and percentage of PISA Massachusetts schools, by response status: 2012

Response status	Original		Substitute		Total	
	Number of schools	Percentage of schools	Number of schools	Percentage of schools	Number of schools	Percentage of schools
Total schools	54	100.0	106	100.0	160	100.0
Total eligible schools	49	90.7	0	0.0	49	30.6
Participating	49	100.0	0	NA	49	100.0
Refusal	0	0.0	0	NA	0	0.0
Ineligible/closed	5	9.3	0	0.0	5	3.1
Other (pending, no contact)	0	0.0	106	100.0	106	66.3

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-4. PISA Connecticut status of sampled students: 2012

	Number of students	Percentage of students
Total students sampled	2,099	100.0
To be assessed	1,939	92.4
Non-participation		
Functional disability	7	0.3
Cognitive disability	62	3.0
Insufficient language ability	4	0.2
Ineligible for population	0	0.0
Withdrawn	87	4.1

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-5. PISA Florida status of sampled students: 2012

	Number of students	Percentage of students
Total students sampled	2,268	100.0
To be assessed	2,104	92.8
Non-participation		
Functional disability	9	0.4
Cognitive disability	75	3.3
Insufficient language ability	14	0.6
Ineligible for population	1	0.0
Withdrawn	65	2.9

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-6. PISA Massachusetts status of sampled students: 2012

	Number of students	Percentage of students
Total students sampled	2,056	100.0
To be assessed	1,908	92.8
Non-participation		
Functional disability	1	0.0
Cognitive disability	60	2.9
Insufficient language ability	10	0.5
Ineligible for population	0	0.0
Withdrawn	77	3.7

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-7. Connecticut participation status of students to be assessed: 2012

	Number of students	Percentage of students
Total students to be assessed	1,939	100.0
Assessed	1,697	87.5
Absent	141	7.3
Parent refusal	101	5.2

NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-8. Florida participation status of students to be assessed: 2012

	Number of students	Percentage of students
Total students to be assessed	2,104	100.0
Assessed	1,896	90.1
Absent	163	7.7
Parent refusal	45	2.1

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Table B-9. Massachusetts participation status of students to be assessed: 2012

	Number of students	Percentage of students
Total students to be assessed	1,908	100.0
Assessed	1,723	90.0
Absent	93	5.0
Parent refusal	92	5.0

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2012.

Appendix C. PISA 2012 School Recruiting Materials

Exhibit C-1. State PISA 2012 letter from the NCES Commissioner

[Date]
[Title] [Name First] [Name Last]. [Title/Department]
[State]
[Address 1]
[Address 2]
[City], [State] [Zip code]

Dear [Title] [Name Last]:

I am pleased to inform you that some schools in your state have been randomly selected to participate in the Program for International Student Assessment (PISA) in the fall of 2012. The United States is one of more than 60 countries participating in PISA. PISA will help benchmark student performance in our country to that of other countries around the world. I am writing to ask your agency to support the participation of schools in your state in the PISA 2012 study.

PISA is administered every three years in more than 60 countries and provides important information for comparing the performance of 15-year-old U.S. students in reading, mathematics, and science with 15-year-old students in other countries. For the first time in the United States, computer-based versions of PISA will be administered to see if they can efficiently and effectively collect the same information as pencil and paper assessments. In addition, PISA 2012 will provide an opportunity for the United States to gather information on students' financial literacy compared with other countries.

The assessment process for schools in PISA 2012 is described in more detail in materials enclosed with this letter. The study is sponsored in the United States by the National Center for Education Statistics (NCES) in the U.S. Department of Education and is conducted by Westat in Rockville, Maryland. The U.S. Office of Management and Budget has approved the data collection under OMB # 1850-0755. While participation in this study is entirely voluntary, we ask your agency to support participation on the part of schools in your state so that the United States has a representative sample of schools across the country.

NCES is authorized to conduct this study under the Education Sciences Reform Act of 2002 (Public Law 107-279, Section 153). By law, the data provided by your schools, staff, and students may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose (Public Law 107-279, Section 183 and Title V, subtitle A of the E-Government Act of 2002 (P.L. 107-347)). Reports of the findings from PISA 2012 will not identify participating districts, schools, students, or individual staff. Individual responses will be combined with those from other participants to produce summary statistics and reports.

Within the next few weeks, a representative of Westat will contact sampled school districts and schools to discuss conducting data collection. In the meantime, if you have questions about the study, please do not hesitate to call David Kastberg at 1-888-638-2597 or send an email to PISAHELP@westat.com. You may also get more information about these studies by contacting Dana Kelly at NCES at (202) 219-7101 or visiting the PISA website at: http://nces.ed.gov/surveys/pisa/.

Thank you for your time and support. PISA is an important element in the U.S. effort to benchmark the performance and progress of our education system against international standards.

Sincerely,

Jack Buckley Commissioner
National Center for Education Statistics

cc: [State assessment coordinator name]
Enclosures

Exhibit C-2. School district PISA 2012 letter from the NCES Commissioner

[Date]
[Title] [Name First] [Name Last], [Title/Department]
[School District]
[Address 1]
[City], [State] [Zip code]

Dear [Title] [Name Last]:

I am pleased to inform you that some schools in your district have been randomly selected to participate in the Program for International Student Assessment (PISA) in the fall of 2012. The United States is one of more than 60 countries participating in PISA. PISA will help benchmark student performance in our country to that of other countries around the world. I am writing to ask your agency to support the participation of schools in your district in the PISA 2012 study.

PISA is administered every three years in more than 60 countries and provides important information for comparing the performance of 15-year-old U.S. students in reading, mathematics, and science with 15-year-old students in other countries. In addition, PISA 2012 will provide an opportunity for the United States to gather information on students' financial literacy compared with other countries. The United States will also administer computer-based assessments in mathematics, reading and problem solving.

We ask your agency to support the participation of schools in your district in PISA 2012. To compensate their time and efforts, participating schools will receive $200 (or equivalent in equipment or supplies) and each student who is assessed will receive $25. Students selected for the subsample taking both the paper-and-pencil and computer-based assessments will receive an additional $15. In addition, each school's PISA school coordinator will receive $100 for their time and effort to coordinate PISA in the school.

Materials enclosed with this letter describe the PISA 2012 assessment process for schools in more detail. The assessment is sponsored by the U.S. Department of Education's National Center for Education Statistics (NCES) and is conducted by Westat, a research organization based in Rockville, Maryland. The U.S. Office of Management and Budget has approved the data collection under OMB # 1850-0755. While participation in this study is entirely voluntary, we ask your agency to support participation on the part of schools in your district so that the United States has a representative sample of schools across the country.

Within the next few days, a representative of Westat will contact the following school or schools in your district that have been selected to participate in the study: [LIST SAMPLED SCHOOLS HERE…].

NCES is authorized to conduct this study under the Education Sciences Reform Act of 2002 (Public Law 107-279, Section 153). By law, the data provided by your schools, staff, and students may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose (Public Law 107-279, Section 183 and Title V, subtitle A of the E-Government Act of 2002 (P.L. 107-347)). We will disclose the names of schools only to the governing district for each school, and we require that each district maintain the confidentiality of the sampled schools in the PISA 2012 study. Reports of the findings from the study will not identify participating districts, schools, students, or individual staff. Individual responses will be combined with those from other participants to produce summary statistics and reports.

If you have any questions, please do not hesitate to call 1-888-638-2597 or send an email to PISAHELP@westat.com. You may also get more information about this study by contacting Dana Kelly at NCES at 202-219-7101 or visiting the PISA website at: http://nces.ed.gov/surveys/pisa/.

Thank you for your time and support. PISA is an important element in the U.S. effort to benchmark the performance and progress of our education system against international standards.

Sincerely,

Jack Buckley, Commissioner
National Center for Education Statistics

Exhibit C-3. School principal 2012 letter from the NCES Commissioner

[Date]
[Title] [Name First] [Name Last], [Title/Department]
[School District]
[Address 1]
[City], [State] [Zip code]

Dear [Title] [Name Last]:

I am pleased to inform you that your school has the opportunity to be a part of the upcoming Program for International Student Assessment (PISA) 2012. In PISA 2012, the United States will participate along with more than 60 other countries in a study that produces important international benchmarks in reading, mathematics, science, general problem-solving, and financial literacy of 15-year-old students. Your school is one of 240 across the United States that has been randomly selected to take part in PISA in the fall of 2012.

The study will measure our students' knowledge and skills in mathematics, reading, science, problem solving and financial literacy, and compare their results with those of students of other countries. I encourage your school's participation in PISA 2012, as it will PISA provide valuable information about our students' abilities at the national and international level. As compensation for time and effort, your school will receive $200 and students who are assessed will receive $25. Some students will also be selected to take an additional assessment on a computer. These students will receive an additional $15. Your school's PISA school coordinator (a staff person you designate to liaise with PISA staff) will receive $100 for his or her time and effort coordinating PISA in the school.

Materials enclosed with this letter further describe the PISA 2012 assessment process for schools. The assessment is sponsored in the United States by the U.S. Department of Education's National Center for Education Statistics (NCES) and is conducted by Westat in Rockville, Maryland. The U.S. Office of Management and Budget has approved the data collection under OMB # 1850-0755. We will only disclose the names of schools to the governing district for each school, and we require that each district maintain the confidentiality of the sampled schools in the PISA2012 study. For more information on the confidentiality of the data collected, please see the enclosed FAQ. I hope you will participate in this voluntary study because it is important that the United States has a nationally representative sample of schools.

Within the next few days, a representative of Westat will call you to answer any questions you have and discuss your participation in PISA. If you have any questions about PISA 2012 or your school's participation before then, please feel free to call 1-888-638-2597, or send an email to PISAHELP@westat.com. You may also contact Dana Kelly at NCES at (202) 219-7101 or visit the PISA website at: http://nces.ed.gov/surveys/pisa/ for more information about PISA.

Your participation in the PISA 2012 Study is vital; I hope you and your school will take advantage of this opportunity. Thank you for your time and for supporting this important international study.

Sincerely,

Jack Buckley Commissioner
National Center for Education Statistics
Enclosures

NCES is authorized to conduct this study under the Education Sciences Reform Act of 2002 (Public Law 107-279, Section 153). By law, the data provided by your school, staff, and students may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose (Public Law 107-279, Section 183 and Title V, subtitle A of the E-Government Act of 2002 (P.L. 107-347)).

Exhibit C-4. PISA study brochure

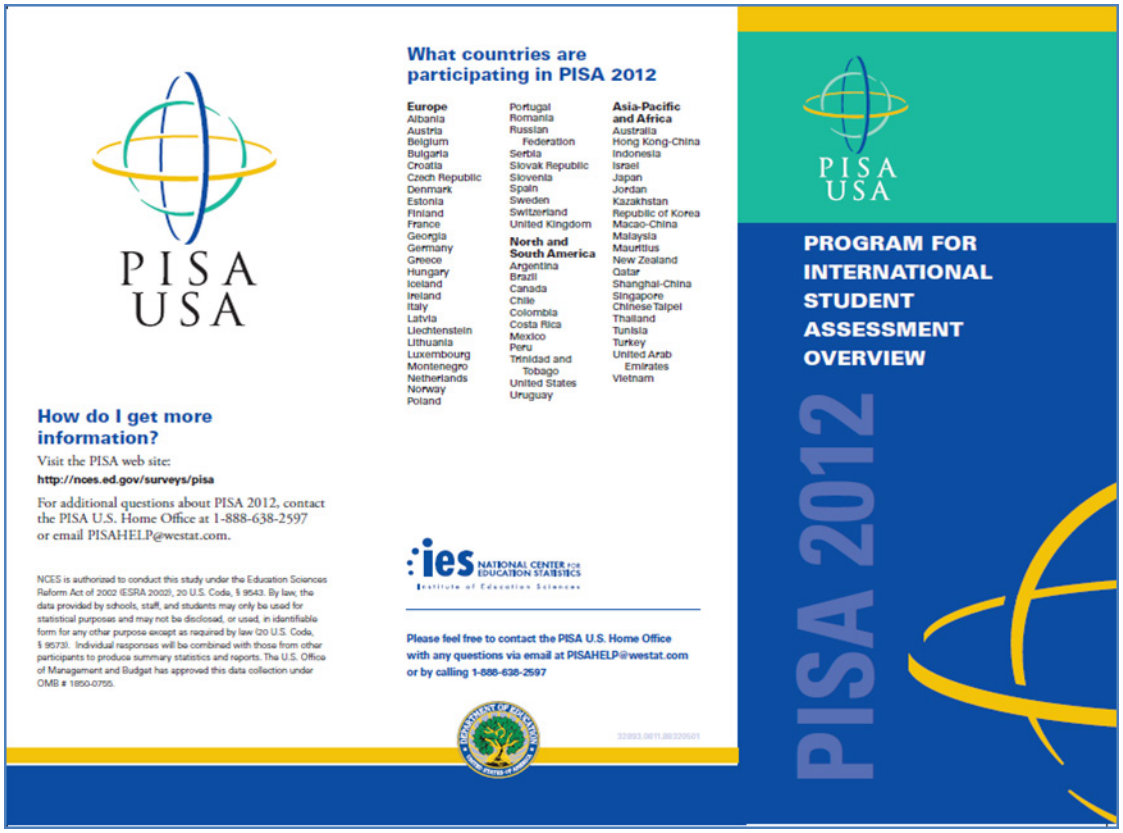


Exhibit C-5. Summary of activities for schools

SUMMARY OF ACTIVITIES FOR PISA 2012

	Winter 2011	Summer – Fall 2012 Pre-assessment Contact	Fall 2012 Assessment Visit	Benefits
Principal	▪ Identify a school coordinator.	▪ Complete a School Questionnaire on the characteristics of the school and its enrollment, resources, policies, and learning environment.		▪ Represent other similar U.S. schools. ▪ Receive U.S. national report with PISA 2012 results. ▪ Receive $200 check for your school's participation. ▪ Receive report with your school's PISA results compared with other countries (provided response rate and sample size requirements are met).
School Coordinator	▪ Select an assessment date convenient for your school. ▪ Arrange for the use of a classroom or an alternative quiet space for the assessment. ▪ Determine parent notification procedures.	▪ Invited to International PISA Conference in Washington, D.C. ▪ Provide a list of eligible students to PISA staff. ▪ Notify teachers, selected students, and students' parents of the study and benefits of participating. ▪ Coordinate the principal's completion of the School Questionnaire. ▪ Confirm the date and location of the assessment for PISA staff. ▪ Collect parental consent forms where required and submit to PISA staff.	▪ Arrange assessment space. ▪ Help ensure all sampled students attend the assessment. ▪ Collect completed School Questionnaire and return it to PISA staff. ▪ Ensure all sampled students are released from class for the assessment. ▪ Meet with PISA staff and review the assessment procedures.	▪ Receive U.S. national report with PISA 2012 results. ▪ Receive $200 for participating.
Students			▪ Take the assessment and complete a Student Questionnaire, in a 3-hour session. ▪ Some of these students will also take a computer-based assessment in an 80-minute session.	▪ Receive a Certificate of Volunteer Service for 4 hours of community service. ▪ Represent other U.S. students like themselves and contribute to the profile of what American students know and can do. ▪ Receive compensation for participating. Students will receive $25 for completing the paper-based assessment and an additional $15, if selected, for participating in the computer-based assessment.
PISA Staff	▪ Provide school with materials explaining PISA and its importance. ▪ Work with the school coordinator to set an assessment date. ▪ Maintain school and student confidentiality.	▪ Call the school coordinator to discuss assessment day, space, and student participation. ▪ Select a random sample of eligible students to participate. ▪ Provide a School Questionnaire to the school coordinator.	▪ Conduct assessment from start to finish. ▪ Furnish all the assessment materials, pencils, test booklets, and computers. ▪ Conduct a follow-up interview with the school coordinator at the end of the assessment. ▪ Pack up the materials to ensure that the assessments are complete and secure.	
Find Out More	http://nces.ed.gov/surveys/PISA			

Exhibit C-6. PISA FAQ (front)

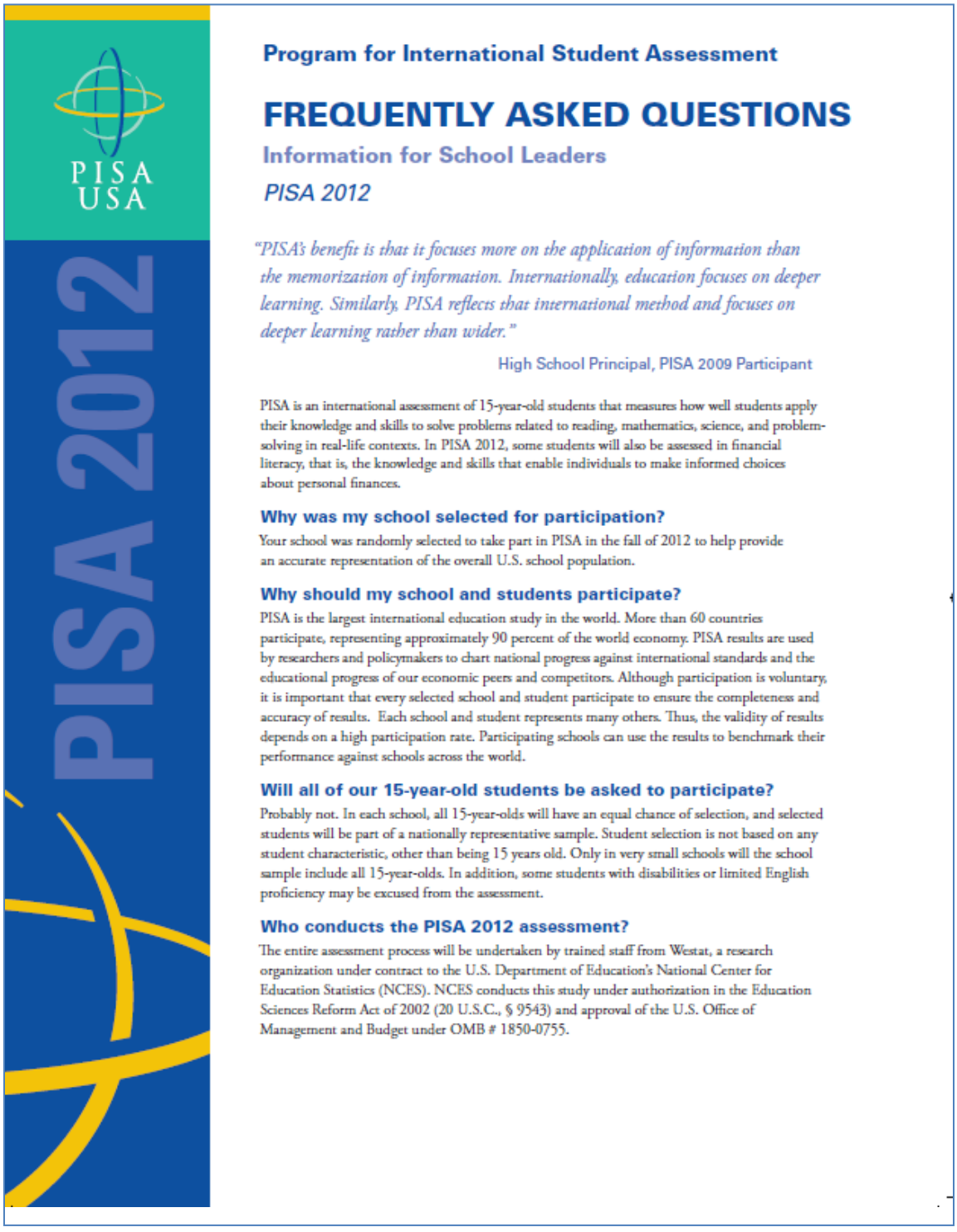


Exhibit C-6. PISA FAQ (back)

Appendix D. Student and Parent Materials

Exhibit D-1. Student invitation

PISA
USA

Welcome to the U.S. PISA Team!

Student Name

Congratulations, you have been selected to be part of a special group of students representing the United States in the

Program for International Student Assessment (PISA) 2012.

This fall, selected students from the United States will match their knowledge and skills in reading, mathematics, science, problem solving, and financial literacy against students from 66 other countries.

Join us on....

PISA Date:
PISA Time:
PISA Location:

Exhibit D-2. Explicit parent materials

Sample Explicit Consent Letter, PISA

SCHOOL LETTERHEAD

{DATE}

Dear Parent or Guardian,

This letter is to inform you about an important international study of student learning being conducted in fall 2012. This study is called the Program for International Student Assessment or PISA for short. PISA provides important information for internationally benchmarking performance in reading, mathematics, and science of 15-year-old students in the United States against top countries around the world.

Our school has accepted an invitation from the National Center for Education Statistics (NCES), U.S. Department of Education, to participate in PISA 2012. Fifty of our 15-year-old students, along with your teenager, will take part in this study. The enclosed summary sheet provides some background to PISA, explains what is involved for each student selected to participate in the study, and gives a contact phone number and email address where you can find answers to any questions you might have. If enough of our selected students participate, our school will receive a report comparing our students' performance with other countries.

To have an accurate picture of what U.S. 15-year-old students can do, it is important that each student selected take part in the study. I urge you to support this effort by encouraging your teenager to take part; however, participation in this study is entirely voluntary. Previous experience suggests that students actually enjoy taking part, and all students participating in the paper-and-pencil assessment will receive $25. About half of the students will also be selected to participate in a second, computer-based test session. These students will receive an additional $15. NCES may contact your teenager after the PISA assessment for a follow up study to look at the relationship between performance on PISA and other outcomes. In order to do so NCES will ask your teenager for contact information.

NCES is authorized to conduct this study under the Education Sciences Reform Act of 2002 (ESRA 2002), 20 U.S. Code, § 9543. By law, the data provided by your schools, staff, and students may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law (20 U.S. Code, § 9573). Students and schools are never identified in any reports. All reported statistics are based on aggregate data.

Before we can allow your teenager to join in the PISA study we must have your written consent. Please let us know by completing the attached form and returning it to the school.

Thank you for taking the time to learn about this important study and consider your teenager's participation in it. We wish you all the best.

Sincerely,

Enclosures:
Facts for Parents About PISA 2012
Parent/Guardian Consent Form

Exhibit D-2. Explicit parent materials—Continued

Explicit Consent Form

Program for International Student Assessment (PISA 2012)
Parent/Guardian Consent Form

Your teenager has been asked to participate in an international study of student learning called the Program for International Student Assessment (PISA). This assessment will be conducted by a team of researchers from Westat, who are operating under contract on behalf of the U. S. Department of Education. In the fall of 2012, approximately 165 schools across the United States will participate in the study.

❑ Yes, I do grant permission for my teenager to participate in the PISA 2012.

❑ No, I do not grant permission for my teenager to participate in the PISA 2012.

_____
(Signature of parent or guardian)

Date of signature: _____/_____/_____

Student name: _____ *(PLEASE PRINT)*

School name: _____ *(PLEASE PRINT)*

Exhibit D-3. Parent notification

Sample Notification Letter, PISA

SCHOOL LETTERHEAD

{DATE}

Dear Parent or Guardian,

This letter is to inform you about an important international study of student learning being conducted in our school in fall 2012. This study is called the Program for International Student Assessment or PISA for short. PISA provides important information for internationally benchmarking performance in reading, mathematics, and science of 15-year-old students in the United States against top countries around the world.

Our school has accepted an invitation from the National Center for Education Statistics (NCES), U.S. Department of Education, to participate in PISA 2012. Fifty of our 15-year-old students, along with your teenager, will take part in this study. The enclosed summary sheet provides some background to PISA, explains what is involved for each student selected to participate in the study, and gives a contact phone number and email address where you can find answers to any questions you might have. If enough of our selected students participate, our school will receive a report comparing our students' performance with other countries

To have an accurate picture of what U.S. 15-year-old students can do, it is important that each student selected take part in the study. I urge you to support this effort by encouraging your teenager to take part; however, participation in this study is entirely voluntary. Previous experience suggests that students actually enjoy taking part, and all students participating in the paper-and-pencil assessment will receive $25. About half of the students will also be selected to participate in a second, computer-based test session. These students will receive an additional $15. NCES may contact your teenager after the PISA assessment for a follow up study to look at the relationship between performance on PISA and other outcomes. In order to do so NCES will ask your teenager for contact information.

NCES is authorized to conduct this study under the Education Sciences Reform Act of 2002 (ESRA 2002), 20 U.S. Code, § 9543. By law, the data provided by your schools, staff, and students may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law (20 U.S. Code, § 9573). Students and schools are never identified in any reports. All reported statistics are based on aggregated data.

Thank you for taking the time to learn about this important study. We wish you all the best.

Sincerely,

Enclosures:
Facts for Parents About PISA 2012

Exhibit D-4. Fact sheet for parents

Facts for Parents About PISA

PISA USA

Facts for Parents About PISA 2012

In the fall of 2012, your teenager's school will participate in PISA 2012. The schools were selected randomly to represent the nation's schools and, within each school, about 50 students were selected randomly to take part. Your teenager was among those students selected to take part in the study.

What is PISA?

PISA (the Program for International Student Assessment) is an international assessment that measures student learning in reading, mathematics, and science. The assessment occurs every three years and provides information about how students in the United States compare in achievement with students in other countries. More than 60 countries will be participating in PISA 2012. The National Center for Education Statistics within the U.S. Department of Education sponsors U.S. participation in PISA.

What is involved?

PISA staff will visit the school and administer the assessment, which consists of two sessions. The first session will take approximately 3 hours; it includes time for instructions, the administration of the paper-and-pencil assessment, and a brief questionnaire that students complete about themselves. The second session is administered on computer; about half of the students who took the paper-based assessment will participate in the approximately 80 minute session, which includes time for instructions. As part of a follow-up study to look at the relationship between performance on PISA and other outcomes, NCES may contact participating students after the PISA assessment.

Why both paper and pencil and computer-based sessions?

All participating countries currently administer the paper-based PISA assessment and a growing number are administering PISA on computer as well. Computers are increasingly being used in and outside of classrooms. Computers offer multiple ways of presenting information that cannot be provided in a paper-based assessment. Computer-based assessments allow students to interact more directly with the assessment tasks presented in order to solve problems and answer questions. PISA 2012 is the beginning of a transition to a wider use of computer-based assessments in future PISA cycles. When more countries are able to administer PISA on computer it is anticipated that PISA will be administered only on computer.

What are the benefits?

The nation as a whole benefits from PISA by having a greater understanding of how the knowledge and skills of U.S. students compare with those of students from other countries. Schools that participate in PISA will receive an honorarium, and each student who participates in the paper-and-pencil assessment will receive $25. Those students that also participate in the second, computer-based session will receive an additional $15.

Where can I find out more about PISA?

More information about PISA is available at the PISA website at http://www.nces.ed.gov/surveys/pisa/. If you have specific questions you can call PISA staff at 1-888-638-2597 or e-mail us at PISAHELP@westat.com.

Exhibit D-5. Certificate of volunteer service

Exhibit D-6. Student FAQ

PISA USA

PISA 2012

Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Students

What is PISA?

PISA is an international assessment of 15-year-old students that assesses how well students apply their knowledge and skills in mathematics, reading, science, problem solving and financial literacy. PISA presents problems that students would encounter in the real world.

Think of PISA as an Olympics of the mind.
The United States is one of 67 countries participating in PISA.

Why should I participate in PISA?

You represent other students like you all across the country. PISA informs discussions about U.S. education and international competitiveness.

Only about 5,000 students will participate in PISA in the United States, representing students nationwide.

Participating in PISA is a national service.
How often do you get to represent your country?

What subjects are assessed in PISA?

You will answer questions about mathematics, reading, science, financial literacy, or a combination of these subjects in a paper-and-pencil assessment. Some students will also be selected to take an assessment on a computer and will answer questions about reading, mathematics, problem-solving, or a combination of these subjects. You will also complete a questionnaire about your home and school experiences.

How long does PISA take?

Students will take a paper-and-pencil assessment lasting about three hours. Some students will also take an 80-minute computer-based assessment.

How does PISA select a representative sample of students?

The schools that participate in PISA in the United States are randomly selected from a list of all schools in the country that have 15-year-old students. This is to ensure that U.S. participants accurately represent the whole United States and not just particular types of schools or students. In each PISA school, each 15-year-old student has an equal chance of being selected. From a list of all 15-year-old students in the school, 50 students are randomly selected to participate. Participants in other countries are selected just the same way to make sure each country is fairly represented and no country has an advantage because of types of schools or students selected. As part of a follow-up study to look at the relationship between performance on PISA and other outcomes, NCES may contact you after the PISA assessment.

NCES is authorized to conduct this study under the Education Sciences Reform Act of 2002 (ESRA 2002), 20 U.S. Code, § 9543. By law, the data provided by schools, staff, and students may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law (20 U.S. Code, § 9573).

ies NATIONAL CENTER FOR EDUCATION STATISTICS
Institute of Education Sciences

O.M.B. No. 1850-0755

32154.0812.88320802

Appendix E. PISA 2012 Student and School Questionnaires

Exhibit E-1. PISA 2012 student questionnaire

OECD Program for International Student Assessment 2012

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

USA

Date of Test (Main Survey PISA 2012)		
Month	Day	2012

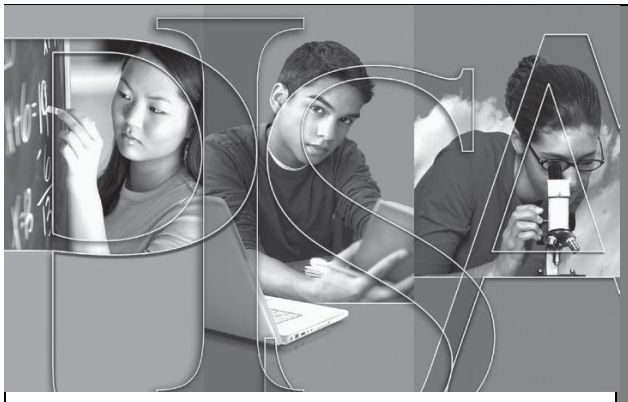
Student Questionnaire - Form A

Place Label Here

Student ID

Participation Status

English 313



Project Consortium

- Australian Council for Educational Research (ACER)
- cApStAn Linguistic Quality Control (Belgium)
- Deutsches Institut für Internationale Pädagogische Forschung (DIPF, Germany)
- Educational Testing Service (ETS, USA)
- Institutt for Lærerutdanning og Skoleutvikling (ILS, Norway)
- Leibniz - Institute for Science and Mathematics Education (IPN, Germany)
- National Institute for Educational Policy Research (NIER, Japan)
- The Tao Initiative: CRP - Henri Tudor and Université de Luxembourg EMACS (Luxembourg)
- Unité d'analyse des systèmes et des pratiques d'enseignement (aSPe, Belgium)
- Westat (USA)

Exhibit E-1. PISA 2012 student questionnaire—Continued

In this booklet you will find questions about:

- You (Section A)
- Your Family and Home (Section B)
- Learning Mathematics (Section C and Section E)
- Your Problem Solving Experiences (Section D)

Please read each question carefully and answer as accurately as you can. In the test, you usually circled your answers. For this questionnaire, you will normally answer by darkening a circle. For a few questions you will need to write a short answer.

If you make a mistake when darkening a circle, erase your mistake and darken the correct circle. If you make a mistake when writing an answer, simply cross it out and write the correct answer next to it.

In this questionnaire, there are no right or wrong answers. Your answers should be the ones that are right for you.

You may ask for help if you do not understand something or are not sure how to answer a question.

Your answers will be combined with answers from other students to calculate totals and averages. All information (or responses) you provide may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law [Education Science Reform Act of 2002 (ESRA 2002), 20 U.S. Code, Section 9573].

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION A: ABOUT YOU

ST01

Q1 What grade are you in?

_____

grade

ST03

Q2 When were you born?

(Please write the month, day and year you were born.)

_____ _____ *19___*

Month *Day* *Year*

ST04

Q3 Are you female or male?

Female *Male*

○1 ○2

USA_ST116A01

Q4 Which best describes you?

(Please darken only one circle.)

I am Hispanic or Latino. ○1

I am <u>not</u> Hispanic or Latino. ○2

Exhibit E-1. PISA 2012 student questionnaire—Continued

USA_ST117A01

Q5 Which of these categories best describes your race?

(Please darken one or more circles.)

White	○ 1
Black or African American	○ 1
Asian	○ 1
American Indian or Alaska Native	○ 1
Native Hawaiian or Other Pacific Islander	○ 1

USA_ST05N01

Q6 Did you attend pre-school?

No	○ 1
Yes, for one year or less	○ 2
Yes, for more than one year	○ 3

USA_ST05N02

Q7 Did you attend kindergarten?

No	○ 1
Yes	○ 2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST06

Q8 How old were you when you started first grade?

_____ *years old*

USA_ST07N01

Q9 Have you ever repeated a grade?

(Please darken only one circle in each row.)

	No, never	*Yes, once*	*Yes, twice or more*
a) In kindergarten	○1	○2	○3
b) In grades 1-6	○1	○2	○3
c) In grades 7-9	○1	○2	○3
d) In grades 10-12	○1	○2	○3

ST08

Q10 In the last two full weeks of school, how many times did you arrive late for school?

(Please darken only one circle.)

None ○1

One or two times ○2

Three or four times ○3

Five or more times ○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST09

Q11 In the last two full weeks of school, how many times did you skip a whole school day?

(Please darken only one circle.)

None	○ 1
One or two times	○ 2
Three or four times	○ 3
Five or more times	○ 4

ST115

Q12 In the last two full weeks of school, how many times did you skip some classes?

(Please darken only one circle.)

None	○ 1
One or two times	○ 2
Three or four times	○ 3
Five or more times	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

USA_ST119A01

Q13 What is the highest grade or level of school you expect to complete?

(Please darken only one circle.)

Less than high school	○ 1
High school (high school diploma or GED)	○ 2
Vocational or technical certificate (such as cosmetology or auto mechanics)	○ 3
Associate's degree (2-year degree from a community college)	○ 4
Bachelor's degree (4-year college degree)	○ 5
Master's degree	○ 6
Doctoral or professional degree such as medicine or law	○ 7

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION B: ABOUT YOUR FAMILY AND HOME

In this section you will be asked some questions about your family and your home.

Some of the following questions are about your mother and father or those persons who are like a mother or father to you — for example, guardians, step-parents, foster parents, etc.

If you share your time with more than one set of parents or guardians, please answer the following questions for those parents/guardians you spend the most time with.

ST11

Q14 Who usually lives at home with you?

(Please darken only one circle in each row.)

	Yes	*No*
a) Mother (including stepmother or foster mother)	○ 1	○ 2
b) Father (including stepfather or foster father)	○ 1	○ 2
c) Brother(s) (including stepbrothers)	○ 1	○ 2
d) Sister(s) (including stepsisters)	○ 1	○ 2
e) Grandparent(s)	○ 1	○ 2
f) Others (e.g., cousin)	○ 1	○ 2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST12

Q15 What is your mother's main job? (e.g., school teacher, cook, sales manager)

(If she is not working now, please tell us her last main job.)

Please write in the job title. _____

Q16 What does your mother do in her main job? (e.g., teaches high school students, helps prepare meals in a restaurant, manages a sales team)

Please use a sentence to describe the kind of work she does or did in that job.

_____

ST13

Q17 What is the highest level of schooling (not including college) completed by your mother?

If you are not sure which circle to choose, please ask the test administrator for help.

(Please darken only one circle.)

She completed grade 12 (high school diploma or GED)	○ 1
She completed grade 9	○ 2
She completed grade 6	○ 3
She did not complete grade 6	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST14

Q18 Does your mother have any of the following degrees, certificates, or diplomas?

If you are not sure how to answer this question, please ask the test administrator for help.

(Please darken only one circle in each row.)

		Yes	*No*
a)	Master's, doctoral, or professional degree such as medicine or law	○ 1	○ 2
b)	Bachelor's degree (4-year college degree)	○ 1	○ 2
c)	Associate's degree (2-year degree from a community college)	○ 1	○ 2
d)	Vocational or technical certificate/diploma after high school (such as cosmetology or auto mechanics)	○ 1	○ 2

ST15

Q19 What is your mother currently doing?

(Please darken only one circle.)

Working full-time for pay ○ 1

Working part-time for pay ○ 2

Not working, but looking for a job ○ 3

Other (e.g., home duties, retired) ○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST16

Q20 What is your father's main job? (e.g., school teacher, cook, sales manager)

(If he is not working now, please tell us his last main job.)

Please write in the job title. _____

Q21 What does your father do in his main job? (e.g., teaches high school students, helps prepare meals in a restaurant, manages a sales team)

Please use a sentence to describe the kind of work he does or did in that job.

_____

ST17

Q22 What is the highest level of schooling (not including college) completed by your father?

If you are not sure how to answer this question, please ask the test administrator for help.

(Please darken only one circle.)

He completed grade 12 (high school diploma or GED)	○ 1
He completed grade 9	○ 2
He completed grade 6	○ 3
He did not complete grade 6	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST18

Q23 Does your father have any of the following degrees, certificates, or diplomas?

If you are not sure which circle to choose, please ask the test administrator for help.

(Please darken one circle in each row.)

	Yes	*No*
a) Master's, doctoral, or professional degree such as medicine or law	○1	○2
b) Bachelor's degree (4-year college degree)	○1	○2
c) Associate's degree (2-year degree from a community college)	○1	○2
d) Vocational or technical certificate/diploma after high school (such as cosmetology or auto mechanics)	○1	○2

ST19

Q24 What is your father currently doing?

(Please darken only one circle.)

Working full-time for pay ○1

Working part-time for pay ○2

Not working, but looking for a job ○3

Other (e.g., home duties, retired) ○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST20

Q25 In what country were you and your parents born?

(Please darken only one circle in each column.)

	You	*Mother*	*Father*
United States*	○ 01	○ 01	○ 01
Other country	○ 02	○ 02	○ 02

*NOTE: The "United States" refers to the 50 states, District of Columbia, and U.S. military bases abroad.

ST21

Q26 If <u>you</u> were NOT born in the United States, how old were you when you arrived in the United States?

If you were less than 12 months old, please write zero (0).

If you were born in the United States please skip this question and go to Q27.

_____ *years old*

ST25

Q27 What language do you speak at home most of the time?

(Please darken only one circle.)

English	○ 313
Spanish	○ 156
Other language	○ 859

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST26

Q28 Which of the following are in your home?

(Please darken only one circle in each row.)

	Yes	*No*
a) A desk to study at	○1	○2
b) A room of your own	○1	○2
c) A quiet place to study	○1	○2
d) A computer you can use for school work	○1	○2
e) Educational software	○1	○2
f) A link to the Internet	○1	○2
g) Classic literature (e.g., Shakespeare)	○1	○2
h) Books of poetry	○1	○2
i) Works of art (e.g., paintings)	○1	○2
j) Books to help with your school work	○1	○2
k) Technical reference books or manuals	○1	○2
l) A dictionary	○1	○2
m) A dishwasher	○1	○2
n) A DVD player	○1	○2
o) A guest room	○1	○2
p) A high-speed Internet connection	○1	○2
q) A musical instrument	○1	○2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST27

Q29 How many of these are there at your home?

(Please darken only one circle in each row.)

	None	*One*	*Two*	*Three or more*
a) Cell phones	○	○	○	○ 4
b) Televisions	○	○	○	○ 4
c) Computers	○	○	○	○ 4
d) Cars	○	○	○	○ 4
e) Bathrooms with a bathtub or shower	○	○	○	○ 4

ST28

Q30 How many books are there in your home?

There are usually about 15 books per foot of shelving. Do not include magazines, newspapers, or your schoolbooks.

(Please darken only one circle.)

0-10 books ○ 1

11-25 books ○ 2

26-100 books ○ 3

101-200 books ○ 4

201-500 books ○ 5

More than 500 books ○ 6

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION C: ABOUT LEARNING MATHEMATICS

ST29

Q31 Thinking about your views on mathematics: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I enjoy reading about mathematics.	○ 1	○ 2	○ 3	○ 4
b) Making an effort in mathematics is worth it because it will help me in the work that I want to do later on.	○ 1	○ 2	○ 3	○ 4
c) I look forward to my mathematics lessons.	○ 1	○ 2	○ 3	○ 4
d) I do mathematics because I enjoy it.	○ 1	○ 2	○ 3	○ 4
e) Learning mathematics is worthwhile for me because it will improve my career prospects.	○ 1	○ 2	○ 3	○ 4
f) I am interested in the things I learn in mathematics.	○ 1	○ 2	○ 3	○ 4
g) Mathematics is an important subject for me because I need it for what I want to study later on.	○ 1	○ 2	○ 3	○ 4
h) I will learn many things in mathematics that will help me get a job.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST35

Q32 Thinking about how people important to you view mathematics: how strongly do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Most of my friends do well in mathematics.	○ 1	○ 2	○ 3	○ 4
b) Most of my friends work hard at mathematics.	○ 1	○ 2	○ 3	○ 4
c) My friends enjoy taking mathematics tests.	○ 1	○ 2	○ 3	○ 4
d) My parents believe it's important for me to study mathematics.	○ 1	○ 2	○ 3	○ 4
e) My parents believe that mathematics is important for my career.	○ 1	○ 2	○ 3	○ 4
f) My parents like mathematics.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST37

Q33 How confident do you feel about having to do the following mathematics tasks?

(Please darken only one circle in each row.)

	Very confident	*Confident*	*Not very confident*	*Not at all confident*
a) Using a train schedule to figure out how long it would take to get from one place to another.	○1	○2	○3	○4
b) Calculating how much cheaper a TV would be after a 30% discount.	○1	○2	○3	○4
c) Calculating how many square feet of tile you need to cover a floor.	○1	○2	○3	○4
d) Understanding graphs presented in newspapers.	○1	○2	○3	○4
e) Solving an equation like 3x+5= 17.	○1	○2	○3	○4
f) Finding the actual distance between two places on a map with a 1:10,000 scale.	○1	○2	○3	○4
g) Solving an equation like 2(x+3) = (x + 3)(x - 3).	○1	○2	○3	○4
h) Calculating the gas mileage of a car.	○1	○2	○3	○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST43

Q34 Thinking about your mathematics lessons: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) If I put in enough effort I can succeed in mathematics.	○ 1	○ 2	○ 3	○ 4
b) Whether or not I do well in mathematics is completely up to me.	○ 1	○ 2	○ 3	○ 4
c) Family demands or other problems prevent me from putting a lot of time into my mathematics work.	○ 1	○ 2	○ 3	○ 4
d) If I had different teachers I would try harder in mathematics.	○ 1	○ 2	○ 3	○ 4
e) If I wanted to I could do well in mathematics.	○ 1	○ 2	○ 3	○ 4
f) I do badly in mathematics whether or not I study for my exams.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST44

Q35 Suppose that you are a student in the following situation:

Each week, your mathematics teacher gives a short quiz. Recently you have done badly on these quizzes. Today you are trying to figure out why.

How likely are you to have these thoughts or feelings in this situation?

(Please darken only one circle in each row.)

	Very likely	*Likely*	*Slightly likely*	*Not at all likely*
a) I'm not very good at solving mathematics problems.	○ 1	○ 2	○ 3	○ 4
b) My teacher did not explain the concepts well this week.	○ 1	○ 2	○ 3	○ 4
c) This week I guessed badly on the quiz.	○ 1	○ 2	○ 3	○ 4
d) Sometimes the course material is too hard.	○ 1	○ 2	○ 3	○ 4
e) The teacher did not get students interested in the material.	○ 1	○ 2	○ 3	○ 4
f) Sometimes I am just unlucky.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST46

Q36 Thinking about the mathematics you do for school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I have my homework finished in time for mathematics class.	○ 1	○ 2	○ 3	○ 4
b) I work hard on my mathematics homework.	○ 1	○ 2	○ 3	○ 4
c) I am prepared for my mathematics exams.	○ 1	○ 2	○ 3	○ 4
d) I study hard for mathematics quizzes.	○ 1	○ 2	○ 3	○ 4
e) I keep studying until I understand mathematics material.	○ 1	○ 2	○ 3	○ 4
f) I pay attention in mathematics class.	○ 1	○ 2	○ 3	○ 4
g) I listen in mathematics class.	○ 1	○ 2	○ 3	○ 4
h) I avoid distractions when I am studying mathematics.	○ 1	○ 2	○ 3	○ 4
i) I keep my mathematics work well organized.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST48

Q37 For each pair of statements, please choose the item that best describes you.

a) Please darken only one of the following two circles.

○1 I intend to take additional mathematics courses after I finish high school.

○2 I intend to take additional English courses after I finish high school.

b) Please darken only one of the following two circles.

○1 I plan on majoring in a subject in college that requires mathematics skills.

○2 I plan on majoring in a subject in college that requires science skills.

c) Please darken only one of the following two circles.

○1 I am willing to study harder in my mathematics classes than is required.

○2 I am willing to study harder in my English classes than is required.

d) Please darken only one of the following two circles.

○1 I plan on taking as many mathematics classes as I can during my education.

○2 I plan on taking as many science classes as I can during my education.

e) Please darken only one of the following two circles.

○1 I am planning on pursuing a career that involves a lot of mathematics

○2 I am planning on pursuing a career that involves a lot of science.

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST49

Q38 How often do you do the following things at school and outside of school?

(Please darken only one circle in each row.)

	Always or almost always	*Often*	*Sometimes*	*Never or rarely*
a) I talk about mathematics problems with my friends.	○ 1	○ 2	○ 3	○ 4
b) I help my friends with mathematics.	○ 1	○ 2	○ 3	○ 4
c) I do mathematics as an extracurricular activity.	○ 1	○ 2	○ 3	○ 4
d) I take part in mathematics competitions.	○ 1	○ 2	○ 3	○ 4
e) I do mathematics more than 2 hours a day outside of school.	○ 1	○ 2	○ 3	○ 4
f) I play chess.	○ 1	○ 2	○ 3	○ 4
g) I program computers.	○ 1	○ 2	○ 3	○ 4
h) I participate in a mathematics club.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION D: ABOUT YOUR PROBLEM SOLVING EXPERIENCES

ST93

Q39 How well does each of the following statements describe you?

(Please darken only one circle in each row.)

	Very much like me	*Mostly like me*	*Somewhat like me*	*Not much like me*	*Not at all like me*
a) When confronted with a problem I give up easily.	○ 1	○ 2	○ 3	○ 4	○ 5
b) I put off difficult problems.	○ 1	○ 2	○ 3	○ 4	○ 5
c) I remain interested in the tasks that I start.	○ 1	○ 2	○ 3	○ 4	○ 5
d) I continue working on tasks until everything is perfect.	○ 1	○ 2	○ 3	○ 4	○ 5
e) When confronted with a problem I do more than what is expected of me.	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST94

Q40 How well does each of the following statements describe you?

(Please darken only one circle in each row.)

	Very much like me	*Mostly like me*	*Somewhat like me*	*Not much like me*	*Not at all like me*
a) I can handle a lot of information.	○ 1	○ 2	○ 3	○ 4	○ 5
b) I am quick to understand things.	○ 1	○ 2	○ 3	○ 4	○ 5
c) I seek explanations for things.	○ 1	○ 2	○ 3	○ 4	○ 5
d) I can easily link facts together.	○ 1	○ 2	○ 3	○ 4	○ 5
e) I like to solve complex problems.	○ 1	○ 2	○ 3	○ 4	○ 5

ST96

Q41 *Suppose that you have been sending text messages from your cell phone for several weeks. Today, however, you can't send text messages. You want to try to solve the problem.*

What would you do? For each suggestion, darken the option that best applies to you.

(Please darken only one circle in each row.)

	I would definitely do this	*I would probably do this*	*I would probably not do this*	*I would definitely not do this*
a) I press every button possible to find out what is wrong.	○ 1	○ 2	○ 3	○ 4
b) I think about what might have caused the problem and what I can do to solve it.	○ 1	○ 2	○ 3	○ 4
c) I read the manual.	○ 1	○ 2	○ 3	○ 4
d) I ask a friend for help.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST101

Q42 *Suppose that you are planning a trip to the zoo with your brother. You don't know which route to take to get there.*

What would you do? For each suggestion, darken the option that best applies to you.

(Please darken only one circle in each row.)

	I would definitely do this	*I would probably do this*	*I would probably not do this*	*I would definitely not do this*
a) I read the zoo brochure to see if it says how to get there.	○ 1	○ 2	○ 3	○ 4
b) I study a map and figure out the best route.	○ 1	○ 2	○ 3	○ 4
c) I leave it to my brother to worry about how to get there.	○ 1	○ 2	○ 3	○ 4
d) I know roughly where it is, so I suggest we just start driving.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST104

Q43 *Suppose that you arrive at the train station. There is a ticket machine that you have never used before. You want to buy a ticket.*

What would you do? For each suggestion, darken the option that best applies to you.

(Please darken only one circle in each row.)

	I would definitely do this	*I would probably do this*	*I would probably not do this*	*I would definitely not do this*
a) I check how similar it is to other ticket machines I have used.	○1	○2	○3	○4
b) I try out all the buttons to see what happens.	○1	○2	○3	○4
c) I ask someone for help.	○1	○2	○3	○4
d) I try to find a ticket office at the station to buy a ticket.	○1	○2	○3	○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION E: MORE QUESTIONS ABOUT LEARNING MATHEMATICS

ST53

Q44 For each group of three items, please choose the item that best describes your approach to mathematics.

a) Please darken only one of the following three circles.

○1 When I study for a mathematics test, I try to figure out what are the most important parts to learn.

○2 When I study for a mathematics test, I try to understand new concepts by relating them to things I already know.

○3 When I study for a mathematics test, I learn as much as I can by heart.

b) Please darken only one of the following three circles.

○1 When I study mathematics, I try to figure out which concepts I still do not understand completely.

○2 When I study mathematics, I think of new ways to get the answer.

○3 When I study mathematics, I make myself check to see if I remember the work I have already done.

c) Please darken only one of the following three circles.

○1 When I study mathematics, I try to relate the work to things I have learned in other subjects.

○2 When I study mathematics, I start by working out exactly what I need to learn.

○3 When I study mathematics, I go over some problems so often that I feel as if I could solve them in my sleep.

d) Please darken only one of the following three circles.

○1 In order to remember the method for solving a mathematics problem, I go through examples again and again.

○2 I think about how the mathematics I have learned can be used in everyday life.

○3 When I cannot understand something in mathematics, I always search for more information to clarify the problem.

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST55

Q45 How many hours do you typically spend per week attending out-of-school-time lessons in the following subjects?

These are only lessons in subjects that you are also learning at school, that you spend extra time learning outside of normal school hours. The lessons may be given at your school, at your home or somewhere else.

(Please darken only one circle in each row.)

	I do not attend out-of-school-time lessons in this subject	*Less than 2 hours a week*	*2 or more but less than 4 hours a week*	*4 or more but less than 6 hours a week*	*6 or more hours a week*
a) English (e.g., language arts, literature, writing)	○ 1	○ 2	○ 3	○ 4	○ 5
b) Mathematics	○ 1	○ 2	○ 3	○ 4	○ 5
c) Science	○ 1	○ 2	○ 3	○ 4	○ 5
d) Other subjects	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST57

Q46 Thinking about all school subjects: on average, how many hours do you spend each week on the following?

When answering, include time spent on the weekend too.

a) Homework or other material assigned by your teachers _____ *hours per week*

b) Out of the time spent in (a), how many hours do you work on your homework with somebody overlooking and providing help if necessary ("guided homework"), either at school or elsewhere? _____ *hours per week*

c) Work with a personal tutor (whether paid or not) _____ *hours per week*

d) Attend out of school classes organized by a commercial company and paid for by your parents _____ *hours per week*

e) Study with a parent or other family member _____ *hours per week*

f) Practice content from school lessons by working on a computer (e.g., learn vocabulary with training software) _____ *hours per week*

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST61

Q47 How often have you encountered the following types of mathematics tasks during your time at school?

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) Figuring out from a train schedule how long it would take to get from one place to another.	○ 1	○ 2	○ 3	○ 4
b) Calculating how much more expensive a computer would be after adding tax.	○ 1	○ 2	○ 3	○ 4
c) Calculating how many square feet of tile you need to cover a floor.	○ 1	○ 2	○ 3	○ 4
d) Understanding scientific tables presented in an article.	○ 1	○ 2	○ 3	○ 4
e) Solving an equation like $6x^2 + 5 = 29$.	○ 1	○ 2	○ 3	○ 4
f) Finding the actual distance between two places on a map with a 1:10,000 scale.	○ 1	○ 2	○ 3	○ 4
g) Solving an equation like $2(x+3) = (x + 3)(x - 3)$.	○ 1	○ 2	○ 3	○ 4
h) Calculating the power consumption of an electronic appliance per week.	○ 1	○ 2	○ 3	○ 4
i) Solving an equation like $3x + 5 = 17$.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST62

Q48 Thinking about mathematical concepts: how familiar are you with the following terms?

(Please darken only one circle in each row.)

	Never heard of it	*Heard of it once or twice*	*Heard of it a few times*	*Heard of it often*	*Know it well, understand the concept*
a) Exponential Function	○ 1	○ 2	○ 3	○ 4	○ 5
b) Divisor	○ 1	○ 2	○ 3	○ 4	○ 5
c) Quadratic Function	○ 1	○ 2	○ 3	○ 4	○ 5
d) Proper Number	○ 1	○ 2	○ 3	○ 4	○ 5
e) Linear Equation	○ 1	○ 2	○ 3	○ 4	○ 5
f) Vectors	○ 1	○ 2	○ 3	○ 4	○ 5
g) Complex Number	○ 1	○ 2	○ 3	○ 4	○ 5
h) Rational Number	○ 1	○ 2	○ 3	○ 4	○ 5
i) Radicals	○ 1	○ 2	○ 3	○ 4	○ 5
j) Subjunctive Scaling	○ 1	○ 2	○ 3	○ 4	○ 5
k) Polygon	○ 1	○ 2	○ 3	○ 4	○ 5
l) Declarative Fraction	○ 1	○ 2	○ 3	○ 4	○ 5
m) Congruent Figure	○ 1	○ 2	○ 3	○ 4	○ 5
n) Cosine	○ 1	○ 2	○ 3	○ 4	○ 5
o) Arithmetic Mean	○ 1	○ 2	○ 3	○ 4	○ 5
p) Probability	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST69

Q49 How many minutes, on average, are there in a class period for the following subjects?

a) Minutes in a class period in English (e.g., language arts, literature, writing): _____ *minutes*

b) Minutes in a class period in mathematics: _____ *minutes*

c) Minutes in a class period in science: _____ *minutes*

ST70

Q50 How many class periods per week do you typically have for the following subjects?

a) Number of class periods per week in English (e.g., language arts, literature, writing): _____ *class periods*

b) Number of class periods per week in mathematics: _____ *class periods*

c) Number of class periods per week in science: _____ *class periods*

ST71

Q51 In a normal, full week at school, how many class periods do you have in total?

Number of **ALL** class periods _____ *class periods*

ST72

Q52 On average, about how many students attend your English class (e.g., language arts, literature, writing)?

_____ *students*

Exhibit E-1. PISA 2012 student questionnaire—Continued

The next four questions are about your experience with different kinds of mathematics problems at school. You will see descriptions of problems and gray-colored boxes, each containing a mathematics problem.

Please read each problem. You do NOT need to solve it.

ST73

Q53 *In this box are two problems. Each requires you to understand a problem written in text and perform the appropriate calculations. Usually the problem talks about practical situations, but the numbers, people and places mentioned are made up. All the information you need is given. Here are two examples.*

1) Ann is two years older than Betty and Betty is four times as old as Sam. When Betty is 30, how old is Sam?

2) Mr. Smith bought a television and a bed. The television cost $625 but he got a 10% discount. The bed cost $200. He paid $20 for delivery. How much money did Mr. Smith spend?

We want to know your experience with this type of word problem at school. Do not solve them!

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST74

Q54 *Below are examples of another type of mathematics problem.*

1) Solve 2x + 3 = 7.
2) Find the volume of a box with sides 3m, 4m and 5m.

We want to know about your experience with this type of problem at school. Do not solve them!

(Please darken only one circle in each row.)

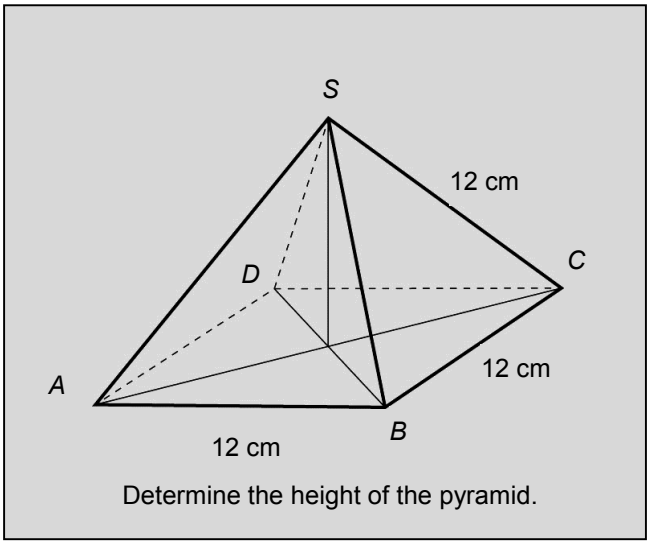
	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST75

Q55 *In the next type of problem, you have to use mathematical knowledge and draw conclusions. There is no practical application provided. Here are two examples.*

1) Here you need to use geometrical theorems:



2) Here you have to know what a prime number is:

If n is any number: can $(n+1)^2$ be a prime number?

We want to know about your experience with this type of problem at school. Do not solve them!

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

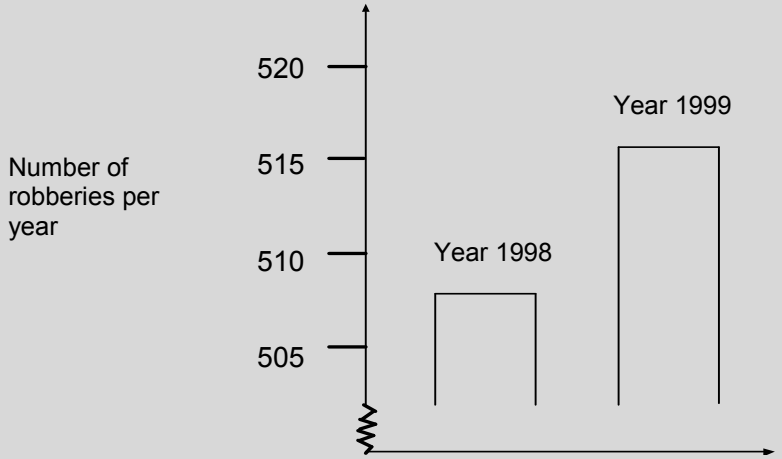
Exhibit E-1. PISA 2012 student questionnaire—Continued

ST76

Q56 *In this type of problem, you have to apply suitable mathematical knowledge to find a useful answer to a problem that arises in everyday life or work. The data and information are about real situations. Here are two examples.*

Example 1:

A TV reporter says "This graph shows that there is a huge increase in the number of robberies from 1998 to 1999."



Do you consider the reporter's statement to be a reasonable interpretation of the graph? Give an explanation to support your answer.

Example 2:

For years the relationship between a person's recommended maximum heart rate and the person's age was described by the following formula:

Recommended maximum heart rate = 220 - *age*

Recent research showed that this formula should be modified slightly. The new formula is as follows:

Recommended maximum heart rate = 208 – (0.7 × *age*)

From which age onwards does the recommended maximum heart rate increase as a result of the introduction of the new formula? Show your work.

Exhibit E-1. PISA 2012 student questionnaire—Continued

We want to know about your experience with this type of problem at school. Do not solve them!

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

Thank you very much for your cooperation in completing this questionnaire!

Exhibit E-1. PISA 2012 student questionnaire—Continued

OECD Program for International Student Assessment 2012

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

USA

Date of Test (Main Survey PISA 2012)		
_____ Month	_____ Day	2012

Student Questionnaire - Form B

Place Label Here

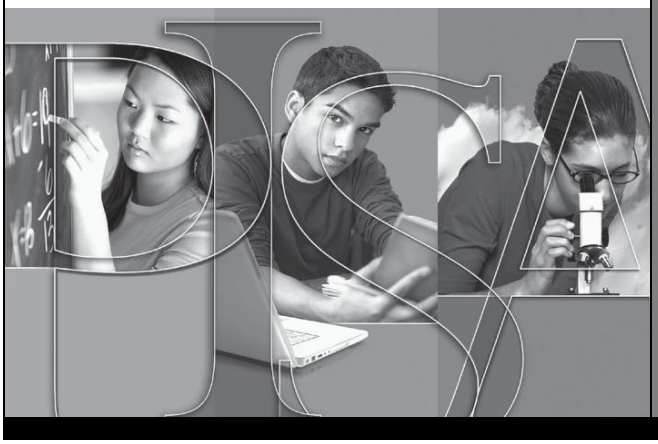
Student ID

Participation Status

English 313

U.S. participation in this study is sponsored by the National Center for Education Statistics (NCES), U.S. Department of Education. Your responses are protected by federal statute (20 U.S.C., § 9573). Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law. By law, everyone working on this NCES survey is subject to a jail term of up to 5 years, a fine of up to $250,000, or both if he or she willfully discloses ANY identifiable information about you.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. The valid OMB control number for this voluntary information collection is 1850-0755. The time required to complete this information collection is estimated to average 30 minutes per response, including the time to review instructions, search existing data resources, gather the data needed, and complete and review the information collection. **If you have any comments concerning the accuracy of the time estimate(s) or suggestions for improving the form, please write to**: U.S. Department of Education, Washington, D.C. 20202-4537. **If you have comments or concerns regarding the status of your individual submission of this form, write directly to:** Program for International Student Assessment (PISA), National Center for Education Statistics, U.S. Department of Education, 1990 K Street, N.W., Washington, D.C. 20006. O.M.B. No. 1850-0755, Approval Expires 11/30/2013



Project Consortium

- Australian Council for Educational Research (ACER)
- cApStAn Linguistic Quality Control (Belgium)
- Deutsches Institut für Internationale Pädagogische Forschung (DIPF, Germany)
- Educational Testing Service (ETS, USA)
- Institutt for Lærerutdanning og Skoleutvikling (ILS, Norway)
- Leibniz - Institute for Science and Mathematics Education (IPN, Germany)
- National Institute for Educational Policy Research (NIER, Japan)
- The Tao Initiative: CRP - Henri Tudor and Université de Luxembourg EMACS (Luxembourg)
- Unité d'analyse des systèmes et des pratiques d'enseignement (aSPe, Belgium)
- Westat (USA)

Exhibit E-1. PISA 2012 student questionnaire—Continued

In this booklet you will find questions about:

- You (Section A)
- Your Family and Home (Section B)
- Your Mathematics Experiences (Section C)
- Your School (Section D)
- Learning Mathematics (Section E)
- Your Problem Solving Experiences (Section F)

Please read each question carefully and answer as accurately as you can. In the test, you usually circled your answers. For this questionnaire, you will normally answer by darkening a circle. For a few questions you will need to write a short answer.

If you make a mistake when darkening a circle, erase your mistake and darken the correct circle. If you make a mistake when writing an answer, simply cross it out and write the correct answer next to it.

In this questionnaire, there are no right or wrong answers. Your answers should be the ones that are right for you.

You may ask for help if you do not understand something or are not sure how to answer a question.

Your answers will be combined with answers from other students to calculate totals and averages. All information (or responses) you provide may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law [Education Science Reform Act of 2002 (ESRA 2002), 20 U.S. Code, Section 9573].

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION A: ABOUT YOU

ST01

Q1 What grade are you in?

_____

grade

ST03

Q2 When were you born?

(Please write the month, day and year you were born.)

_____ _____ *19___*

Month *Day* *Year*

ST04

Q3 Are you female or male?

Female ○1

Male ○2

USA_ST116A01

Q4 Which best describes you?

(Please darken only one circle.)

I am Hispanic or Latino. ○1

I am <u>not</u> Hispanic or Latino. ○2

Exhibit E-1. PISA 2012 student questionnaire—Continued

USA_ST117A01

Q5 Which of these categories best describes your race?

(Please darken one or more circles.)

White	○ 1
Black or African American	○ 1
Asian	○ 1
American Indian or Alaska Native	○ 1
Native Hawaiian or Other Pacific Islander	○ 1

USA_ST05N01

Q6 Did you attend pre-school?

No	○ 1
Yes, for one year or less	○ 2
Yes, for more than one year	○ 3

USA_ST05N02

Q7 Did you attend kindergarten?

No	○ 1
Yes	○ 2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST06

Q8 How old were you when you started first grade?

_____ *years old*

USA_ST07N01

Q9 Have you ever repeated a grade?

(Please darken only one circle in each row.)

	No, never	*Yes, once*	*Yes, twice or more*
a) In kindergarten	○1	○2	○3
b) In grades 1-6	○1	○2	○3
c) In grades 7-9	○1	○2	○3
d) In grades 10-12	○1	○2	○3

ST08

Q10 In the last two full weeks of school, how many times did you arrive late for school?

(Please darken only one circle.)

None ○1

One or two times ○2

Three or four times ○3

Five or more times ○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST09

Q11 In the last two full weeks of school, how many times did you skip a whole school day?

(Please darken only one circle.)

None	○ 1
One or two times	○ 2
Three or four times	○ 3
Five or more times	○ 4

ST115

Q12 In the last two full weeks of school, how many times did you skip some classes?

(Please darken only one circle.)

None	○ 1
One or two times	○ 2
Three or four times	○ 3
Five or more times	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

USA_ST119A01

Q13 What is the highest grade or level of school you expect to complete?

(Please darken only one circle.)

Less than high school	○ 1
High school (high school diploma or GED)	○ 2
Vocational or technical certificate (such as cosmetology or auto mechanics)	○ 3
Associate's degree (2-year degree from a community college)	○ 4
Bachelor's degree (4-year college degree)	○ 5
Master's degree	○ 6
Doctoral or professional degree such as medicine or law	○ 7

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION B: ABOUT YOUR FAMILY AND HOME

In this section you will be asked some questions about your family and your home.

Some of the following questions are about your mother and father or those persons who are like a mother or father to you — for example, guardians, step-parents, foster parents, etc.

If you share your time with more than one set of parents or guardians, please answer the following questions for those parents/guardians you spend the most time with.

ST11

Q14 Who usually lives at home with you?

(Please darken only one circle in each row.)

	Yes	*No*
a) Mother (including stepmother or foster mother)	○ 1	○ 2
b) Father (including stepfather or foster father)	○ 1	○ 2
c) Brother(s) (including stepbrothers)	○ 1	○ 2
d) Sister(s) (including stepsisters)	○ 1	○ 2
e) Grandparent(s)	○ 1	○ 2
f) Others (e.g., cousin)	○ 1	○ 2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST12

Q15 What is your mother's main job? (e.g., school teacher, cook, sales manager)

(If she is not working now, please tell us her last main job.)

Please write in the job title. _____

Q16 What does your mother do in her main job? (e.g., teaches high school students, helps prepare meals in a restaurant, manages a sales team)

Please use a sentence to describe the kind of work she does or did in that job.

_____

ST13

Q17 What is the highest level of schooling (not including college) completed by your mother?

If you are not sure which circle to choose, please ask the test administrator for help.

(Please darken only one circle.)

She completed grade 12 (high school diploma or GED)	○ 1
She completed grade 9	○ 2
She completed grade 6	○ 3
She did not complete grade 6	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST14

Q18 Does your mother have any of the following degrees, certificates, or diplomas?

If you are not sure how to answer this question, please ask the test administrator for help.

(Please darken only one circle in each row.)

	Yes	*No*
a) Master's, doctoral, or professional degree such as medicine or law	○ 1	○ 2
b) Bachelor's degree (4-year college degree)	○ 1	○ 2
c) Associate's degree (2-year degree from a community college)	○ 1	○ 2
d) Vocational or technical certificate/diploma after high school (such as cosmetology or auto mechanics)	○ 1	○ 2

ST15

Q19 What is your mother currently doing?

(Please darken only one circle.)

Working full-time for pay ○ 1

Working part-time for pay ○ 2

Not working, but looking for a job ○ 3

Other (e.g., home duties, retired) ○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST16

Q20 What is your father's main job? (e.g., school teacher, cook, sales manager)

(If he is not working now, please tell us his last main job.)

Please write in the job title. _____

Q21 What does your father do in his main job? (e.g., teaches high school students, helps prepare meals in a restaurant, manages a sales team)

Please use a sentence to describe the kind of work he does or did in that job.

_____

ST17

Q22 What is the highest level of schooling (not including college) completed by your father?

If you are not sure how to answer this question, please ask the test administrator for help.

(Please darken only one circle.)

He completed grade 12 (high school diploma or GED)	○ 1
He completed grade 9	○ 2
He completed grade 6	○ 3
He did not complete grade 6	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST18

Q23 Does your father have any of the following degrees, certificates, or diplomas?

If you are not sure which circle to choose, please ask the test administrator for help.

(Please darken only one circle in each row.)

	Yes	*No*
a) Master's, doctoral, or professional degree such as medicine or law	○1	○2
b) Bachelor's degree (4-year college degree)	○1	○2
c) Associate's degree (2-year degree from a community college)	○1	○2
d) Vocational or technical certificate/diploma after high school (such as cosmetology or auto mechanics)	○1	○2

ST19

Q24 What is your father currently doing?

(Please darken only one circle.)

Working full-time for pay ○1

Working part-time for pay ○2

Not working, but looking for a job ○3

Other (e.g., home duties, retired) ○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST20

Q25 In what country were you and your parents born?

(Please darken only one circle in each column.)

	You	*Mother*	*Father*
United States*	○ 01	○ 01	○ 01
Other country	○ 02	○ 02	○ 02

*NOTE: The "United States" refers to the 50 states, District of Columbia, and U.S. military bases abroad.

ST21

Q26 If <u>you</u> were NOT born in the United States, how old were you when you arrived in the United States?

If you were less than 12 months old, please write zero (0).

If you were born in the United States please skip this question and go to Q27.

_____ *years old*

ST25

Q27 What language do you speak at home most of the time?

(Please darken only one circle.)

English	○ 313
Spanish	○ 156
Other language	○ 859

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST26

Q28 Which of the following are in your home?

(Please darken only one circle in each row.)

	Yes	*No*
a) A desk to study at	○1	○2
b) A room of your own	○1	○2
c) A quiet place to study	○1	○2
d) A computer you can use for school work	○1	○2
e) Educational software	○1	○2
f) A link to the Internet	○1	○2
g) Classic literature (e.g., Shakespeare)	○1	○2
h) Books of poetry	○1	○2
i) Works of art (e.g., paintings)	○1	○2
j) Books to help with your school work	○1	○2
k) Technical reference books or manuals	○1	○2
l) A dictionary	○1	○2
m) A dishwasher	○1	○2
n) A DVD player	○1	○2
o) A guest room	○1	○2
p) A high-speed Internet connection	○1	○2
q) A musical instrument	○1	○2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST27

Q29 How many of these are there at your home?

(Please darken only one circle in each row.)

	None	*One*	*Two*	*Three or more*
a) Cell phones	○	○	○	○ 4
b) Televisions	○	○	○	○ 4
c) Computers	○	○	○	○ 4
d) Cars	○	○	○	○ 4
e) Bathrooms with a bathtub or shower	○	○	○	○ 4

ST28

Q30 How many books are there in your home?

There are usually about 15 books per foot of shelving. Do not include magazines, newspapers, or your schoolbooks.

(Please darken only one circle.)

0-10 books ○ 1

11-25 books ○ 2

26-100 books ○ 3

101-200 books ○ 4

201-500 books ○ 5

More than 500 books ○ 6

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION C: ABOUT YOUR MATHEMATICS EXPERIENCES

ST77

Q31 How often do these things happen in your mathematics classes?

(Please darken only one circle in each row.)

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
a) The teacher shows an interest in every student's learning.	○ 1	○ 2	○ 3	○ 4
b) The teacher gives extra help when students need it.	○ 1	○ 2	○ 3	○ 4
c) The teacher helps students with their learning.	○ 1	○ 2	○ 3	○ 4
d) The teacher continues teaching until the students understand.	○ 1	○ 2	○ 3	○ 4
e) The teacher gives students an opportunity to express opinions.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST79

Q32 How often do these things happen in your mathematics classes?

(Please darken only one circle in each row.)

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
a) The teacher sets clear goals for our learning.	○ 1	○ 2	○ 3	○ 4
b) The teacher asks me or my classmates to present our thinking or reasoning at some length.	○ 1	○ 2	○ 3	○ 4
c) The teacher gives different work to classmates who have difficulties learning and/or to those who can advance faster.	○ 1	○ 2	○ 3	○ 4
d) The teacher assigns projects that require at least one week to complete.	○ 1	○ 2	○ 3	○ 4
e) The teacher tells me about how well I am doing in my mathematics class.	○ 1	○ 2	○ 3	○ 4
f) The teacher asks questions to check whether we have understood what was taught.	○ 1	○ 2	○ 3	○ 4
g) The teacher has us work in small groups to come up with joint solutions to a problem or task.	○ 1	○ 2	○ 3	○ 4
h) At the beginning of a lesson, the teacher presents a short summary of the previous lesson.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
i) The teacher asks us to help plan classroom activities or topics.	○ 1	○ 2	○ 3	○ 4
j) The teacher gives me feedback on my strengths and weaknesses in mathematics.	○ 1	○ 2	○ 3	○ 4
k) The teacher tells us what is expected of us when we get a test, quiz or assignment.	○ 1	○ 2	○ 3	○ 4
l) The teacher tells us what we have to learn.	○ 1	○ 2	○ 3	○ 4
m) The teacher tells me what I need to do to become better in mathematics.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST80

Q33 Thinking about the mathematics teacher that taught your last mathematics class: how often does each of the following happen?

(Please darken only one circle in each row.)

	Always or almost always	*Often*	*Sometimes*	*Never or rarely*
a) The teacher asks questions that make us reflect on the problem.	○ 1	○ 2	○ 3	○ 4
b) The teacher gives problems that require us to think for an extended time.	○ 1	○ 2	○ 3	○ 4
c) The teacher asks us to decide on our own procedures for solving complex problems.	○ 1	○ 2	○ 3	○ 4
d) The teacher presents problems for which there is no immediately obvious method of solution.	○ 1	○ 2	○ 3	○ 4
e) The teacher presents problems in different contexts so that students know whether they have understood the concepts.	○ 1	○ 2	○ 3	○ 4
f) The teacher helps us to learn from mistakes we have made.	○ 1	○ 2	○ 3	○ 4
g) The teacher asks us to explain how we have solved a problem.	○ 1	○ 2	○ 3	○ 4
h) The teacher presents problems that require students to apply what they have learned to new contexts.	○ 1	○ 2	○ 3	○ 4
i) The teacher gives problems that can be solved in several different ways.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST81

Q34 How often do these things happen in your mathematics classes?

(Please darken only one circle in each row.)

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
a) Students don't listen to what the teacher says.	○1	○2	○3	○4
b) There is noise and disorder.	○1	○2	○3	○4
c) The teacher has to wait a long time for students to quiet down.	○1	○2	○3	○4
d) Students cannot work well.	○1	○2	○3	○4
e) Students don't start working for a long time after the lesson begins.	○1	○2	○3	○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST82

Q35 Below you will find descriptions of three mathematics teachers. Read each of the descriptions of these teachers, then let us know to what extent you agree with the final statement.

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Ms. Anderson assigns mathematics homework every other day. She always gets the answers back to students before examinations. **Ms. Anderson is concerned about her students' learning.**	○ 1	○ 2	○ 3	○ 4
b) Mr. Crawford assigns mathematics homework once a week. He always gets the answers back to students before examinations. **Mr. Crawford is concerned about his students' learning.**	○ 1	○ 2	○ 3	○ 4
c) Ms. Dalton assigns mathematics homework once a week. She never gets the answers back to students before examinations. **Ms. Dalton is concerned about her students' learning.**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST83

Q36 Thinking about the mathematics teacher who taught your last mathematics class: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) My teacher lets us know we need to work hard.	○ 1	○ 2	○ 3	○ 4
b) My teacher provides extra help when needed.	○ 1	○ 2	○ 3	○ 4
c) My teacher helps students learn.	○ 1	○ 2	○ 3	○ 4
d) My teacher gives students the opportunity to express opinions.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST84

Q37 Below you will find descriptions of three mathematics teachers. Read each of the descriptions of these teachers, then let us know to what extent you agree with the final statement.

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) The students in Ms. Franklin's class frequently interrupt her lessons. She is always in her classroom five minutes before the class starts. **Ms. Franklin is in control of her classroom.**	○ 1	○ 2	○ 3	○ 4
b) The students in Ms. Harris' class are calm and orderly. She is always in her classroom at the start of class. **Ms. Harris is in control of her classroom.**	○ 1	○ 2	○ 3	○ 4
c) The students in Mr. Reynolds' class frequently interrupt his lessons. As a result, he often arrives five minutes late to his classroom. **Mr. Reynolds is in control of his classroom.**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST85

Q38 Thinking about the mathematics teacher who taught your last mathematics class: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) My teacher gets students to listen to him or her.	○ 1	○ 2	○ 3	○ 4
b) My teacher keeps the class orderly.	○ 1	○ 2	○ 3	○ 4
c) My teacher starts the class period on time.	○ 1	○ 2	○ 3	○ 4
d) The teacher has to wait a long time for students to quiet down.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION D: ABOUT YOUR SCHOOL

ST86

Q39 Thinking about the teachers at your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Students get along well with most teachers.	○ 1	○ 2	○ 3	○ 4
b) Most teachers are interested in students' well-being.	○ 1	○ 2	○ 3	○ 4
c) Most of my teachers really listen to what I have to say.	○ 1	○ 2	○ 3	○ 4
d) If I need extra help, I will receive it from my teachers.	○ 1	○ 2	○ 3	○ 4
e) Most of my teachers treat me fairly.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST87

Q40 Thinking about your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I feel like an outsider (or left out of things) at school.	○ 1	○ 2	○ 3	○ 4
b) I make friends easily at school.	○ 1	○ 2	○ 3	○ 4
c) I feel like I belong at school.	○ 1	○ 2	○ 3	○ 4
d) I feel awkward and out of place in my school.	○ 1	○ 2	○ 3	○ 4
e) Other students seem to like me.	○ 1	○ 2	○ 3	○ 4
f) I feel lonely at school.	○ 1	○ 2	○ 3	○ 4
g) I feel happy at school.	○ 1	○ 2	○ 3	○ 4
h) Things are ideal in my school.	○ 1	○ 2	○ 3	○ 4
i) I am satisfied with my school.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST88

Q41 Thinking about what you have learned at school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) School has done little to prepare me for adult life when I leave school.	○ 1	○ 2	○ 3	○ 4
b) School has been a waste of time.	○ 1	○ 2	○ 3	○ 4
c) School has helped give me confidence to make decisions.	○ 1	○ 2	○ 3	○ 4
d) School has taught me things which could be useful in a job.	○ 1	○ 2	○ 3	○ 4

ST89

Q42 Thinking about your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Trying hard at school will help me get a good job.	○ 1	○ 2	○ 3	○ 4
b) Trying hard at school will help me get into a good college.	○ 1	○ 2	○ 3	○ 4
c) I enjoy receiving good grades.	○ 1	○ 2	○ 3	○ 4
d) Trying hard at school is important.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST91

Q43 Thinking about your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) If I put in enough effort I can succeed in school.	○ 1	○ 2	○ 3	○ 4
b) It is completely my choice whether or not I do well at school.	○ 1	○ 2	○ 3	○ 4
c) Family demands or other problems prevent me from putting a lot of time into my school work.	○ 1	○ 2	○ 3	○ 4
d) If I had different teachers I would try harder at school.	○ 1	○ 2	○ 3	○ 4
e) If I wanted to I could do well in school.	○ 1	○ 2	○ 3	○ 4
f) I do badly in school whether or not I study for my exams.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION E: ABOUT LEARNING MATHEMATICS

ST29

Q44 Thinking about your views on mathematics: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I enjoy reading about mathematics.	○ 1	○ 2	○ 3	○ 4
b) Making an effort in mathematics is worth it because it will help me in the work that I want to do later on.	○ 1	○ 2	○ 3	○ 4
c) I look forward to my mathematics lessons.	○ 1	○ 2	○ 3	○ 4
d) I do mathematics because I enjoy it.	○ 1	○ 2	○ 3	○ 4
e) Learning mathematics is worthwhile for me because it will improve my career prospects.	○ 1	○ 2	○ 3	○ 4
f) I am interested in the things I learn in mathematics.	○ 1	○ 2	○ 3	○ 4
g) Mathematics is an important subject for me because I need it for what I want to study later on.	○ 1	○ 2	○ 3	○ 4
h) I will learn many things in mathematics that will help me get a job.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST35

Q45 Thinking about how people important to you view mathematics: how strongly do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Most of my friends do well in mathematics.	○ 1	○ 2	○ 3	○ 4
b) Most of my friends work hard at mathematics.	○ 1	○ 2	○ 3	○ 4
c) My friends enjoy taking mathematics tests.	○ 1	○ 2	○ 3	○ 4
d) My parents believe it's important for me to study mathematics.	○ 1	○ 2	○ 3	○ 4
e) My parents believe that mathematics is important for my career.	○ 1	○ 2	○ 3	○ 4
f) My parents like mathematics.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST37

Q46 How confident do you feel about having to do the following mathematics tasks?

(Please darken only one circle in each row.)

	Very confident	*Confident*	*Not very confident*	*Not at all confident*
a) Using a train schedule to figure out how long it would take to get from one place to another.	○ 1	○ 2	○ 3	○ 4
b) Calculating how much cheaper a TV would be after a 30% discount.	○ 1	○ 2	○ 3	○ 4
c) Calculating how many square feet of tile you need to cover a floor.	○ 1	○ 2	○ 3	○ 4
d) Understanding graphs presented in newspapers.	○ 1	○ 2	○ 3	○ 4
e) Solving an equation like $3x + 5 = 17$.	○ 1	○ 2	○ 3	○ 4
f) Finding the actual distance between two places on a map with a 1:10,000 scale.	○ 1	○ 2	○ 3	○ 4
g) Solving an equation like $2(x+3) = (x + 3)(x - 3)$.	○ 1	○ 2	○ 3	○ 4
h) Calculating the gas mileage of a car.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST42

Q47 Thinking about studying mathematics: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I often worry that it will be difficult for me in mathematics classes.	○ 1	○ 2	○ 3	○ 4
b) I am just not good at mathematics.	○ 1	○ 2	○ 3	○ 4
c) I get very tense when I have to do mathematics homework.	○ 1	○ 2	○ 3	○ 4
d) I get good grades in mathematics.	○ 1	○ 2	○ 3	○ 4
e) I get very nervous doing mathematics problems.	○ 1	○ 2	○ 3	○ 4
f) I learn mathematics quickly.	○ 1	○ 2	○ 3	○ 4
g) I have always believed that mathematics is one of my best subjects.	○ 1	○ 2	○ 3	○ 4
h) I feel helpless when doing a mathematics problem.	○ 1	○ 2	○ 3	○ 4
i) In my mathematics class, I understand even the most difficult work.	○ 1	○ 2	○ 3	○ 4
j) I worry that I will get poor grades in mathematics.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST43

Q48 Thinking about your mathematics lessons: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) If I put in enough effort I can succeed in mathematics.	○ 1	○ 2	○ 3	○ 4
b) Whether or not I do well in mathematics is completely up to me.	○ 1	○ 2	○ 3	○ 4
c) Family demands or other problems prevent me from putting a lot of time into my mathematics work.	○ 1	○ 2	○ 3	○ 4
d) If I had different teachers I would try harder in mathematics.	○ 1	○ 2	○ 3	○ 4
e) If I wanted to I could do well in mathematics.	○ 1	○ 2	○ 3	○ 4
f) I do badly in mathematics whether or not I study for my exams.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST44

Q49 Suppose that you are a student in the following situation:

Each week, your mathematics teacher gives a short quiz. Recently you have done badly on these quizzes. Today you are trying to figure out why.

How likely are you to have these thoughts or feelings in this situation?

(Please darken only one circle in each row.)

	Very likely	*Likely*	*Slightly likely*	*Not at all likely*
a) I'm not very good at solving mathematics problems.	○ 1	○ 2	○ 3	○ 4
b) My teacher did not explain the concepts well this week.	○ 1	○ 2	○ 3	○ 4
c) This week I guessed badly on the quiz.	○ 1	○ 2	○ 3	○ 4
d) Sometimes the course material is too hard.	○ 1	○ 2	○ 3	○ 4
e) The teacher did not get students interested in the material.	○ 1	○ 2	○ 3	○ 4
f) Sometimes I am just unlucky.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST46

Q50 Thinking about the mathematics you do for school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I have my homework finished in time for mathematics class.	○ 1	○ 2	○ 3	○ 4
b) I work hard on my mathematics homework.	○ 1	○ 2	○ 3	○ 4
c) I am prepared for my mathematics exams.	○ 1	○ 2	○ 3	○ 4
d) I study hard for mathematics quizzes.	○ 1	○ 2	○ 3	○ 4
e) I keep studying until I understand mathematics material.	○ 1	○ 2	○ 3	○ 4
f) I pay attention in mathematics class.	○ 1	○ 2	○ 3	○ 4
g) I listen in mathematics class.	○ 1	○ 2	○ 3	○ 4
h) I avoid distractions when I am studying mathematics.	○ 1	○ 2	○ 3	○ 4
i) I keep my mathematics work well organized.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST48

Q51 For each pair of statements, please choose the item that best describes you.

a) Please darken only one of the following two circles.

○1 I intend to take additional mathematics courses after I finish high school.

○2 I intend to take additional English courses after I finish high school.

b) Please darken only one of the following two circles.

○1 I plan on majoring in a subject in college that requires mathematics skills.

○2 I plan on majoring in a subject in college that requires science skills.

c) Please darken only one of the following two circles.

○1 I am willing to study harder in my mathematics classes than is required.

○2 I am willing to study harder in my English classes than is required.

d) Please darken only one of the following two circles.

○1 I plan on taking as many mathematics classes as I can during my education.

○2 I plan on taking as many science classes as I can during my education.

e) Please darken only one of the following two circles.

○1 I am planning on pursuing a career that involves a lot of mathematics.

○2 I am planning on pursuing a career that involves a lot of science.

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST49

Q52 How often do you do the following things at school and outside of school?

(Please darken only one circle in each row.)

	Always or almost always	*Often*	*Sometimes*	*Never or rarely*
a) I talk about mathematics problems with my friends.	○ 1	○ 2	○ 3	○ 4
b) I help my friends with mathematics.	○ 1	○ 2	○ 3	○ 4
c) I do mathematics as an extracurricular activity.	○ 1	○ 2	○ 3	○ 4
d) I take part in mathematics competitions.	○ 1	○ 2	○ 3	○ 4
e) I do mathematics more than 2 hours a day outside of school.	○ 1	○ 2	○ 3	○ 4
f) I play chess.	○ 1	○ 2	○ 3	○ 4
g) I program computers.	○ 1	○ 2	○ 3	○ 4
h) I participate in a mathematics club.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION F: ABOUT YOUR PROBLEM SOLVING EXPERIENCES

ST93

Q53 How well does each of the following statements describe you?

(Please darken only one circle in each row.)

	Very much like me	*Mostly like me*	*Somewhat like me*	*Not much like me*	*Not at all like me*
a) When confronted with a problem I give up easily.	○ 1	○ 2	○ 3	○ 4	○ 5
b) I put off difficult problems.	○ 1	○ 2	○ 3	○ 4	○ 5
c) I remain interested in the tasks that I start.	○ 1	○ 2	○ 3	○ 4	○ 5
d) I continue working on tasks until everything is perfect.	○ 1	○ 2	○ 3	○ 4	○ 5
e) When confronted with a problem I do more than what is expected of me.	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST94

Q54 How well does each of the following statements describe you?

(Please darken only one circle in each row.)

	Very much like me	*Mostly like me*	*Somewhat like me*	*Not much like me*	*Not at all like me*
a) I can handle a lot of information.	○ 1	○ 2	○ 3	○ 4	○ 5
b) I am quick to understand things.	○ 1	○ 2	○ 3	○ 4	○ 5
c) I seek explanations for things.	○ 1	○ 2	○ 3	○ 4	○ 5
d) I can easily link facts together.	○ 1	○ 2	○ 3	○ 4	○ 5
e) I like to solve complex problems.	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST96

Q55 *Suppose that you have been sending text messages from your cell phone for several weeks. Today, however, you can't send text messages. You want to try to solve the problem.*

What would you do? For each suggestion, darken the option that best applies to you.

(Please darken only one circle in each row.)

	I would definitely do this	*I would probably do this*	*I would probably not do this*	*I would definitely not do this*
a) I press every button possible to find out what is wrong.	○ 1	○ 2	○ 3	○ 4
b) I think about what might have caused the problem and what I can do to solve it.	○ 1	○ 2	○ 3	○ 4
c) I read the manual.	○ 1	○ 2	○ 3	○ 4
d) I ask a friend for help.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST101

Q56 *Suppose that you are planning a trip to the zoo with your brother. You don't know which route to take to get there.*

What would you do? For each suggestion, darken the option that best applies to you.

(Please darken only one circle in each row.)

	I would definitely do this	*I would probably do this*	*I would probably not do this*	*I would definitely not do this*
a) I read the zoo brochure to see if it says how to get there.	○ 1	○ 2	○ 3	○ 4
b) I study a map and figure out the best route.	○ 1	○ 2	○ 3	○ 4
c) I leave it to my brother to worry about how to get there.	○ 1	○ 2	○ 3	○ 4
d) I know roughly where it is, so I suggest we just start driving.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST104

Q57 *Suppose that you arrive at the train station. There is a ticket machine that you have never used before. You want to buy a ticket.*

What would you do? For each suggestion, darken the option that best applies to you.

(Please darken only one circle in each row.)

	I would definitely do this	*I would probably do this*	*I would probably not do this*	*I would definitely not do this*
a) I check how similar it is to other ticket machines I have used.	○ 1	○ 2	○ 3	○ 4
b) I try out all the buttons to see what happens.	○ 1	○ 2	○ 3	○ 4
c) I ask someone for help.	○ 1	○ 2	○ 3	○ 4
d) I try to find a ticket office at the station to buy a ticket.	○ 1	○ 2	○ 3	○ 4

Thank you very much for your cooperation in completing this questionnaire!

Exhibit E-1. PISA 2012 student questionnaire—Continued

OECD Program for International Student Assessment 2012

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

USA

Date of Test (Main Survey PISA 2012)		
Month	Day	2012

Student Questionnaire - Form C

Place Label Here

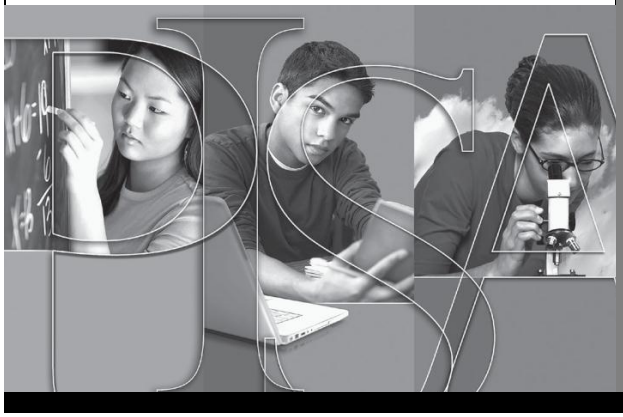
Student ID

Participation Status

English 313

U.S. participation in this study is sponsored by the National Center for Education Statistics (NCES), U.S. Department of Education. Your responses are protected by federal statute (20 U.S.C., § 9573). Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law. By law, everyone working on this NCES survey is subject to a jail term of up to 5 years, a fine of up to $250,000, or both if he or she willfully discloses ANY identifiable information about you.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. The valid OMB control number for this voluntary information collection is 1850-0755. The time required to complete this information collection is estimated to average 30 minutes per response, including the time to review instructions, search existing data resources, gather the data needed, and complete and review the information collection. **If you have any comments concerning the accuracy of the time estimate(s) or suggestions for improving the form, please write to**: U.S. Department of Education, Washington, D.C. 20202-4537. **If you have comments or concerns regarding the status of your individual submission of this form, write directly to:** Program for International Student Assessment (PISA), National Center for Education Statistics, U.S. Department of Education, 1990 K Street, N.W., Washington, D.C. 20006. O.M.B. No. 1850-0755, Approval Expires 11/30/2013



Project Consortium

- Australian Council for Educational Research (ACER)
- cApStAn Linguistic Quality Control (Belgium)
- Deutsches Institut für Internationale Pädagogische Forschung (DIPF, Germany)
- Educational Testing Service (ETS, USA)
- Institutt for Lærerutdanning og Skoleutvikling (ILS, Norway)
- Leibniz - Institute for Science and Mathematics Education (IPN, Germany)
- National Institute for Educational Policy Research (NIER, Japan)
- The Tao Initiative: CRP - Henri Tudor and Université de Luxembourg EMACS (Luxembourg)
- Unité d'analyse des systèmes et des pratiques d'enseignement (aSPe, Belgium)
- Westat (USA)

Exhibit E-1. PISA 2012 student questionnaire—Continued

In this booklet you will find questions about:

- You (Section A)
- Your Family and Home (Section B)
- Learning Mathematics (Section C)
- Your Mathematics Experiences (Section D)
- Your School (Section E)

Please read each question carefully and answer as accurately as you can. In the test, you usually circled your answers. For this questionnaire, you will normally answer by darkening a circle. For a few questions you will need to write a short answer.

If you make a mistake when darkening a circle, erase your mistake and darken the correct circle. If you make a mistake when writing an answer, simply cross it out and write the correct answer next to it.

In this questionnaire, there are no right or wrong answers. Your answers should be the ones that are right for you.

You may ask for help if you do not understand something or are not sure how to answer a question.

Your answers will be combined with answers from other students to calculate totals and averages. All information (or responses) you provide may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law [Education Science Reform Act of 2002 (ESRA 2002), 20 U.S. Code, Section 9573].

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION A: ABOUT YOU

ST01

Q1 What grade are you in?

_____

grade

ST03

Q2 When were you born?

(Please write the month, day and year you were born.)

_____ _____ *19*___

Month *Day* *Year*

ST04

Q3 Are you female or male?

Female ○1

Male ○2

Q4 Which best describes you?

(Please darken only one circle.)

I am Hispanic or Latino. ○1

I am <u>not</u> Hispanic or Latino. ○2

Exhibit E-1. PISA 2012 student questionnaire—Continued

USA_ST117A01

Q5 Which of these categories best describes your race?

(Please darken one or more circles.)

White	○ 1
Black or African American	○ 1
Asian	○ 1
American Indian or Alaska Native	○ 1
Native Hawaiian or Other Pacific Islander	○ 1

USA_ST05N01

Q6 Did you attend pre-school?

No	○ 1
Yes, for one year or less	○ 2
Yes, for more than one year	○ 3

USA_ST05N02

Q7 Did you attend kindergarten?

No	○ 1
Yes	○ 2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST06

Q8 How old were you when you started first grade?

_____ *years old*

USA_ST07N01

Q9 Have you ever repeated a grade?

(Please darken only one circle in each row.)

	No, never	*Yes, once*	*Yes, twice or more*
a) In kindergarten	○1	○2	○3
b) In grades 1-6	○1	○2	○3
c) In grades 7-9	○1	○2	○3
d) In grades 10-12	○1	○2	○3

ST08

Q10 In the last two full weeks of school, how many times did you arrive late for school?

(Please darken only one circle.)

None ○1

One or two times ○2

Three or four times ○3

Five or more times ○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST09

Q11 In the last two full weeks of school, how many times did you skip a whole school day?

(Please darken only one circle.)

None	○ 1
One or two times	○ 2
Three or four times	○ 3
Five or more times	○ 4

ST115

Q12 In the last two full weeks of school, how many times did you skip some classes?

(Please darken only one circle.)

None	○ 1
One or two times	○ 2
Three or four times	○ 3
Five or more times	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

USA_ST119A0101

Q13 What is the highest grade or level of school you expect to complete?

(Please darken only one circle.)

Less than high school	○ 1
High school (high school diploma or GED)	○ 2
Vocational or technical certificate (such as cosmetology or auto mechanics)	○ 3
Associate's degree (2-year degree from a community college)	○ 4
Bachelor's degree (4-year college degree)	○ 5
Master's degree	○ 6
Doctoral or professional degree such as medicine or law	○ 7

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION B: ABOUT YOUR FAMILY AND HOME

In this section you will be asked some questions about your family and your home.

Some of the following questions are about your mother and father or those persons who are like a mother or father to you — for example, guardians, step-parents, foster parents, etc.

If you share your time with more than one set of parents or guardians, please answer the following questions for those parents/guardians you spend the most time with.

ST11

Q14 Who usually lives at home with you?

(Please darken only one circle in each row.)

	Yes	*No*
a) Mother (including stepmother or foster mother)	○ 1	○ 2
b) Father (including stepfather or foster father)	○ 1	○ 2
c) Brother(s) (including stepbrothers)	○ 1	○ 2
d) Sister(s) (including stepsisters)	○ 1	○ 2
e) Grandparent(s)	○ 1	○ 2
f) Others (e.g., cousin)	○ 1	○ 2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST12

Q15 What is your mother's main job? (e.g., school teacher, cook, sales manager)

(If she is not working now, please tell us her last main job.)

Please write in the job title. _____

Q16 What does your mother do in her main job? (e.g., teaches high school students, helps prepare meals in a restaurant, manages a sales team)

Please use a sentence to describe the kind of work she does or did in that job.

_____

ST13

Q17 What is the highest level of schooling (not including college) completed by your mother?

If you are not sure which circle to choose, please ask the test administrator for help.

(Please darken only one circle.)

She completed grade 12 (high school diploma or GED)	○ 1
She completed grade 9	○ 2
She completed grade 6	○ 3
She did not complete grade 6	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST14

Q18 Does your mother have any of the following degrees, certificates, or diplomas?

If you are not sure how to answer this question, please ask the test administrator for help.

(Please darken only one circle in each row.)

		Yes	*No*
a)	Master's, doctoral, or professional degree such as medicine or law	○ 1	○ 2
b)	Bachelor's degree (4-year college degree)	○ 1	○ 2
c)	Associate's degree (2-year degree from a community college)	○ 1	○ 2
d)	Vocational or technical certificate/diploma after high school (such as cosmetology or auto mechanics)	○ 1	○ 2

ST15

Q19 What is your mother currently doing?

(Please darken only one circle.)

Working full-time for pay ○ 1

Working part-time for pay ○ 2

Not working, but looking for a job ○ 3

Other (e.g., home duties, retired) ○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST16

Q20 What is your father's main job? (e.g., school teacher, cook, sales manager)

(If he is not working now, please tell us his last main job.)

Please write in the job title. _____

Q21 What does your father do in his main job? (e.g., teaches high school students, helps prepare meals in a restaurant, manages a sales team)

Please use a sentence to describe the kind of work he does or did in that job.

_____

ST17

Q22 What is the highest level of schooling (not including college) completed by your father?

If you are not sure how to answer this question, please ask the test administrator for help.

(Please darken only one circle.)

He completed grade 12 (high school diploma or GED)	○ 1
He completed grade 9	○ 2
He completed grade 6	○ 3
He did not complete grade 6	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST18

Q23 Does your father have any of the following degrees, certificates, or diplomas?

If you are not sure which circle to choose, please ask the test administrator for help.

(Please darken only one circle in each row.)

	Yes	*No*
a) Master's, doctoral, or professional degree such as medicine or law	○1	○2
b) Bachelor's degree (4-year college degree)	○1	○2
c) Associate's degree (2-year degree from a community college)	○1	○2
d) Vocational or technical certificate/diploma after high school (such as cosmetology or auto mechanics)	○1	○2

ST19

Q24 What is your father currently doing?

(Please darken only one circle.)

Working full-time for pay ○1

Working part-time for pay ○2

Not working, but looking for a job ○3

Other (e.g., home duties, retired) ○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST20

Q25 In what country were you and your parents born?

(Please darken only one circle in each column.)

	You	*Mother*	*Father*
United States*	○ 01	○ 01	○ 01
Other country	○ 02	○ 02	○ 02

*NOTE: The "United States" refers to the 50 states, District of Columbia, and U.S. military bases abroad.

ST21

Q26 If <u>you</u> were NOT born in the United States, how old were you when you arrived in the United States?

If you were less than 12 months old, please write zero (0).

If you were born in the United States please skip this question and go to Q27.

_____ *years old*

ST25

Q27 What language do you speak at home most of the time?

(Please darken only one circle.)

English	○ 313
Spanish	○ 156
Other language	○ 859

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST26

Q28 Which of the following are in your home?

(Please darken only one circle in each row.)

	Yes	*No*
a) A desk to study at	○1	○2
b) A room of your own	○1	○2
c) A quiet place to study	○1	○2
d) A computer you can use for school work	○1	○2
e) Educational software	○1	○2
f) A link to the Internet	○1	○2
g) Classic literature (e.g., Shakespeare)	○1	○2
h) Books of poetry	○1	○2
i) Works of art (e.g., paintings)	○1	○2
j) Books to help with your school work	○1	○2
k) Technical reference books or manuals	○1	○2
l) A dictionary	○1	○2
m) A dishwasher	○1	○2
n) A DVD player	○1	○2
o) A guest room	○1	○2
p) A high-speed Internet connection	○1	○2
q) A musical instrument	○1	○2

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST27

Q29 How many of these are there at your home?

(Please darken only one circle in each row.)

	None	*One*	*Two*	*Three or more*
a) Cell phones	○	○	○	○ 4
b) Televisions	○	○	○	○ 4
c) Computers	○	○	○	○ 4
d) Cars	○	○	○	○ 4
e) Bathrooms with a bathtub or shower	○	○	○	○ 4

ST28

Q30 How many books are there in your home?

There are usually about 15 books per foot of shelving. Do not include magazines, newspapers, or your schoolbooks.

(Please darken only one circle.)

0-10 books ○ 1

11-25 books ○ 2

26-100 books ○ 3

101-200 books ○ 4

201-500 books ○ 5

More than 500 books ○ 6

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION C: ABOUT LEARNING MATHEMATICS

ST53

Q31 For each group of three items, please choose the item that best describes your approach to mathematics.

a) Please darken only one of the following three circles.

○1 When I study for a mathematics test, I try to figure out what are the most important parts to learn.

○2 When I study for a mathematics test, I try to understand new concepts by relating them to things I already know.

○3 When I study for a mathematics test, I learn as much as I can by heart.

b) Please darken only one of the following three circles.

○1 When I study mathematics, I try to figure out which concepts I still do not understand completely.

○2 When I study mathematics, I think of new ways to get the answer.

○3 When I study mathematics, I make myself check to see if I remember the work I have already done.

c) Please darken only one of the following three circles.

○1 When I study mathematics, I try to relate the work to things I have learned in other subjects.

○2 When I study mathematics, I start by working out exactly what I need to learn.

○3 When I study mathematics, I go over some problems so often that I feel as if I could solve them in my sleep.

d) Please darken only one of the following three circles.

○1 In order to remember the method for solving a mathematics problem, I go through examples again and again.

○2 I think about how the mathematics I have learned can be used in everyday life.

○3 When I cannot understand something in mathematics, I always search for more information to clarify the problem.

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST55

Q32 How many hours do you typically spend per week attending out-of-school-time lessons in the following subjects?

These are only lessons in subjects that you are also learning at school, that you spend extra time learning outside of normal school hours. The lessons may be given at your school, at your home or somewhere else.

(Please darken only one circle in each row.)

	I do not attend out-of-school-time lessons in this subject	*Less than 2 hours a week*	*2 or more but less than 4 hours a week*	*4 or more but less than 6 hours a week*	*6 or more hours a week*
a) English (e.g., language arts, literature, writing)	○ 1	○ 2	○ 3	○ 4	○ 5
b) Mathematics	○ 1	○ 2	○ 3	○ 4	○ 5
c) Science	○ 1	○ 2	○ 3	○ 4	○ 5
d) Other subjects	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST57

Q33 Thinking about all school subjects: on average, how many hours do you spend each week on the following?

When answering, include time spent on the weekend too.

a) Homework or other material assigned by your teachers _____ *hours per week*

b) Out of the time spent in (a), how many hours do you work on your homework with somebody overlooking and providing help if necessary ("guided homework"), either at school or elsewhere? _____ *hours per week*

c) Work with a personal tutor (whether paid or not) _____ *hours per week*

d) Attend out of school classes organized by a commercial company and paid for by your parents _____ *hours per week*

e) Study with a parent or other family member _____ *hours per week*

f) Practice content from school lessons by working on a computer (e.g., learn vocabulary with training software) _____ *hours per week*

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST61

Q34 How often have you encountered the following types of mathematics tasks during your time at school?

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) Figuring out from a train schedule how long it would take to get from one place to another.	○ 1	○ 2	○ 3	○ 4
b) Calculating how much more expensive a computer would be after adding tax.	○ 1	○ 2	○ 3	○ 4
c) Calculating how many square feet of tile you need to cover a floor.	○ 1	○ 2	○ 3	○ 4
d) Understanding scientific tables presented in an article.	○ 1	○ 2	○ 3	○ 4
e) Solving an equation like $6x^2 + 5 = 29$.	○ 1	○ 2	○ 3	○ 4
Finding the actual distance between two places on a map with a 1:10,000 scale.	○ 1	○ 2	○ 3	○ 4
g) Solving an equation like $2(x+3) = (x + 3)(x - 3)$.	○ 1	○ 2	○ 3	○ 4
h) Calculating the power consumption of an electronic appliance per week.	○ 1	○ 2	○ 3	○ 4
i) Solving an equation like $3x + 5 = 17$.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST62

Q35 Thinking about mathematical concepts: how familiar are you with the following terms?

(Please darken only one circle in each row.)

	Never heard of it	*Heard of it once or twice*	*Heard of it a few times*	*Heard of it often*	*Know it well, understand the concept*
a) Exponential Function	○ 1	○ 2	○ 3	○ 4	○ 5
b) Divisor	○ 1	○ 2	○ 3	○ 4	○ 5
c) Quadratic Function	○ 1	○ 2	○ 3	○ 4	○ 5
d) Proper Number	○ 1	○ 2	○ 3	○ 4	○ 5
e) Linear Equation	○ 1	○ 2	○ 3	○ 4	○ 5
f) Vectors	○ 1	○ 2	○ 3	○ 4	○ 5
g) Complex Number	○ 1	○ 2	○ 3	○ 4	○ 5
h) Rational Number	○ 1	○ 2	○ 3	○ 4	○ 5
i) Radicals	○ 1	○ 2	○ 3	○ 4	○ 5
j) Subjunctive Scaling	○ 1	○ 2	○ 3	○ 4	○ 5
k) Polygon	○ 1	○ 2	○ 3	○ 4	○ 5
l) Declarative Fraction	○ 1	○ 2	○ 3	○ 4	○ 5
m) Congruent Figure	○ 1	○ 2	○ 3	○ 4	○ 5
n) Cosine	○ 1	○ 2	○ 3	○ 4	○ 5
o) Arithmetic Mean	○ 1	○ 2	○ 3	○ 4	○ 5
p) Probability	○ 1	○ 2	○ 3	○ 4	○ 5

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST69

Q36 How many minutes, on average, are there in a class period for the following subjects?

a) Minutes in a class period in English (e.g., language arts, literature, writing): _____ *minutes*

b) Minutes in a class period in mathematics: _____ *minutes*

c) Minutes in a class period in science: _____ *minutes*

ST70

Q37 How many class periods per week do you typically have for the following subjects?

a) Number of class periods per week in English (e.g., language arts, literature, writing): _____ *class periods*

b) Number of class periods per week in mathematics: _____ *class periods*

c) Number of class periods per week in science: _____ *class periods*

ST71

Q38 In a normal, full week at school, how many class periods do you have in total?

Number of **ALL** class periods _____ *class periods*

ST72

Q39 On average, about how many students attend your English class (e.g., language arts, literature, writing)?

_____ *students*

Exhibit E-1. PISA 2012 student questionnaire—Continued

The next four questions are about your experience with different kinds of mathematics problems at school. You will see descriptions of problems and gray-colored boxes, each containing a mathematics problem.

Please read each problem. You do NOT need to solve it.

ST73

Q40 *In this box are two problems. Each requires you to understand a problem written in text and perform the appropriate calculations. Usually the problem talks about practical situations, but the numbers, people and places mentioned are made up. All the information you need is given. Here are two examples.*

1) Ann is two years older than Betty and Betty is four times as old as Sam. When Betty is 30, how old is Sam?

2) Mr. Smith bought a television and a bed. The television cost $625 but he got a 10% discount. The bed cost $200. He paid $20 for delivery. How much money did Mr. Smith spend?

We want to know your experience with this type of word problem at school. Do not solve them!

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST74

Q41 *Below are examples of another type of mathematics problem.*

1) Solve 2x + 3 = 7.
2) Find the volume of a box with sides 3m, 4m and 5m.

We want to know about your experience with this type of problem at school. Do not solve them!

(Please darken only one circle in each row.)

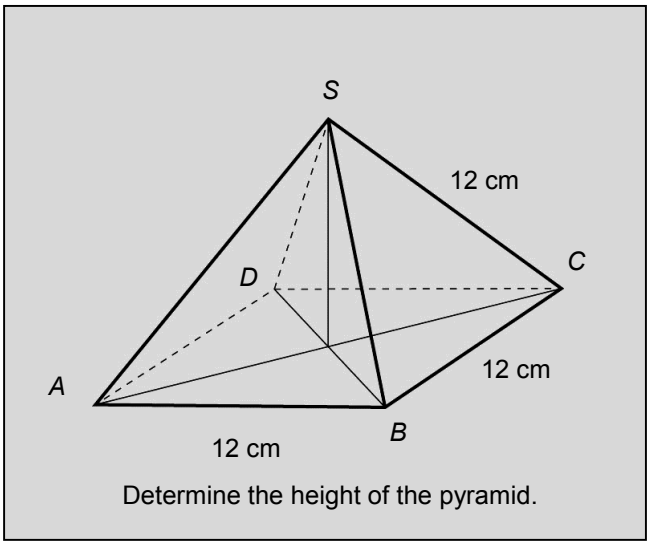
	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST75

Q42 *In the next type of problem, you have to use mathematical knowledge and draw conclusions. There is no practical application provided. Here are two examples.*

1) Here you need to use geometrical theorems:



Determine the height of the pyramid.

2) Here you have to know what a prime number is:

If n is any number: can $(n+1)^2$ be a prime number?

We want to know about your experience with this type of problem at school. Do not solve them!

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

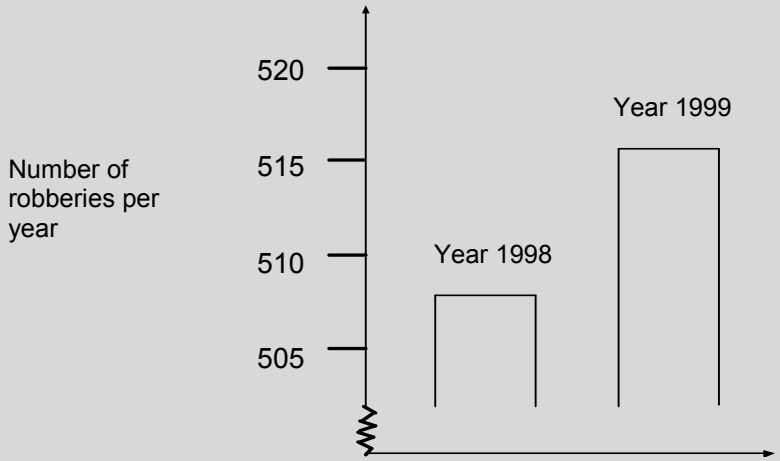
Exhibit E-1. PISA 2012 student questionnaire—Continued

ST76

Q43 *In this type of problem, you have to apply suitable mathematical knowledge to find a useful answer to a problem that arises in everyday life or work. The data and information are about real situations. Here are two examples.*

Example 1:

A TV reporter says "This graph shows that there is a huge increase in the number of robberies from 1998 to 1999."



Do you consider the reporter's statement to be a reasonable interpretation of the graph? Give an explanation to support your answer.

Example 2:

For years the relationship between a person's recommended maximum heart rate and the person's age was described by the following formula:

Recommended maximum heart rate = 220 - *age*

Recent research showed that this formula should be modified slightly. The new formula is as follows:

Recommended maximum heart rate = 208 – (0.7 × *age*)

From which age onwards does the recommended maximum heart rate increase as a result of the introduction of the new formula? Show your work.

Exhibit E-1. PISA 2012 student questionnaire—Continued

We want to know about your experience with this type of problem at school. Do not solve them!

(Please darken only one circle in each row.)

	Frequently	*Sometimes*	*Rarely*	*Never*
a) How often have you encountered this type of problem in your **mathematics lessons**?	○ 1	○ 2	○ 3	○ 4
b) How often have you encountered this type of problem in the **tests you have taken at school?**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST42

Q44 Thinking about studying mathematics: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I often worry that it will be difficult for me in mathematics classes.	○ 1	○ 2	○ 3	○ 4
b) I am just not good at mathematics.	○ 1	○ 2	○ 3	○ 4
c) I get very tense when I have to do mathematics homework.	○ 1	○ 2	○ 3	○ 4
d) I get good grades in mathematics.	○ 1	○ 2	○ 3	○ 4
e) I get very nervous doing mathematics problems.	○ 1	○ 2	○ 3	○ 4
f) I learn mathematics quickly.	○ 1	○ 2	○ 3	○ 4
g) I have always believed that mathematics is one of my best subjects.	○ 1	○ 2	○ 3	○ 4
h) I feel helpless when doing a mathematics problem.	○ 1	○ 2	○ 3	○ 4
i) In my mathematics class, I understand even the most difficult work.	○ 1	○ 2	○ 3	○ 4
j) I worry that I will get poor grades in mathematics.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION D: ABOUT YOUR MATHEMATICS EXPERIENCES

ST77

Q45 How often do these things happen in your mathematics classes?

(Please darken only one circle in each row.)

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
a) The teacher shows an interest in every student's learning.	○ 1	○ 2	○ 3	○ 4
b) The teacher gives extra help when students need it.	○ 1	○ 2	○ 3	○ 4
c) The teacher helps students with their learning.	○ 1	○ 2	○ 3	○ 4
d) The teacher continues teaching until the students understand.	○ 1	○ 2	○ 3	○ 4
e) The teacher gives students an opportunity to express opinions.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST79

Q46 How often do these things happen in your mathematics classes?

(Please darken only one circle in each row.)

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
a) The teacher sets clear goals for our learning.	○1	○2	○3	○4
b) The teacher asks me or my classmates to present our thinking or reasoning at some length.	○1	○2	○3	○4
c) The teacher gives different work to classmates who have difficulties learning and/or to those who can advance faster.	○1	○2	○3	○4
d) The teacher assigns projects that require at least one week to complete.	○1	○2	○3	○4
e) The teacher tells me about how well I am doing in my mathematics class.	○1	○2	○3	○4
f) The teacher asks questions to check whether we have understood what was taught.	○1	○2	○3	○4
g) The teacher has us work in small groups to come up with joint solutions to a problem or task.	○1	○2	○3	○4
h) At the beginning of a lesson, the teacher presents a short summary of the previous lesson.	○1	○2	○3	○4

Exhibit E-1. PISA 2012 student questionnaire—Continued

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
i) The teacher asks us to help plan classroom activities or topics.	○ 1	○ 2	○ 3	○ 4
j) The teacher gives me feedback on my strengths and weaknesses in mathematics.	○ 1	○ 2	○ 3	○ 4
k) The teacher tells us what is expected of us when we get a test, quiz or assignment.	○ 1	○ 2	○ 3	○ 4
l) The teacher tells us what we have to learn.	○ 1	○ 2	○ 3	○ 4
m) The teacher tells me what I need to do to become better in mathematics.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST80

Q47 Thinking about the mathematics teacher that taught your last mathematics class: how often does each of the following happen?

(Please darken only one circle in each row.)

	Always or almost always	*Often*	*Sometimes*	*Never or rarely*
a) The teacher asks questions that make us reflect on the problem.	○ 1	○ 2	○ 3	○ 4
b) The teacher gives problems that require us to think for an extended time.	○ 1	○ 2	○ 3	○ 4
c) The teacher asks us to decide on our own procedures for solving complex problems.	○ 1	○ 2	○ 3	○ 4
d) The teacher presents problems for which there is no immediately obvious method of solution.	○ 1	○ 2	○ 3	○ 4
e) The teacher presents problems in different contexts so that students know whether they have understood the concepts.	○ 1	○ 2	○ 3	○ 4
f) The teacher helps us to learn from mistakes we have made.	○ 1	○ 2	○ 3	○ 4
g) The teacher asks us to explain how we have solved a problem.	○ 1	○ 2	○ 3	○ 4
h) The teacher presents problems that require students to apply what they have learned to new contexts.	○ 1	○ 2	○ 3	○ 4
i) The teacher gives problems that can be solved in several different ways.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST81

Q48 How often do these things happen in your mathematics classes?

(Please darken only one circle in each row.)

	Every class	*Most classes*	*Some classes*	*Never or hardly ever*
a) Students don't listen to what the teacher says.	○ 1	○ 2	○ 3	○ 4
b) There is noise and disorder.	○ 1	○ 2	○ 3	○ 4
c) The teacher has to wait a long time for students to quiet down.	○ 1	○ 2	○ 3	○ 4
d) Students cannot work well.	○ 1	○ 2	○ 3	○ 4
e) Students don't start working for a long time after the lesson begins.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST82

Q49 Below you will find descriptions of three mathematics teachers. Read each of the descriptions of these teachers, then let us know to what extent you agree with the final statement.

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Ms. Anderson assigns mathematics homework every other day. She always gets the answers back to students before examinations. **Ms. Anderson is concerned about her students' learning.**	○ 1	○ 2	○ 3	○ 4
b) Mr. Crawford assigns mathematics homework once a week. He always gets the answers back to students before examinations. **Mr. Crawford is concerned about his students' learning.**	○ 1	○ 2	○ 3	○ 4
c) Ms. Dalton assigns mathematics homework once a week. She never gets the answers back to students before examinations. **Ms. Dalton is concerned about her students' learning.**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST83

Q50 Thinking about the mathematics teacher who taught your last mathematics class: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) My teacher lets us know we need to work hard.	○ 1	○ 2	○ 3	○ 4
b) My teacher provides extra help when needed.	○ 1	○ 2	○ 3	○ 4
c) My teacher helps students learn.	○ 1	○ 2	○ 3	○ 4
d) My teacher gives students the opportunity to express opinions.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST84

Q51 Below you will find descriptions of three mathematics teachers. Read each of the descriptions of these teachers, then let us know to what extent you agree with the final statement.

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) The students in Ms. Franklin's class frequently interrupt her lessons. She is always in her classroom five minutes before the class starts. **Ms. Franklin is in control of her classroom.**	○ 1	○ 2	○ 3	○ 4
b) The students in Ms. Harris' class are calm and orderly. She is always in her classroom at the start of class. **Ms. Harris is in control of her classroom.**	○ 1	○ 2	○ 3	○ 4
c) The students in Mr. Reynolds' class frequently interrupt his lessons. As a result, he often arrives five minutes late to his classroom. **Mr. Reynolds is in control of his classroom.**	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST85

Q52 Thinking about the mathematics teacher who taught your last mathematics class: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) My teacher gets students to listen to him or her.	○ 1	○ 2	○ 3	○ 4
b) My teacher keeps the class orderly.	○ 1	○ 2	○ 3	○ 4
c) My teacher starts the class period on time.	○ 1	○ 2	○ 3	○ 4
d) The teacher has to wait a long time for students to quiet down.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

SECTION E: ABOUT YOUR SCHOOL

ST86

Q53 Thinking about the teachers at your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Students get along well with most teachers.	○ 1	○ 2	○ 3	○ 4
b) Most teachers are interested in students' well-being.	○ 1	○ 2	○ 3	○ 4
c) Most of my teachers really listen to what I have to say.	○ 1	○ 2	○ 3	○ 4
d) If I need extra help, I will receive it from my teachers.	○ 1	○ 2	○ 3	○ 4
e) Most of my teachers treat me fairly.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST87

Q54 Thinking about your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) I feel like an outsider (or left out of things) at school.	○ 1	○ 2	○ 3	○ 4
b) I make friends easily at school.	○ 1	○ 2	○ 3	○ 4
c) I feel like I belong at school.	○ 1	○ 2	○ 3	○ 4
d) I feel awkward and out of place in my school.	○ 1	○ 2	○ 3	○ 4
e) Other students seem to like me.	○ 1	○ 2	○ 3	○ 4
f) I feel lonely at school.	○ 1	○ 2	○ 3	○ 4
g) I feel happy at school.	○ 1	○ 2	○ 3	○ 4
h) Things are ideal in my school.	○ 1	○ 2	○ 3	○ 4
i) I am satisfied with my school.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST88

Q55 Thinking about what you have learned at school*:* to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) School has done little to prepare me for adult life when I leave school.	○ 1	○ 2	○ 3	○ 4
b) School has been a waste of time.	○ 1	○ 2	○ 3	○ 4
c) School has helped give me confidence to make decisions.	○ 1	○ 2	○ 3	○ 4
d) School has taught me things which could be useful in a job.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST89

Q56 Thinking about your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Trying hard at school will help me get a good job.	○ 1	○ 2	○ 3	○ 4
b) Trying hard at school will help me get into a good college.	○ 1	○ 2	○ 3	○ 4
c) I enjoy receiving good grades.	○ 1	○ 2	○ 3	○ 4
d) Trying hard at school is important.	○ 1	○ 2	○ 3	○ 4

Exhibit E-1. PISA 2012 student questionnaire—Continued

ST91

Q57 Thinking about your school: to what extent do you agree with the following statements?

(Please darken only one circle in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) If I put in enough effort I can succeed in school.	○ 1	○ 2	○ 3	○ 4
b) It is completely my choice whether or not I do well at school.	○ 1	○ 2	○ 3	○ 4
c) Family demands or other problems prevent me from putting a lot of time into my school work.	○ 1	○ 2	○ 3	○ 4
d) If I had different teachers I would try harder in school.	○ 1	○ 2	○ 3	○ 4
e) If I wanted to I could do well in school.	○ 1	○ 2	○ 3	○ 4
f) I do badly in school whether or not I study for my exams.	○ 1	○ 2	○ 3	○ 4

Thank you very much for your cooperation in completing this questionnaire!

Exhibit E-1. PISA 2012 student questionnaire—Continued

THIS PAGE INTENTIONALLY LEFT BLANK

Exhibit E-2. PISA 2012 school questionnaire

OECD Program for International Student Assessment 2012

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

USA

Date of Test (Main Survey PISA 2012)		
_____ Month	_____ Day	2012

School Questionnaire

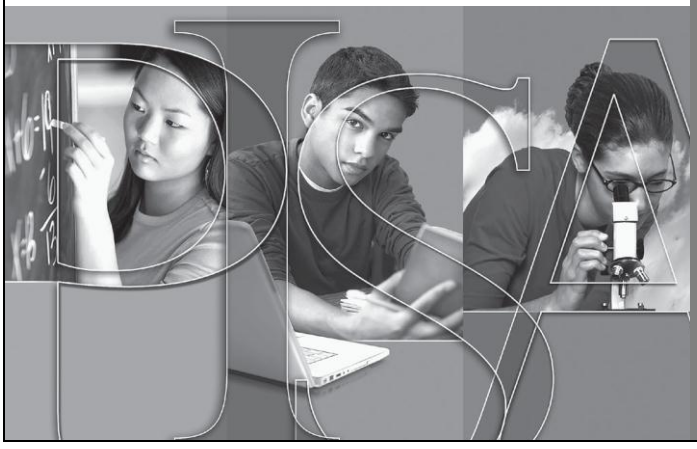
Place Label Here

School ID | | | | | | | |

English 313

U.S. participation in this study is sponsored by the National Center for Education Statistics (NCES), U.S. Department of Education. Your responses are protected by federal statute (20 U.S.C., § 9573). Your answers may be used only for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law. By law, everyone working on this NCES survey is subject to a jail term of up to 5 years, a fine of up to $250,000, or both if he or she willfully discloses ANY identifiable information about you.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless such collection displays a valid OMB control number. The valid OMB control number for this voluntary information collection is 1850-0755. The time required to complete this information collection is estimated to average 30 minutes per response, including the time to review instructions, search existing data resources, gather the data needed, and complete and review the information collection. **If you have any comments concerning the accuracy of the time estimate(s) or suggestions for improving the form, please write to**: U.S. Department of Education, Washington, D.C. 20202-4537. **If you have comments or concerns regarding the status of your individual submission of this form, write directly to**: Program for International Student Assessment (PISA), National Center for Education Statistics, U.S. Department of Education, 1990 K Street, N.W., Washington, D.C. 20006. O.M.B. No. 1850-0755, Approval Expires 11/30/2013



Project Consortium

- Australian Council for Educational Research (ACER)
- cApStAn Linguistic Quality Control (Belgium)
- Deutsches Institut für Internationale Pädagogische Forschung (DIPF, Germany)
- Educational Testing Service (ETS, USA)
- Institutt for Lærerutdanning og Skoleutvikling (ILS, Norway)
- Leibniz - Institute for Science and Mathematics Education (IPN, Germany)
- National Institute for Educational Policy Research (NIER, Japan)
- The Tao Initiative: CRP - Henri Tudor and Université de Luxembourg EMACS (Luxembourg)
- Unité d'analyse des systèmes et des pratiques d'enseignement (aSPe, Belgium)
- Westat (USA)

Exhibit E-2. PISA 2012 school questionnaire —Continued

This questionnaire asks for information including:

- The structure and organization of the school;
- The student body and teachers;
- The school's resources;
- The school's instruction, curriculum and assessment;
- The school climate;
- The school's policies and practices;
- Financial education at school.

This information helps illustrate the similarities and differences between groups of schools in order to better establish the context for students' test results. For example, the information provided may help to establish what effect the availability of resources may have on student achievement – both within and between countries.

The questionnaire should be completed by the principal or their designee. It should take about 30 minutes to complete.

For some questions, specific expertise may be needed. You may consult experts to help you answer these questions.

If you do not know an answer precisely, your best estimate will be adequate for the purposes of the study.

Some questions ask about 10th grade or 10th graders. If you do not have a 10th grade in your school, then answer these questions for the grade in your school that contains the most 15-year-olds.

Your answers will be combined with answers from other principals to calculate totals and averages. All information (or responses) you provide may only be used for statistical purposes and may not be disclosed, or used, in identifiable form for any other purpose except as required by law [Education Science Reform Act of 2002 (ESRA 2002), 20 U.S. Code, Section 9573].

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION A: THE STRUCTURE AND ORGANIZATION OF THE SCHOOL

SC01

Q1 Is your school a public or a private school?

(Please check only one box.)

A public school ☐ 1

A private school ☐ 2

SC02

Q2 About what percentage of your total funding for a typical school year comes from the following sources?

(Please write a number in each row. Write 0 (zero) if no funding comes from that source.)

	%
a) Government (includes local, state and federal)	_____
b) Tuition, student fees or school charges paid by parents	_____
c) Benefactors, donations, bequests, sponsorships, parent fundraising	_____
d) Other	_____
Total	100%

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC03

Q3 Which of the following definitions best describes the community in which your school is located?

(Please check only one box.)

- A village, hamlet, or rural area (fewer than 3,000 people) ☐ 1
- A small town (3,000 to about 15,000 people) ☐ 2
- A town (15,000 to about 100,000 people) ☐ 3
- A city (100,000 to about 1,000,000 people) ☐ 4
- A large city (with over 1,000,000 people) ☐ 5

SC04

Q4 *We are interested in the options parents have when choosing a school for their children.*

Which of the following statements best describes the schooling available to students in your location?

(Please check only one box.)

- There are two or more other schools in this area that compete for our students. ☐ 1
- There is one other school in this area that competes for our students. ☐ 2
- There are no other schools in this area that compete for our students. ☐ 3

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC05

Q5 What is the average size of English classes in the 10th grade in your school?

(Please check only one box.)

15 students or fewer	☐ 01
16-20 students	☐ 02
21-25 students	☐ 03
26-30 students	☐ 04
31-35 students	☐ 05
36-40 students	☐ 06
41-45 students	☐ 07
46-50 students	☐ 08
More than 50 students	☐ 09

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION B: THE STUDENT BODY AND TEACHERS

SC07

Q6 As of September 1, 2012, what was the total school enrollment (number of students)?

(Please write a number on each line. Write 0 (zero) if there are none.)

a) Number of boys: _____

b) Number of girls: _____

USA_SC53A01

Q7 Approximately what percentage of students at this school last year were eligible for free- or reduced-price lunches through the National School Lunch Program?

(*Please write a number on the line. Write 0 (zero) if there are none.)*

Percentage of students eligible _____ %

USA_SC54A01

Q8 About how many students in the 10th grade in your school have a first language that is not English?

(Please check only one box.)

60% or more ☐ 1

40% or more but less than 60% ☐ 2

20% or more but less than 40% ☐ 3

10% or more but less than 20% ☐ 4

More than 0% but less than 10% ☐ 5

None ☐ 6

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC09

Q9 How many of the following teachers are on the staff of your school?

Include both full-time and part-time teachers. *A full-time teacher is employed at least 90% of the time as a teacher for the full school year. All other teachers should be considered part time.*

(Please write a number in each space provided. Write 0 (zero) if there are none.)

	Full-time	*Part-time*
a) Teachers in TOTAL	_____	_____
b) Teachers fully certified by the state in their main assignment field	_____	_____
c) Teachers with at least a bachelor's degree	_____	_____

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC10

Q10 How many of the following are on the mathematics staff of your school?

Include both full-time and part-time teachers. *A full-time teacher is employed at least 90% of the time as a teacher for the full school year. All other teachers should be considered part time.*

Please count only those teachers who have taught or will teach mathematics during the current school year.

(Please write a number in each space provided. Write 0 (zero) if there are none.)

	Full-time	*Part-time*
a) Teachers of mathematics in TOTAL	_____	_____
b) Teachers of mathematics with a bachelor's or master's degree	_____	_____
c) Teachers of mathematics with a bachelor's or master's degree with a major in mathematics, statistics, physics, or engineering	_____	_____
d) Teachers of mathematics with a bachelor's or master's degree in education	_____	_____
e) Teachers of mathematics with an associate's degree but not a bachelor's or master's degree	_____	_____

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION C: THE SCHOOL'S RESOURCES

The goal of the following set of three questions is to gather information about the student-computer ratio for students in the 10th grade at your school.

SC11

Number

Q11a At your school, what is the total number of students in the 10th grade? _____

Q11b Approximately how many computers are available for these students for educational purposes? _____

Q11c Approximately how many of these computers are connected to the Internet? _____

SC13

Q12 In all subjects taken together, for how much of their work does the school expect 10th-grade students to access the Internet?

(Please check only one box in each row.)

	<10%	*10-25%*	*26-50%*	*51-75%*	*>75%*
a) Work during class	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b) Homework	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c) Assignments or projects	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC14

Q13 Is your school's capacity to provide instruction hindered by any of the following issues?

(Please check one box in each row.)

	Not at all	*Very little*	*To some extent*	*A lot*
a) A lack of qualified science teachers	☐ 1	☐ 2	☐ 3	☐ 4
b) A lack of qualified mathematics teachers	☐ 1	☐ 2	☐ 3	☐ 4
c) A lack of qualified English teachers	☐ 1	☐ 2	☐ 3	☐ 4
d) A lack of qualified teachers of other subjects	☐ 1	☐ 2	☐ 3	☐ 4
e) Shortage or inadequacy of science laboratory equipment	☐ 1	☐ 2	☐ 3	☐ 4
f) Shortage or inadequacy of instructional materials (e.g., textbooks)	☐ 1	☐ 2	☐ 3	☐ 4
g) Shortage or inadequacy of computers for instruction	☐ 1	☐ 2	☐ 3	☐ 4
h) Lack or inadequacy of Internet connectivity	☐ 1	☐ 2	☐ 3	☐ 4
i) Shortage or inadequacy of computer software for instruction	☐ 1	☐ 2	☐ 3	☐ 4
j) Shortage or inadequacy of library materials	☐ 1	☐ 2	☐ 3	☐ 4
k) Shortage or inadequacy of school buildings and grounds	☐ 1	☐ 2	☐ 3	☐ 4
l) Shortage or inadequacy of heating/cooling and lighting systems	☐ 1	☐ 2	☐ 3	☐ 4
m) Shortage or inadequacy of instructional space (e.g., classrooms)	☐ 1	☐ 2	☐ 3	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION D: SCHOOL INSTRUCTION, CURRICULUM, AND ASSESSMENT

SC15

Q14 *Schools sometimes organize instruction differently for students with different abilities and interests in mathematics.* **Which of the following options describe what your school does for 10th-grade students in mathematics classes?**

(Please check one box in each row.)

	For all classes	*For some classes*	*Not for any classes*
a) Mathematics classes study similar content, but at different levels of difficulty.	☐ 1	☐ 2	☐ 3
b) Different classes study different content or sets of mathematics topics that have different levels of difficulty.	☐ 1	☐ 2	☐ 3
c) Students are grouped by ability within their mathematics classes.	☐ 1	☐ 2	☐ 3
d) In mathematics classes, teachers use pedagogy suitable for students with heterogeneous abilities (i.e., students are not grouped by ability).	☐ 1	☐ 2	☐ 3

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC16

Q15 In this academic year, which of the following activities does your school offer to students in the 10th grade?

(Please check one box in each row.)

	Yes	*No*
a) Band, orchestra or choir	☐ 1	☐ 2
b) School play or school musical	☐ 1	☐ 2
c) School yearbook, newspaper or magazine	☐ 1	☐ 2
d) Volunteering or community service activities	☐ 1	☐ 2
e) Mathematics club	☐ 1	☐ 2
f) Mathematics competitions	☐ 1	☐ 2
g) Chess club	☐ 1	☐ 2
h) Club with a focus on computers/ Information and Communication Technology	☐ 1	☐ 2
i) Art club or art activities	☐ 1	☐ 2
j) Sports team or sports activities	☐ 1	☐ 2

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC18

Q16 In your school, are assessments of students in the 10th grade used for any of the following purposes?

(Please check only one box in each row.)

	Yes	*No*
a) To inform parents about their child's progress	☐ 1	☐ 2
b) To make decisions about students' retention or promotion	☐ 1	☐ 2
c) To group students for instructional purposes	☐ 1	☐ 2
d) To compare the school to district, state, or national performance	☐ 1	☐ 2
e) To monitor the school's progress from year to year	☐ 1	☐ 2
f) To make judgments about teachers' effectiveness	☐ 1	☐ 2
g) To identify aspects of instruction or the curriculum that could be improved	☐ 1	☐ 2
h) To compare the school with other schools	☐ 1	☐ 2

SC19

Q17 In your school, are achievement data used in any of the following accountability procedures?

*Achievement data include **aggregated** school or grade-level test scores or grades, or graduation rates.*

(Please check one box in each row.)

	Yes	*No*
a) Achievement data are posted publicly (e.g., in the media)	☐ 1	☐ 2
b) Achievement data are tracked over time by an administrative authority, such as a district, state, or national education agency	☐ 1	☐ 2

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC20

Q18 Does your school offer mathematics lessons or classes in addition to the mathematics classes offered during the usual school hours?

(Please check only one box.)

Yes	☐ 1	*go to the next question*
No	☐ 2	*go to Q20*

SC21

Q19 What is the purpose of these additional mathematics lessons or classes?

(Please check only one box.)

Enrichment mathematics only	☐ 1
Remedial mathematics only	☐ 2
Both enrichment mathematics and remedial mathematics	☐ 3
Without differentiation depending on the prior achievement level of the students	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION E: SCHOOL CLIMATE

SC22

Q20 In your school, to what extent is the learning of students hindered by the following phenomena?

(Please check one box in each row.)

	Not at all	*Very little*	*To some extent*	*A lot*
a) Student truancy	☐ 1	☐ 2	☐ 3	☐ 4
b) Students skipping classes	☐ 1	☐ 2	☐ 3	☐ 4
c) Students arriving late for school	☐ 1	☐ 2	☐ 3	☐ 4
d) Students not attending compulsory school events (e.g., school assemblies) or excursions	☐ 1	☐ 2	☐ 3	☐ 4
e) Students lacking respect for teachers	☐ 1	☐ 2	☐ 3	☐ 4
f) Disruption of classes by students	☐ 1	☐ 2	☐ 3	☐ 4
g) Student use of alcohol or illegal drugs	☐ 1	☐ 2	☐ 3	☐ 4
h) Students intimidating or bullying other students	☐ 1	☐ 2	☐ 3	☐ 4
i) Students not being encouraged to achieve their full potential	☐ 1	☐ 2	☐ 3	☐ 4
j) Poor student-teacher relations	☐ 1	☐ 2	☐ 3	☐ 4
k) Teachers having to teach students of heterogeneous ability levels within the same class	☐ 1	☐ 2	☐ 3	☐ 4
l) Teachers having to teach students of diverse ethnic backgrounds (i.e., language, culture) within the same class	☐ 1	☐ 2	☐ 3	☐ 4
m) Teachers' low expectations of students	☐ 1	☐ 2	☐ 3	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

	Not at all	*Very little*	*To some extent*	*A lot*
n) Teachers not meeting individual students' needs	☐ 1	☐ 2	☐ 3	☐ 4
o) Teacher absenteeism	☐ 1	☐ 2	☐ 3	☐ 4
p) Staff resisting change	☐ 1	☐ 2	☐ 3	☐ 4
q) Teachers being too strict with students	☐ 1	☐ 2	☐ 3	☐ 4
r) Teachers being late for classes	☐ 1	☐ 2	☐ 3	☐ 4
s) Teachers not being well prepared for classes	☐ 1	☐ 2	☐ 3	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC23

Q21 During the 2011-2012 academic year, what proportion of students left your school without a diploma or an alternative credential (e.g., a GED)?

Only include students who dropped out of school without a diploma or alternative credential (e.g., a GED), not students who moved or transferred to another school.

_____ %

SC24

Q22 Which statement below best characterizes parental expectations towards your school?

(Please check only one box.)

There is *constant pressure* from many parents who expect our school to set very high academic standards and to have our students achieve them. ☐ 1

Pressure on the school to achieve higher academic standards among students comes from a *minority of parents.* ☐ 2

Pressure from parents on the school to achieve higher academic standards among students is *largely absent.* ☐ 3

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC25

Q23 During the 2011-2012 academic year, what proportion of students' parents participated in the following school-related activities?

(Please write a number in each row. Write 0 (zero) if no parents participated in the activity. Write 100 (one hundred) if all parents participated in the activity.)

	%
a) Discussed their child's behavior with a teacher on their own initiative.	_____
b) Discussed their child's behavior on the initiative of one of their child's teachers.	_____
c) Discussed their child's academic progress with a teacher on their own initiative.	_____
d) Discussed their child's academic progress on the initiative of one of their child's teachers.	_____
e) Volunteered for physical activities (e.g., building maintenance, carpentry, gardening or yard work).	_____
f) Volunteered for extra-curricular activities (e.g., book club, school play, sports, field trip).	_____
g) Volunteered in the school library or media center.	_____
h) Assisted a teacher in the school.	_____
i) Appeared as a guest speaker.	_____
j) Participated in local school government (e.g., parent teacher association or parent advisory council).	_____
k) Assisted in fundraising for the school.	_____
l) Volunteered in the school cafeteria.	_____

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC26

Q24 Think about the teachers in your school. How much do you agree with the following statements?

(Please check one box in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) The morale of teachers in this school is high.	☐ 1	☐ 2	☐ 3	☐ 4
b) Teachers work with enthusiasm.	☐ 1	☐ 2	☐ 3	☐ 4
c) Teachers take pride in this school.	☐ 1	☐ 2	☐ 3	☐ 4
d) Teachers value academic achievement.	☐ 1	☐ 2	☐ 3	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC27

Q25 How much do you agree with these statements about teachers in your school?

(Please check one box in each row.)

	Strongly agree	*Agree*	*Disagree*	*Strongly disagree*
a) Mathematics teachers are interested in trying new methods and teaching practices.	☐ 1	☐ 2	☐ 3	☐ 4
b) There is a preference among mathematics teachers to stay with well-known methods and practices.	☐ 1	☐ 2	☐ 3	☐ 4

SC28

c) There is consensus among mathematics teachers that academic achievement must be kept as high as possible.	☐ 1	☐ 2	☐ 3	☐ 4
d) There is consensus among mathematics teachers that it is best to adapt academic standards to the students' levels and needs.	☐ 1	☐ 2	☐ 3	☐ 4

SC29

e) There is consensus among mathematics teachers that the social and emotional development of the students is as important as their acquisition of mathematical skills and knowledge in mathematics classes.	☐ 1	☐ 2	☐ 3	☐ 4
f) There is consensus among mathematics teachers that the development of mathematical skills and knowledge in students is the most important objective in mathematics classes.	☐ 1	☐ 2	☐ 3	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC30

Q26 During the last year, have any of the following methods been used to monitor the practice of <u>mathematics</u> teachers at your school?

(Please check one box in each row.)

	Yes	*No*
a) Tests or assessments of student achievement	☐ 1	☐ 2
b) Teacher peer review (of lesson plans, assessment instruments, lessons)	☐ 1	☐ 2
c) Principal or senior staff observations of lessons	☐ 1	☐ 2
d) Observation of classes by inspectors or other persons external to the school	☐ 1	☐ 2

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC31

Q27 To what extent have appraisals of and/or feedback to teachers directly led to the following?

(Please check one box in each row.)

	No change	*A small change*	*A moderate change*	*A large change*
a) A change in salary	☐ 1	☐ 2	☐ 3	☐ 4
b) A financial bonus or another kind of monetary reward	☐ 1	☐ 2	☐ 3	☐ 4
c) Opportunities for professional development activities	☐ 1	☐ 2	☐ 3	☐ 4
d) A change in the likelihood of career advancement	☐ 1	☐ 2	☐ 3	☐ 4
e) Public recognition from you	☐ 1	☐ 2	☐ 3	☐ 4
f) Changes in work responsibilities that make the job more attractive	☐ 1	☐ 2	☐ 3	☐ 4
g) A role in school development initiatives (e.g., curriculum development group, development of school objectives)	☐ 1	☐ 2	☐ 3	☐ 4

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION F: SCHOOL POLICIES AND PRACTICES

SC32

Q28 How often are the following factors considered when students are admitted to your school?

(Please check one box in each row.)

	Never	*Sometimes*	*Always*
a) Student's record of academic performance (including placement tests)	☐ 1	☐ 2	☐ 3
b) Recommendation of feeder schools	☐ 1	☐ 2	☐ 3
c) Parents' endorsement of the instructional or religious philosophy of the school	☐ 1	☐ 2	☐ 3
d) Whether the student requires or is interested in a special program	☐ 1	☐ 2	☐ 3
e) Preference given to family members of current or former students	☐ 1	☐ 2	☐ 3
f) Residence in a particular area	☐ 1	☐ 2	☐ 3
g) Other	☐ 1	☐ 2	☐ 3

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC33

Q29 Regarding your school, who has a considerable responsibility for the following tasks?

(Please check as many boxes as appropriate in each row.)

	Principal	*Teachers*	*School-level governing board*	*Local education agency*	*State education agency*	*U.S. Dept. of Education*
a) Selecting teachers for hire	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
b) Firing teachers	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
c) Establishing teachers' starting salaries	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
d) Determining teachers' salary increases	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
e) Formulating the school budget	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
f) Deciding on budget allocations within the school	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
g) Establishing student disciplinary policies	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
h) Establishing student assessment policies	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
i) Approving students for admission to the school	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
j) Choosing which textbooks are used	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
k) Determining course content	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1
l) Deciding which courses are offered	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1	☐ 1

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC34

Q30 Below are statements about your management of this school. Please indicate the frequency of the following activities and behaviors in your school during the 2011-2012 academic year.

(Please check only one box in each row.)

	Did not occur	*1-2 times during the year*	*3-4 times during the year*	*Once a month*	*Once a week*	*More than once a week*
a) I work to enhance the school's reputation in the community.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
b) I use student performance results to develop the school's educational goals.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
c) I make sure that the professional development activities of teachers are in accordance with the teaching goals of the school.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
d) I ensure that teachers work according to the school's educational goals.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
e) I promote teaching practices based on recent educational research.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
f) I praise teachers whose students are actively participating in learning.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
g) When a teacher has problems in his/her classroom, I take the initiative to discuss matters.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
h) I draw teachers' attention to the importance of students' development of critical and social capacities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Exhibit E-2. PISA 2012 school questionnaire —Continued

	Did not occur	*1-2 times during the year*	*3-4 times during the year*	*Once a month*	*Once a week*	*More than once a week*
i) I pay attention to disruptive behavior in classrooms.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
j) I provide staff with opportunities to participate in school decision-making.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
k) I engage teachers to help build a school culture of continuous improvement.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
l) I ask teachers to participate in reviewing management practices.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
m) When a teacher brings up a classroom problem, we solve the problem together.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
n) I discuss the school's academic goals with teachers at faculty meetings.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
o) I refer to the school's academic goals when making curricular decisions with teachers.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
p) I discuss academic performance results with the faculty to identify curricular strengths and weaknesses.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
q) I lead or attend in-service activities concerned with instruction.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
r) I set aside time at faculty meetings for teachers to share ideas or information from in-service activities.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

Exhibit E-2. PISA 2012 school questionnaire —Continued

***Q30 Continued*...Below are statements about your management of this school. Please indicate the frequency of the following activities and behaviors in your school during the 2011-2012 academic year.**

(Please check only one box in each row.)

	Did not occur	*1-2 times during the year*	*3-4 times during the year*	*Once a month*	*Once a week*	*More than once a week*
s) I conduct informal observations in classrooms on a regular basis (informal observations are unscheduled, last at least 5 minutes, and may or may not involve written feedback or a formal conference).	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
t) I review work produced by students when evaluating classroom instruction.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6
u) I evaluate the performance of staff.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5	☐ 6

SC35

Q31 During the last three months, what percentage of teaching staff in your school has attended a program of professional development with a focus on mathematics?

A program of professional development here is a formal program designed to enhance teaching skills or pedagogical practices. It may or may not lead to a recognized qualification. The program must last for at least one day in total and have a focus on mathematics teaching and education.

a) All staff at your school _____ %

b) Staff who teach mathematics at your school _____ %

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC39

Q32 Which of the following measures aimed at quality assurance and improvement do you have in your school?

(Please check one box in each row.)

	Yes	*No*
a) Written specification of the school's curricular profile and educational goals	☐ 1	☐ 2
b) Written specification of student performance standards	☐ 1	☐ 2
c) Systematic recording of data including teacher and student attendance and graduation rates, test results and professional development of teachers	☐ 1	☐ 2
d) Internal evaluation/self-evaluation	☐ 1	☐ 2
e) External evaluation	☐ 1	☐ 2
f) Seeking written feedback from students (e.g., regarding classes, teachers or resources)	☐ 1	☐ 2
g) Teacher mentoring	☐ 1	☐ 2
h) Regular consultation aimed at school improvement with one or more experts over a period of at least six months	☐ 1	☐ 2
i) Implementation of a standardized policy for mathematics (i.e., school curriculum with shared instructional materials accompanied by staff development and training)	☐ 1	☐ 2

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC40

Q33 Which of the following statements apply in your school?

A policy refers to written rules known to those concerned with the policy.

(Please check one box in each row.)

	Yes	*No*
a) The school has a policy on how to use computers in mathematics instruction (e.g., amount of computer use in mathematics classes, use of specific mathematics computer programs).	☐ 1	☐ 2
b) All 10th grade mathematics classes in the school use the same textbook.	☐ 1	☐ 2
c) Mathematics teachers in the school follow a standardized curriculum that specifies content at least on a monthly basis.	☐ 1	☐ 2

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC44

Q34 In your school, how likely is it that a student in 10th grade would be transferred to another school for the following reasons?

(Please check one box in each row.)

	Not likely	*Likely*	*Very likely*
a) Low academic achievement	☐ 1	☐ 2	☐ 3
b) High academic achievement	☐ 1	☐ 2	☐ 3
c) Behavioral problems	☐ 1	☐ 2	☐ 3
d) Special learning needs	☐ 1	☐ 2	☐ 3
e) Parents' or guardians' request	☐ 1	☐ 2	☐ 3
f) Other	☐ 1	☐ 2	☐ 3

Exhibit E-2. PISA 2012 school questionnaire —Continued

SECTION G: FINANCIAL EDUCATION AT SCHOOL

The following five questions are about financial education/personal finance in your school. Financial education/personal finance involves the development of students' knowledge, confidence and skills relating to topics such as money and income; budgeting and long-term planning; saving and spending; credit and debt; investment and insurance; the potential risks and benefits of financial products; and the financial landscape (including consumer rights and responsibilities and understanding of the wider financial, economic and social system).

SC47

Q35 Which of the statements below best describes the situation for students in 10th grade regarding the availability of financial education in your school?

(Please check only one box.)

Financial education is not available. ☐ 1

Financial education has been available for less than two years. ☐ 2

Financial education has been available for two years or more. ☐ 3

SC45

Q36 Is financial education compulsory in your school?

(Please check only one box.)

Yes ☐ 1

No ☐ 2

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC46

Q37 Which of the statements below describe the teaching of financial education in your school?

For each statement, please indicate the number of hours of financial education of this type for students in 10th grade during the 2011-2012 academic year.

(Please check one box in each row.)

	Not at all	*1-4 hours a year*	*5-19 hours year*	*20-49 hours a year*	*50 or more hours a year*
a) It is taught as a separate subject.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b) It is taught as a cross-curricular subject.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c) It is taught as part of business or economics courses.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
d) It is taught as part of mathematics.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
e) It is taught as part of other social sciences and humanities subjects and/or literature/language (e.g., history, geography, home economics, civics).	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
f) It is available as an extracurricular activity.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
g) It is taught as part of homeroom.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Exhibit E-2. PISA 2012 school questionnaire —Continued

SC52

Q38 Who provides financial education in your school?

(Please check one box in each row.)

	Yes	*No*
a) Teachers	☐ 1	☐ 2
b) People from private sector, for-profit institutions (e.g., commercial bank, insurance company)	☐ 1	☐ 2
c) People from non-profit or not-for-profit organizations	☐ 1	☐ 2
d) People from public sector institutions	☐ 1	☐ 2

SC51

Q39 During the last twelve months, what percentage of teaching staff in your school has attended a program of professional development with a focus on financial education?

A program of professional development here is a formal program designed to enhance teaching skills or pedagogical practices. It may or may not lead to a recognized qualification. The program must last for at least one day in total and have a focus on the teaching of financial education.

a) Staff who teach financial education in your school _____ %

b) All other teaching staff in your school _____ %

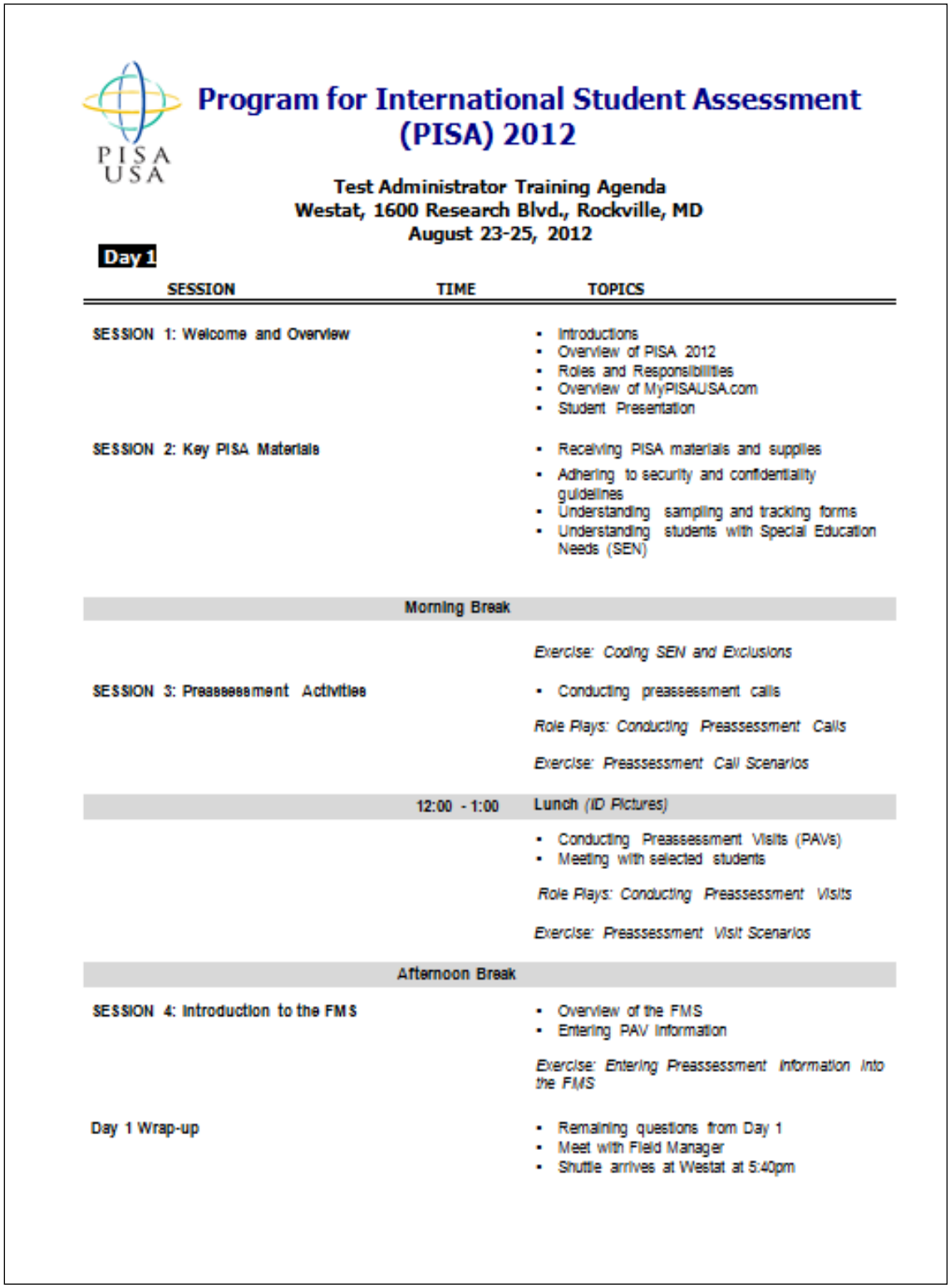
Thank you very much for your cooperation in completing this questionnaire!

Exhibit E-2. PISA 2012 school questionnaire —Continued

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix F. Training Agendas

Exhibit F-1. Test administrator training agenda – national



PISA USA

Program for International Student Assessment (PISA) 2012

Test Administrator Training Agenda
Westat, 1600 Research Blvd., Rockville, MD
August 23-25, 2012

Day 1

SESSION	TIME	TOPICS
SESSION 1: Welcome and Overview		• Introductions • Overview of PISA 2012 • Roles and Responsibilities • Overview of MyPISAUSA.com • Student Presentation
SESSION 2: Key PISA Materials		• Receiving PISA materials and supplies • Adhering to security and confidentiality guidelines • Understanding sampling and tracking forms • Understanding students with Special Education Needs (SEN)
	Morning Break	
		Exercise: Coding SEN and Exclusions
SESSION 3: Preassessment Activities		• Conducting preassessment calls *Role Plays: Conducting Preassessment Calls* *Exercise: Preassessment Call Scenarios*
	12:00 - 1:00	Lunch *(ID Pictures)*
		• Conducting Preassessment Visits (PAVs) • Meeting with selected students *Role Plays: Conducting Preassessment Visits* *Exercise: Preassessment Visit Scenarios*
	Afternoon Break	
SESSION 4: Introduction to the FMS		• Overview of the FMS • Entering PAV information *Exercise: Entering Preassessment Information into the FMS*
Day 1 Wrap-up		• Remaining questions from Day 1 • Meet with Field Manager • Shuttle arrives at Westat at 5:40pm

Exhibit F-1. Test administrator training agenda – national—Continued

PISA 2012
Test Administrator Training Agenda
August 23-25, 2012

Day 2

SESSION	TIME	TOPICS
Welcome to Day 2		• Warm-up • Remaining Questions from Day 1
SESSION 5: Activities to Complete Before Assessment Day		• Preparing the assessment booklets *Exercise: Preparing the Assessment Booklets* • Preparing the Student Questionnaires *Exercise: Preparing the Student Questionnaires* • Gathering materials to bring to the assessment
	Morning Break	
SESSION 6: Activities to Complete Upon Arriving at the School		• Arriving at the school • Meeting with school coordinator • Setting up the room
SESSION 7: Conducting the Paper and Pencil Sessions		• Conducting the session • Monitoring the session • Administering the Student Questionnaire • Ending session and dismissing students *Group Work: Session Script*
	12:00 - 1:00	Lunch
		Exercise: Completing the Session Report Form (Paper-based)
SESSION 8: Preparing for and Conducting the Computer Sessions		• Setting up the laptops • Beginning the session and logging students into the assessment • Monitoring the session • Ending the session and dismissing students • Repacking the Pelican Cases *Group Work: Session Script* *Exercise: Completing the Session Report Form (Computer-based)* *Exercise: Assessment Day Scenarios*
	Afternoon Break	(Receive Pelican Cases)
		Group Work: Setting up the Laptops, Logging Students into the Assessment, Repacking the Pelican Cases
Day 2 Wrap-up		• Remaining questions from Day 2 • Shuttle arrives at Westat at 5:40pm

Exhibit F-1. Test administrator training agenda – national—Continued

PISA 2012
Test Administrator Training Agenda
August 23-25, 2012

Day 3

SESSION	TIME	TOPICS
Welcome to Day 3		• Remaining Questions from Day 2
SESSION 9: Activities to Complete After the Session		• Finalizing Sampling and Tracking Forms • Coding the Booklet and Questionnaire Covers
		Exercise: Coding Booklet and Questionnaire Covers
		• Determining a Makeup
		Exercise: Determining a Makeup
		• Finalizing the PISA Storage Envelope
		Exercise: How to Organize Material and Forms
		• Conducting the School Coordinator Debriefing Interview • Packing the Session Boxes
	Morning Break	
		Group Role Play: Conducting the School Coordinator Debriefing Interview
SESSION 10: Activities to Complete at Home		• Updating the FMS with post-assessment information
		Exercise: Updating the FMS
	12:15 - 1:15	Lunch
		• Uploading and transmitting student data to Westat
		Exercise: Uploading and Transmitting Student Data
SESSION 11: Training Your AAs		• Conducting the AA Training
	Afternoon Break	
SESSION 12: TA Training Wrap-up		• Administrative activities • DCIUFs • Meet with Field Manager • Shuttle arrives at Westat at 5:10pm

Exhibit F-2. Assistant administrator training agenda – national

National

PISA USA

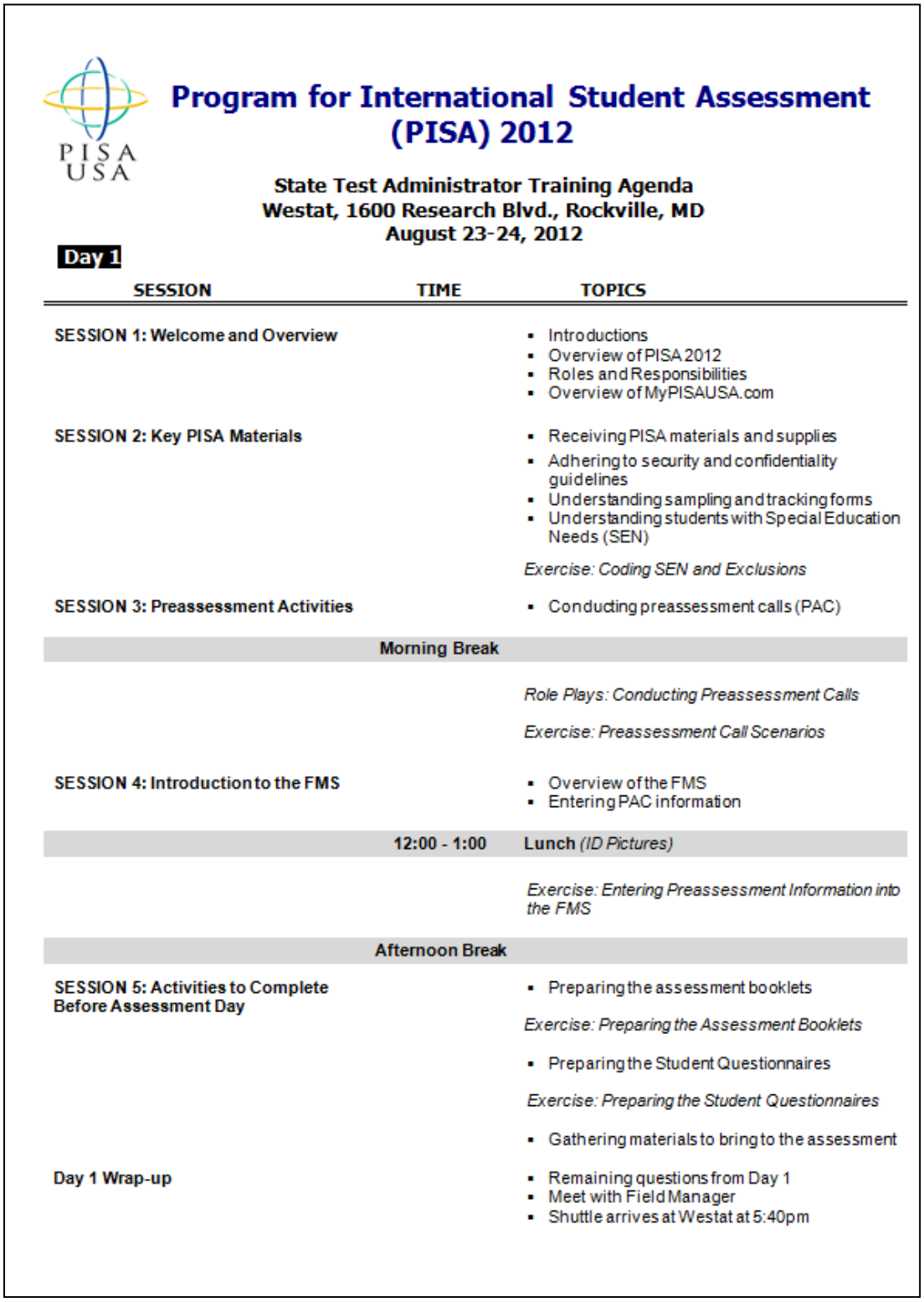
Program for International Student Assessment (PISA) 2012

Assistant Administrator Training Agenda

September 2012

SESSION	TOPICS
SESSION 1: Welcome and Overview	▪ Overview of PISA 2012
SESSION 2: Key PISA Materials	▪ Session Boxes ▪ Adhering to Security and Confidentiality Guidelines ▪ Understanding sampling and tracking forms
SESSION 3: Preparing Student Materials	▪ Preparing the assessment booklets *Exercise: Preparing the Assessment Booklets* ▪ Preparing the Student Questionnaires *Exercise: Preparing the Student Questionnaires* ▪ Gathering Materials to Bring to the Assessment
SESSION 4: Activities to Complete Upon Arriving at the School	▪ Arriving at the school ▪ Setting up the room
Lunch	**(SHOW WESTAT VIDEOS)**
SESSION 5: Conducting the Paper and Pencil Sessions	▪ Conducting the session ▪ Monitoring the session ▪ Administering the Student Questionnaire ▪ Ending session and dismissing students *Group Work: Reviewing Session Script (Paper-based)*
SESSION 6: Preparing for and Conducting the Computer Sessions	▪ Setting up the laptops ▪ Beginning the session and logging students into the assessment ▪ Monitoring the session ▪ Ending the session and dismissing students ▪ Repacking the Pelican Cases *Group Work: Reviewing Session Script (Computer-based)* *Exercise: Setting Up for CBA Sessions (Setting up and Breaking Down Computers)*
SESSION 7: Activities to Complete After the Session	▪ Finalizing Sampling and Tracking Forms ▪ Coding the Booklet and Questionnaire Covers *Exercise: Coding Booklet and Questionnaire Covers*
SESSION 8: Training Wrap-up	▪ Any remaining questions from training? ▪ Share assessment schedule (if not already done ▪ Discuss outstanding travel details (if necessary)

Exhibit F-3. Test administrator training agenda – state



PISA USA

Program for International Student Assessment (PISA) 2012

State Test Administrator Training Agenda
Westat, 1600 Research Blvd., Rockville, MD
August 23-24, 2012

Day 1

SESSION	TIME	TOPICS
SESSION 1: Welcome and Overview		▪ Introductions ▪ Overview of PISA 2012 ▪ Roles and Responsibilities ▪ Overview of MyPISAUSA.com
SESSION 2: Key PISA Materials		▪ Receiving PISA materials and supplies ▪ Adhering to security and confidentiality guidelines ▪ Understanding sampling and tracking forms ▪ Understanding students with Special Education Needs (SEN) *Exercise: Coding SEN and Exclusions*
SESSION 3: Preassessment Activities		▪ Conducting preassessment calls (PAC)
	Morning Break	
		Role Plays: Conducting Preassessment Calls *Exercise: Preassessment Call Scenarios*
SESSION 4: Introduction to the FMS		▪ Overview of the FMS ▪ Entering PAC information
	12:00 - 1:00	**Lunch** *(ID Pictures)*
		Exercise: Entering Preassessment Information into the FMS
	Afternoon Break	
SESSION 5: Activities to Complete Before Assessment Day		▪ Preparing the assessment booklets *Exercise: Preparing the Assessment Booklets* ▪ Preparing the Student Questionnaires *Exercise: Preparing the Student Questionnaires* ▪ Gathering materials to bring to the assessment
Day 1 Wrap-up		▪ Remaining questions from Day 1 ▪ Meet with Field Manager ▪ Shuttle arrives at Westat at 5:40pm

Exhibit F-3. Test administrator training agenda – state—Continued

PISA 2012
State Test Administrator Training Agenda
August 23-24, 2012

Day 2

SESSION	TIME	TOPICS
Welcome to Day 2		▪ Remaining Questions from Day 1
SESSION 6: Activities to Complete Upon Arriving at the School		▪ Arriving at the school ▪ Meeting with school coordinator ▪ Setting up the room
SESSION 7: Conducting the Paper and Pencil Sessions		▪ Conducting the session ▪ Monitoring the session ▪ Administering the Student Questionnaire Ending session and dismissing students
	Morning Break	
		Group Work: Session Scripts *Exercise: Completing the Session Report Form* *Exercise: Assessment Day Scenarios*
	12:00 - 1:00	**Lunch**
SESSION 8: Activities to Complete After the Session		▪ Finalizing Sampling and Tracking Forms ▪ Coding the Booklet and Questionnaire Covers *Exercise: Coding Booklet and Questionnaire Covers* ▪ Determining a Makeup *Exercise: How to Organize Material and Forms* ▪ Finalizing the PISA Storage Envelope *Exercise: How to Organize Material and Forms* *Group Role Play: Conducting the School Coordinator Debriefing Interview*
SESSION 9: Activities to Complete at Home		▪ Updating the FMS with post-assessment information *Exercise: Updating the FMS*
	Afternoon Break	
SESSION 10: Training Your AA		▪ Conducting the AA Training
SESSION 11: TA Training Wrap-up		▪ Administrative activities ▪ DCIUFs ▪ Meet with Field Manager ▪ Shuttle arrives at Westat at 5:40pm

Exhibit F-4. Assistant administrator training agenda – state

State

Program for International Student Assessment (PISA) 2012

PISA USA

Assistant Administrator Training Agenda

September 2012

SESSION	TOPICS
SESSION 1: Welcome and Overview	▪ Overview of PISA 2012
SESSION 2: Key PISA Materials	▪ Session Boxes ▪ Adhering to Security and Confidentiality Guidelines ▪ Understanding sampling and tracking forms
SESSION 3: Preparing Student Questionnaires	▪ Preparing the assessment booklets *Exercise: Preparing the Assessment Booklets* ▪ Preparing the Student Questionnaires *Exercise: Preparing the Student Questionnaires* ▪ Gathering Materials to Bring to the Assessment
SESSION 4: Activities to Complete Upon Arriving at the School	▪ Arriving at the school ▪ Setting up the room
Lunch	**(SHOW WESTAT VIDEOS)**
SESSION 5: Conducting the Paper and Pencil Sessions	▪ Conducting the session ▪ Monitoring the session ▪ Administering the Student Questionnaire ▪ Ending session and dismissing students *Group Work: Reviewing Session Script (Paper-based)* *Exercise: Completing the Session Report Form (Paper-based)*
SESSION 6: Training Wrap-up	▪ Any remaining questions from training? ▪ Share assessment schedule (if not already done) ▪ Discuss outstanding travel details (if necessary)

PREPARE ASSESSMENT BOOKLETS AND QUESTIONNAIRES FOR FIRST WEEK'S ASSESSMENTS.

Appendix G. Item Reliability

Table G-1. PISA 2012 Item reliabilities

Item name	Total Multiple Coded Responses	National Item Reliability Index	Item Reliability Benchmark
Mathematic Items (Computer-Based)			
CM015Q03	135	7.19	9.80
CM028Q03	133	0.31	3.69
CM038Q05	133	3.07	5.05
CM038Q06	134	8.13	7.24
Problem Solving Items (Computer-Based)			
CP002Q06	139	6.00	8.95
CP018Q05	133	5.00	3.39
CP034Q05	130	2.02	3.69
CP036Q02	130	0.00	4.76
CP036Q03	131	1.01	2.62
CP041Q02	111	5.43	6.90
Reading Items (Computer-Based)			
CR002Q05	141	4.98	10.20
CR013Q07	139	3.76	8.09
CR014Q01	142	4.61	8.24
CR017Q07	168	9.81	11.13
CR021Q08	144	7.84	11.76
Mathematics Items (Paper-Based)			
PM00FQ01	133	4.64	6.22
PM00GQ01	N/A	N/A	N/A
PM00KQ02	133	0.64	1.20
PM155Q01	128	0.00	2.75
PM155Q02	105	2.96	5.90
PM155Q03	129	2.12	8.85
PM406Q01	129	0.30	2.04
PM406Q02	129	3.72	3.91
PM411Q01	N/A	N/A	N/A
PM442Q02	N/A	N/A	N/A
PM446Q01	N/A	N/A	N/A
PM446Q02	125	0.68	1.64
PM462Q01	131	1.21	3.35
PM474Q01	N/A	N/A	N/A
PM496Q02	N/A	N/A	N/A
PM828Q01	102	7.02	8.00
PM828Q02	N/A	N/A	N/A
PM828Q03	N/A	N/A	N/A
PM903Q01	133	3.15	7.74
PM903Q03	0		

See notes at end of table.

Table G-1. PISA 2012 Item reliabilities—Continued

Item name	Total Multiple Coded Responses	National Item Reliability Index	Item Reliability Benchmark
Mathematics Items (Paper-Based)—Continued			
PM905Q02	133	4.13	3.26
PM906Q02	107	8.29	10.60
PM909Q01	N/A	N/A	N/A
PM909Q03	125	0.00	2.29
PM915Q02	N/A	N/A	N/A
PM919Q01	N/A	N/A	N/A
PM919Q02	N/A	N/A	N/A
PM923Q04	125	1.01	1.02
PM924Q02	N/A	N/A	N/A
PM943Q02	100	0.40	0.32
PM949Q03	133	1.90	3.87
PM953Q02	125	2.24	4.16
PM953Q03	N/A	N/A	N/A
PM953Q04	133	4.46	4.68
PM954Q01	N/A	N/A	N/A
PM954Q02	125	0.00	1.65
PM954Q04	125	0.63	1.86
PM955Q01	N/A	N/A	N/A
PM955Q02	125	2.32	4.14
PM955Q03	157	0.86	3.49
PM982Q01	N/A	N/A	N/A
PM982Q02	N/A	N/A	N/A
PM992Q01	N/A	N/A	N/A
PM992Q02	N/A	N/A	N/A
PM992Q03	150	0.29	2.32
PM995Q01	N/A	N/A	N/A
PM995Q02	175	0.00	1.88
PM998Q02	N/A	N/A	N/A
Reading Items (Paper-Based)			
PR220Q01	125	2.79	5.67
PR404Q10A	155	7.08	4.80
PR404Q10B	154	8.01	6.06
PR406Q01	156	2.42	3.67
PR406Q02	157	8.57	8.80
PR406Q05	157	3.02	3.72
PR412Q08	128	6.69	6.81
PR420Q02	N/A	N/A	N/A
PR420Q06	180	7.23	7.02
PR420Q09	N/A	N/A	N/A
PR420Q10	129	7.32	5.53
PR432Q01	N/A	N/A	N/A
PR432Q05	129	3.10	4.73

See notes at end of table.

Table G-1. PISA 2012 Item reliabilities—Continued

Item name	Total Multiple Coded Responses	National Item Reliability Index	Item Reliability Benchmark
Reading Items (Paper-Based)—Continued			
PR437Q07	155	8.51	6.08
PR446Q03	N/A	N/A	N/A
PR446Q06	127	1.52	2.88
PR453Q04	103	4.46	8.19
PR453Q06	129	2.89	4.67
PR455Q02	105	3.41	6.26
PR455Q03	N/A	N/A	N/A
PR456Q02	129	1.01	4.41
PR456Q06	128	0.30	2.24
PR466Q02	129	1.31	3.06
PR466Q06	N/A	N/A	N/A
Science Items (Paper-Based)			
PS131Q02	159	8.76	4.42
PS131Q04	159	4.68	4.46
PS269Q01	135	3.72	2.92
PS269Q03	159	5.16	3.84
PS326Q01	133	6.51	5.18
PS326Q02	132	9.25	4.59
PS408Q03	158	7.43	7.51
PS413Q06	N/A	N/A	N/A
PS425Q03	133	5.14	9.10
PS425Q04	134	1.02	4.75
PS428Q05	159	5.19	4.13
PS438Q03	185	11.62	5.95
PS465Q01	110	1.52	6.77
PS498Q04	135	6.60	9.23
PS514Q02	160	1.33	2.20
PS514Q03	160	6.58	4.39
PS514Q04	N/A	N/A	N/A
PS519Q01	160	11.47	15.56
PS519Q03	158	7.07	8.34
Financial Literacy Items (Paper-Based)			
PF004Q03	162	2.03	3.62
PF010Q01	N/A	N/A	N/A
PF010Q02	N/A	N/A	N/A
PF024Q02	163	10.49	11.39
PF028Q02	138	11.79	10.51
PF031Q02	N/A	N/A	N/A
PF035Q01	N/A	N/A	N/A
PF036Q01	169	6.55	8.00
PF051Q01	165	4.58	4.15

See notes at end of table.

Table G-1. PISA 2012 Item reliabilities—Continued

Item name	Total Multiple Coded Responses	National Item Reliability Index	Item Reliability Benchmark
Financial Literacy Items (Paper-Based)—Continued			
PF051Q02	150	12.25	8.99
PF054Q01	125	2.58	5.32
PF055Q03	N/A	N/A	N/A
PF058Q01	150	3.44	5.76
PF068Q01	125	1.60	5.57
PF082Q01	114	0.75	6.35
PF102Q01	N/A	N/A	N/A
PF102Q02	142	9.80	10.43
PF103Q01	125	1.65	6.17
PF106Q01	100	1.89	6.67

NOTE: If the National Item Reliability Index score was greater than the Item Reliability Benchmark, the item was evaluated and rescored.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Appendix H. Selected Indices From OECD and U.S. Composites

This section explains the indices derived from the student and school questionnaires used in PISA 2012. This section of the appendix only covers indices that were used for the PISA 2012 National Report. For a detailed description of other PISA indices used in the international report and details on the methods used to create indices, see *PISA 2012 Technical Report* (OECD, forthcoming).

Several PISA measures reflect indices that summarize responses from students and school representatives (typically principals) to a series of related questions. The questions were selected from a larger pool of questions on the basis of theoretical considerations and previous research. Structural equation modeling was used to confirm the theoretically expected behavior of the indices and to validate their comparability across countries when possible. For this purpose, a model was estimated separately for each country and collectively for all OECD countries.

There are two types of indices: simple indices and scale indices.

Simple indices are the variables that are constructed through the arithmetic transformation or recoding of one or more items, in exactly the same way across assessments. Here, item responses are used to calculate meaningful variables, such as the recoding of the four-digit ISCO-08 codes into "Highest parents' socio-economic index (HISEI)."

Scale indices are the variables constructed through the scaling of multiple items. Scale scores for these indices are usually estimates of latent traits derived through item response theory (IRT) scaling of dichotomous or Likert-type items. Unless otherwise indicated, the index was scaled using a weighted maximum likelihood estimate (WLE) (Warm 1985), using a one-parameter item response model (a partial credit model was used in the case of items with more than two categories).

The scaling was done in three stages:

- The item parameters were estimated from equal-sized subsamples of students from each OECD country.
- The estimates were computed for all students and all schools by anchoring the item parameters obtained in the preceding step.
- The indices were then standardized so that the mean of the index value for the OECD student population was zero and the standard deviation was one (i.e., countries were weighted equally in the standardization process).

Sequential codes were assigned to the different response categories of the questions based on the question's location within the student or school questionnaire. It is important to note that negative values for an index do not necessarily imply that students responded negatively to the underlying questions. A negative value merely indicates that the respondents answered less positively than all respondents did on average. Likewise, a positive value on an index indicates that the respondents answered more favorably, or more positively, than respondents did, on average.

Terms enclosed in brackets < > in the following descriptions were replaced in the national versions of the student questionnaire by the appropriate national equivalent. For example, the term <qualification at ISCED level 5A> was translated in the United States into "Bachelor's degree, post-graduate certificate program, master's degree program or first professional degree program." Similarly the term <classes in the language of assessment> in Luxembourg was translated into "German classes" or "French classes," depending on whether students received the German or French version of the assessment instruments.

In addition to simple and scaled indices described in this annex, there are a number of variables from the student questionnaire that correspond to single items not used to construct indices. These non-recoded variables have prefix of "ST" for the student questionnaire item and "SC" for the items in the school questionnaire. All the context questionnaires as well as the PISA international database, including all variables, are available through www.pisa.oecd.org.

Student-Level Simple Indices

Age

The variable AGE was calculated as the difference between the middle month and the year in which students were assessed and their month and year of birth, expressed in years and months.

Race/Ethnicity

Race/ethnicity data is indicated through a composite variable (RACETH) and is obtained by asking two questions in the student questionnaire. Students were asked whether or not they were Hispanic or Latino (ST116). They were also asked about their race (ST117). In the case that students indicated they were more than one race, they were coded as multiracial. However, if a student indicated that they were Hispanic or Latino, their race/ethnicity was coded as such, regardless of what they identified for their race.

Study Program

In PISA 2012, study programs available to 15-year-old students in each country were collected through the student questionnaire (ST02) and/or the student tracking form. All study programs were classified using ISCED (OECD, 1999). In the PISA international database, all national programs are indicated in a variable (PROGN) where the first six digits refer to the national center code and the last two digits to the nationally specific program code.

The following internationally comparable indices were derived from the data on study programs:

- Program level (ISCEDL) indicates whether students are (1) primary education level (ISCED 1); (2) lower secondary education level; or (3) upper secondary education level.
- Program designation (ISCEDD) indicates the designation of the study program: (1) = "A" (general programs designed to give access to the next program level); (2) = "B" (programs designed to give access to vocational studies at the next program level); (3)= "C" (programs designed to give direct access to the labor market); or (4) = "M" (modular programs that combine any or all of these characteristics).
- Program orientation (ISCEDO) indicates whether the program's curricular content is (1) general; (2) pre-vocational; (3) vocational; or (4) modular programs that combine any or all of these characteristics.

Occupational Status of Parents

Occupational data for both a student's father and a student's mother were obtained by asking constructed-response questions in the student questionnaire (ST12 and ST16). The responses were coded to four-digit ISCO codes (ILO, 1990) and then mapped to Ganzeboom, *et al.*'s (1992) SEI index. Higher scores of SEI indicate higher levels of occupational status. The following three indices were obtained:

- Mother's occupational status (OCOD1).
- Father's occupational status (OCOD2).
- The highest occupational level of parents (HISEI) corresponds to the higher SEI score of either parent or to the only available parent's SEI score.

Educational Level of Parents

The educational level of parents was classified using ISCED (OECD, 1999) based on students' responses in the student questionnaire (ST13, ST14, ST17 and ST18). It should be noted that the question format for school education in PISA 2012 and PISA 2009 differs from the one used in PISA 2006, 2003 and 2000 but the method used to compute parental education has remained the same.

As in all previous years, indices were constructed by selecting the highest level for each parent and then assigning them to the following categories: (0) None, (1) ISCED 1 (primary education), (2) ISCED 2 (lower secondary), (3) ISCED Level 3B or 3C (vocational/pre-vocational upper secondary), (4) ISCED 3A (upper secondary) and/or ISCED 4 (non-tertiary post-secondary), (5) ISCED 5B (vocational tertiary), (6) ISCED 5A, 6 (theoretically oriented tertiary and post- graduate). The following three indices were developed:

- Mother's educational level (MISCED).
- Father's educational level (FISCED).
- Highest educational level of parents (HISCED) corresponds to the higher ISCED level of either parent.

The index scores for HISCED were also converted into estimated years of schooling (PARED). For the conversion of level of education into years of schooling, see table H-1.

Table H-1. Levels of parental education converted into years of schooling: 2012

Education system	ISCED Level 1	ISCED Level 2	ISCED Levels3B or 3C	ISCED Level 3A and/or ISCED Level 4	ISCED Level 5A or ISCED Level 6	ISCED Level 5B
Albania	6.0	9.0	12.0	12.0	16.0	16.0
Argentina	6.0	10.0	12.0	12.0	17.0	14.5
Australia	6.0	10.0	11.0	12.0	15.0	14.0
Austria	4.0	9.0	12.0	13.0	17.0	15.0
Belgium[1]	6.0	9.0	12.0	12.0	17.0	15.0
Brazil	4.0	8.0	11.0	11.0	16.0	14.5
Bulgaria	4.0	8.0	10.0	12.0	17.5	15.0
Canada	6.0	9.0	12.0	12.0	17.0	15.0
Chile	6.0	8.0	12.0	12.0	17.0	16.0
Chinese Taipei	6.0	9.0	12.0	12.0	16.0	14.0
Colombia	5.0	9.0	11.0	11.0	15.5	14.0
Costa Rica	6.0	9.0	11.0	12.0	14.0	16.0
Croatia	4.0	8.0	11.0	12.0	17.0	15.0
Cyprus	6.0	9.0	12.0	12.0	15.0	16.5
Czech Republic	5.0	9.0	11.0	13.0	16.0	16.0
Denmark	7.0	10.0	13.0	13.0	18.0	16.0
Estonia	6.0	9.0	12.0	12.0	16.0	15.0
Finland	6.0	9.0	12.0	12.0	16.5	14.5
France	5.0	9.0	12.0	12.0	15.0	14.0
Germany	4.0	10.0	13.0	13.0	18.0	15.0
Greece	6.0	9.0	11.5	12.0	17.0	15.0
Hong Kong-China	6.0	9.0	11.0	13.0	16.0	14.0
Hungary	4.0	8.0	10.5	12.0	16.5	13.5
Iceland	7.0	10.0	13.0	14.0	18.0	16.0
Indonesia	6.0	9.0	12.0	12.0	15.0	14.0
Ireland	6.0	9.0	12.0	12.0	16.0	14.0
Israel	6.0	9.0	12.0	12.0	15.0	15.0
Italy	5.0	8.0	12.0	13.0	17.0	16.0
Japan	6.0	9.0	12.0	12.0	16.0	14.0
Jordan	6.0	10.0	12.0	12.0	16.0	14.5
Kazakhstan	4.0	9.0	11.5	12.5	15.0	14.0
Korea, Republic of	6.0	9.0	12.0	12.0	16.0	14.0
Latvia	4.0	8.0	11.0	11.0	16.0	14.0
Liechtenstein	5.0	9.0	11.0	13.0	17.0	14.0
Lithuania	3.0	8.0	11.0	11.0	16.0	15.0
Luxembourg	6.0	9.0	12.0	13.0	17.0	16.0
Macao-China	6.0	9.0	11.0	12.0	16.0	15.0
Malaysia	6.0	9.0	11.0	13.0	15.0	16.0
Mexico	6.0	9.0	12.0	12.0	16.0	14.0
Montenegro, Republic of	4.0	8.0	11.0	12.0	16.0	15.0

See notes at end of table.

Table H-1. Levels of parental education converted into years of schooling: 2012—Continued

Education system	ISCED Level 1	ISCED Level 2	ISCED Levels3B or 3C	ISCED Level 3A and/or ISCED Level 4	ISCED Level 5A or ISCED Level 6	ISCED Level 5B
Netherlands	6.0	10.0	13.0	12.0	16.0	15.0
New Zealand	5.5	10.0	11.0	12.0	15.0	14.0
Norway	6.0	9.0	12.0	12.0	16.0	14.0
Peru	6.0	9.0	11.0	11.0	17.0	14.0
Poland	†	8.0	11.0	12.0	16.0	15.0
Portugal	6.0	9.0	12.0	12.0	17.0	15.0
Qatar	6.0	9.0	12.0	12.0	16.0	15.0
Romania	4.0	8.0	11.5	12.5	16.0	14.0
Russian Federation	4.0	9.0	11.5	12.0	15.0	†
Serbia, Republic of	4.0	8.0	11.0	12.0	17.0	14.5
Shanghai-China	6.0	9.0	12.0	12.0	16.0	15.0
Singapore	6.0	8.0	10.0	11.0	16.0	13.0
Slovak Republic[2]	4.0	9.0	12.0	13.0	18.0	16.0
Slovenia	4.0	8.0	11.0	12.0	16.0	15.0
Spain	5.0	8.0	10.0	12.0	16.5	13.0
Sweden	6.0	9.0	11.5	12.0	16.0	14.0
Switzerland	6.0	9.0	12.5	12.5	17.5	14.5
Thailand	6.0	9.0	12.0	12.0	16.0	14.0
Tunisia	6.0	9.0	12.0	13.0	17.0	16.0
Turkey	5.0	8.0	11.0	11.0	15.0	13.0
United Arab Emirates	5.0	9.0	12.0	12.0	16.0	15.0
United Kingdom (excl. Scotland)	6.0	9.0	12.0	13.0	16.0	15.0
United Kingdom (Scotland)	7.0	9.0	11.0	13.0	17.0	15.0
United States	6.0	9.0	†	12.0	16.0	14.0
Uruguay	6.0	9.0	12.0	12.0	17.0	15.0
Vietnam	5.0	9.0	12.0	12.0	17.0	†

† Not applicable.
[1]In Belgium the distinction between universities and other tertiary schools doesn't match the distinction between ISCED 5A and ISCED 5B.
[2]In the Slovak Republic, university education (ISCED 5A) usually lasts five years and doctoral studies (ISCED 6) lasts three more years. Therefore, university graduates will have completed 18 years of study and graduates of doctoral programs will have completed 21 years of study.
NOTE: The indicated levels of education are for completed levels. ISCED Level 1 is classified as primary education. ISCED Level 2 is classified as lower secondary education. ISCED Levels 3B and 3C are classified as upper secondary education providing direct access to the labor market or to ISCED 5B programs. ISCED Level 3A is classified as upper secondary education providing access to ISCED 5A and ISCED 5B programs. ISCED Level 4 is classified as nontertiary post-secondary education. ISCED Level 5A is classified as university level tertiary education and ISCED Level 6 is classified as advanced research programs. ISCED Level 5B is classified as non-university tertiary education. Italics indicate non-OECD countries and education systems.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Student-Level Scale Indices

Family Wealth

The *index of family wealth* (WEALTH) is based on the students' responses to two questions asking them to specify certain assets or possessions in their home. More specifically, the index is based on whether they had the following at home: a room of their own, a link to the Internet, a dishwasher (treated as a country-specific item), a DVD player, and three other country-specific items—a guest room, a high speed internet connection, and a musical instrument (select items in ST26); and their responses on the number of cellular phones, televisions, computers, cars, and rooms with a bath or shower (see ST27).

Home Educational Resources

The *index of home educational resources* (HEDRES) is based on a question asking students to identify certain assets or possessions in their home (select items in ST26). The items used for this index measure the existence of educational resources at home and include having a desk and a quiet place to study, a computer that students can use for schoolwork, educational software, books to help with students' school work, technical reference books, and a dictionary.

Cultural Possessions

The *index of cultural possessions* (CULT POSS) was based on the students' responses to whether they had the following at home: classic literature, books of poetry and works of art (select items in ST26).

Economic Social and Cultural Status

The *PISA index of economic, social and cultural status* (ESCS) was derived from the following three indices: highest occupational status of parents (HISEI), highest educational level of parents in years of education according to ISCED (PARED), and home possessions (HOMEPOS). The *index of home possessions* (HOMEPOS) comprises all items on the indices of WEALTH , HEDRES, and CULT POSS, as well as books in the home recoded into a four-level categorical variable (0-10 books, 11-25 or 26-100 books, 101-200 or 201-500 books, more than 500 books).

The *PISA index of economic, social and cultural status* (ESCS) was derived from a principal component analysis of standardized variables (each variable has an OECD mean of zero and a standard deviation of one), taking the factor scores for the first principal component as measures of the index of economic, social and cultural status.

Principal component analysis was also performed for each participating country to determine to what extent the components of the index operate in similar ways across countries. The analysis revealed that patterns of factor loading were very similar across countries, with all three components contributing to a similar extent to the index. For more detail on the patterns of factor loading, please see the *PISA 2012 Technical Report* (OECD forthcoming).

The imputation of components for students missing data on one component was done on the basis of a regression on the other two variables, with an additional random error component. The final values on the *PISA index of economic, social and cultural status* (ESCS) have an OECD mean of 0 and a standard deviation of 1.

School-Level Simple Indices

School Poverty

The index for school poverty (FRPL) was derived from a question (SC53) asking schools (primarily principals) the approximate percentage of students at their school who were eligible for free or reduced-price lunches through the National School Lunch Program during the previous year. The National School Lunch Program provides free or reduced-price lunch for students meeting certain income guidelines in public schools. Thus, this index applies only to public schools.

References

Ganzeboom, H.B., and Treiman, D.J. (1996). Internationally Comparable Measures of Occupational Status for the 1988 International Standard Classification of Occupations. *Social Science Research*, *25*: 201-239.

International Labour Organisation (ILO). 1990. *International Standard Classification of Occupations: ISCO-88*. Geneva: Author.

Organization for Economic Cooperation and Development OECD. (1999). *Classifying Educational Programmes: Manual for ISCED-97 Implementation in OECD Countries*. Paris: Author.

Organization for Economic Cooperation and Development (OECD). (forthcoming). *PISA 2012 Technical Report.* Paris: Author.

Warm, T.A. (1989). Weighted Likelihood Estimation of Ability in Item Response Theory. *Psychometrika 54*(3): 427-450.

Appendix I. PISA 2012 Nonresponse Bias Analysis Report

Introduction

The Program for International Student Assessment (PISA) is a large international comparative study of the knowledge, skills, and competencies of 15-year-old students in the domains of reading literacy, mathematics literacy, science literacy, problem solving, and financial literacy. The 2012 cycle of the study was carried out in 65 education systems, including the United States. To provide valid estimates of student achievement (and characteristics), the sample of PISA students was selected to represent the full population of 15-year-old students in each education system. For PISA 2012, the international desired population in each education system consisted of 15-year-olds attending educational institutions, both publicly and privately controlled, located within the education system, in grades 7 and higher.

The U.S. PISA study, supported by the National Center for Education Statistics (NCES), used a two-stage stratified sampling design. The first stage made use of a systematic probability-proportionate-to-size technique to select schools where size is the estimated age-eligible enrollment of the school. Though efforts were made to secure the participation of all schools selected in the first stage, it was anticipated that not all schools would choose to participate. Therefore, as each school was selected in the sample, the two neighboring schools in the sampling frame (immediately preceding and following the selected school) were designated as substitute schools. If the sampled school refused to participate, the first substitute was then contacted. If that school also refused to participate, the second substitute was then contacted.

Within each school, a sample of 50 students was selected in an equal probability sample, unless fewer than 50 students aged 15 were available (in which case all students were selected). International standards required that students be sampled based on an age definition of 15 years and 3 months to 16 years and 2 months at the beginning of the testing period. The U.S. PISA sample consisted of 207 eligible schools[1] having at least one 15-year-old student.

The PISA national data collection was fielded in October and November 2012. There were 240 schools in the original sample. Of these 240 sampled schools, 207 were determined to be eligible (the eligible original school sample), and of these, 139 participated (the participating original sample) for an initial unweighted response rate of 67 percent before replacement (also 67 percent weighted). An additional

[1] Of the 240 original schools selected for the sample, there were 33 ineligible or closed schools.

23 substitute schools participated for a total of 162 participating schools after replacement (the participating final sample). The unweighted response rate increased to 78 percent (also 78 percent weighted). The school participation rates for this report are summarized in table I-1.

Of the 6,677 students sampled, there were 6,065 students to be assessed. A total of 5,233 students were assessed, with 603 students absent and 229 students not assessed due to parent refusal. The overall unweighted student response rate was 86 percent. The weighted student response rate was 87 percent.

Table I-1. Selected characteristics for the nonresponse bias analysis of the U.S. PISA final school sample: 2012

				Percent			
Schools in original sample	Eligible schools in sample	Number of participating schools before replacement	Number of participating schools after replacement	Unweighted school participation rate before replacement	Weighted school participation rate before replacement	Unweighted school participation after replacement[1]	Weighted school participation rate after replacement[1]
240	207	139	162	67.1	67.1	78.3	77.7

[1]For the purposes of calculating response rates, international guidelines stipulated that schools with between 25 and 50 percent of students participating were considered not participating and their students were excluded from the student response rates. However, those students were included in the PISA 2012 database and the school is treated as a participant in this appendix. Thus the response rates in this section differ slightly from Chapter 3.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

NCES standards for assessment surveys stipulate that a nonresponse bias analysis is required at any stage of data collection reporting a weighted unit response rate less than 85 percent. Since the U.S. PISA weighted school response rate is below 85 percent, NCES requires an investigation into the potential magnitude of nonresponse bias at the school level in the U.S. sample. Since the U.S. PISA weighted student response rate is above 85 percent, a nonresponse bias analysis at the student level is not required.

School Nonresponse Bias

Methodology

To measure the potential nonresponse bias at the school level, the characteristics of participating schools were compared to those of the total eligible sample of schools. This was conducted in a way so that the tests of statistical significance that were applied account for the fact that the participating schools are a subset of the eligible schools, and not a distinct group.

The analysis was conducted in three parts, as follows:

1. Analysis of the participating original sample: The distribution of the participating original school sample (N=139) was compared with that of the total eligible original school sample (N=207). The participating original sample is the sample before substitution. In each sample, schools were weighted by their school base weights, excluding any nonresponse adjustment factor. The base weight for each original school is the reciprocal of its selection probability.

2. Analysis of the participating final sample with substitutes: The distribution of the participating final school sample (N=162), which includes 23 participating substitutes that were used as replacements for nonresponding schools from the original eligible sample, was compared to the total eligible final school sample (N=207). The total eligible final sample includes the participating final sample plus those original nonrespondents that were not replaced by substitutes. Again, school base weights were used for both the eligible sample and the participating schools. The base weight for each substitute school is set to the base weight of the original school that it replaced.

3. Analysis of the nonresponse adjusted final sample with substitutes: The same sets of schools were compared as in the second analysis, but this time, when analyzing the participating final schools alone, school nonresponse adjustments were applied to the weights. The international weighting procedures form nonresponse adjustment classes by cross-classifying the explicit and implicit stratification variables.

The first analysis indicates the potential for nonresponse bias that was introduced through school nonresponse. The second analysis suggests the remaining potential for nonresponse bias after the mitigating effects of substitution have been accounted for. The third analysis indicates the potential for bias after accounting for the mitigating effects of both substitution and nonresponse weight adjustments. Both the second and third analyses, however, may provide an overly optimistic scenario, resulting from the fact that substitution and nonresponse adjustments may correct somewhat for deficiencies in the characteristics examined here, but there is no guarantee that they are equally as effective for other characteristics and, in particular, for student achievement.

Participating PISA schools and the total eligible PISA school sample were compared by as many school sampling frame characteristics as possible that might provide information about the presence of nonresponse bias. Comparing frame characteristics between participating schools and the total eligible schools sample is not an ideal measure of nonresponse bias if the characteristics are unrelated or weakly related to more substantive items in the survey; however, often it is the only approach available since PISA data are not available for nonparticipating schools. While the school-level characteristics used in these analyses are limited to those available in the sampling frame, each of the variables had a demonstrated relationship to achievement in previous PISA cycles.

Frame characteristics for public schools were from the 2008-09 Common Core of Data (CCD) and, for private schools, from the 2009-10 Private School Universe Survey (PSS).

The following categorical variables were available in the sampling frame for all schools:

- School control—indicates whether the school is under public control (operated by publicly elected or appointed officials) or private control (operated by privately elected or appointed officials and derives its major source of funds from private sources);
- Locale— urban-centric locale code (i.e., city, suburb, town, rural);
- Census region—Northeast, Midwest, South and West (see appendix A for state listing); and
- Poverty level[2]—for public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the national free and reduced-price lunch (FRPL) program, and a low poverty school is defined as one in which less than 50 percent are eligible;

The following continuous variables were available in the sampling frame for all schools:

- Estimated number of 15-year-old eligible students enrolled;
- Total number of students;
- Percentage of students in seven race/ethnicity categories (White, non-Hispanic; Black, non-Hispanic; Hispanic; Asian; American Indian or Alaska Native; Hawaiian/Pacific Islander and two or more races).[3]
- An additional continuous variable, the percentage of students eligible to participate in the FRPL, was available only for public schools. The poverty level variable mentioned among the categorical variable is the recoded version of this continuous variable.[4]

For categorical variables, the distribution of frame characteristics for participants was compared with the distribution for all eligible schools. The hypothesis of independence between the characteristic and participation status was tested using a Rao-Scott modified Chi-square statistic at the 5 percent level (Rao and Thomas 2003). For continuous variables, summary means were calculated and the difference between means was tested using a *t* test. The *p*-values for the tests are presented in the tables. The statistical significance of differences between participants and the total eligible sample is identical to that which would result from comparing participants and nonparticipants, since all significance tests account for the fact that the participants are a subset of the full sample. The bias and relative bias are also shown in each table. The bias is the difference between the respective estimates for the participants and the eligible sample. The relative bias is calculated as the bias divided by the estimate from the eligible sample. The relative bias is a measure of the size of the bias compared to the eligible sample estimate.

[2] The sample frame did not contain a direct measure of poverty. No free or reduced-price lunch (FRPL) program data were available for private schools, thus all private schools are treated as low-poverty schools.
[3] Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin.
[4] The continuous variable percentage of students eligible to participate in the FRPL is missing for private schools; however, private schools are treated as low poverty for the categorical variable poverty level. The nonresponse bias analysis was designed to measure the potential nonresponse bias for all participating schools, so no additional logistic regression was conducted using only public schools.

In addition to these tests, logistic regression models were used to provide a multivariate analysis that examined the conditional independence of these school characteristics as predictors of participation. It may be that only one or two variables are actually related to participation status. However, if these variables are also related to the other variables examined in the analyses, then other variables, which are not related to participation status, will appear as significant in simple bivariate tables. Dummy variables were created for each component of the categorical variables so that each component was included separately. The last component of each categorical variable is used as the reference category. The *p*-value of a dummy variable indicates whether there is a significant difference at the 5 percent level from the effect of the (omitted) reference category. It is not possible to include all the frame characteristics in a single model because the seven race/ethnicity variables are linearly dependent (i.e., they sum up to 100 percent for every school). Therefore, two models were used. In the first model, six race/ethnicities (Black, non-Hispanic; Hispanic; Asian; American Indian or Alaska Native, Hawaiian/Pacific Islander; and two or more races) were included in the model with "percentage White, non-Hispanic" as the reference category. In addition, an *F* test was used to determine whether the parameter estimates of these six characteristics were simultaneously equal to zero. In the second model, the summed percentage of the six race/ethnicities (Black, non-Hispanic; Hispanic; Asian; American Indian or Alaska Native; Hawaiian/Pacific Islander and two or more races) replaced the six race/ethnicity variables with "percentage White, non-Hispanic" again as the reference category. The second model permits the analysis of differences in the percentages of White, non-Hispanic students, which is not possible in the first model. All other frame characteristics were included in both models.

The logistic regression was performed using WesVar® (Westat 2007) and replicate weights to properly account for the complex sample design. The balanced repeated replication (BRR), the Fay method of BRR, was used to create the replicate weights (Westat 2007).

Participating Original Sample

This section presents the nonresponse bias analysis based on the original sample of 207 eligible schools for PISA. The distribution of the participating original sample was compared to the schools in the total eligible original sample. School base weights were used for both the eligible sample and the participating schools. The unweighted school response rate for PISA was 67.1 percent, with 139 out of 207 schools participating. The weighted response rate was also 67.1 percent.

Categorical Variables

The distribution of participating and eligible schools by the four characteristics is shown in table I-2. There are no statistically significant relationships between participation status and any of the characteristics shown in table I-2. However, the absolute values of the relative bias for schools in towns, rural locations, Midwest region, West region, and high poverty are greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected.

Table I-2. Percentage distribution of eligible and participating schools in the U.S. PISA original sample, by selected categorical variables: 2012

School characteristic	Sample schools: Eligible (percent) (N=207)	Sample schools: Participating (percent) (N=162)	Bias	Relative bias	Chi-square *p*-value
School control					0.622
Public	92.5	93.2	0.69	0.007	
Private	7.5	6.8	-0.69	-0.091	
Locale					0.086
Central city	27.9	29.1	1.25	0.045	
Suburb	36.5	33.5	-3.01	-0.083	
Town	11.2	8.5	-2.64	-0.237	
Rural	24.5	28.9	4.41	0.180	
Census region					0.361
Northeast	17.8	17.2	-0.62	-0.035	
Midwest	21.6	18.2	-3.42	-0.158	
South	37.0	38.2	1.24	0.033	
West	23.6	26.4	2.80	0.119	
Poverty level					0.234
High	24.2	26.9	2.71	0.112	
Low	75.8	73.1	-2.71	-0.036	

NOTE: Detail may not sum to totals because of rounding. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low-poverty schools. Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Continuous Variables

Summary means for each continuous variable for participating and eligible schools are shown in tables I-3 through I-5. One nonparticipating school had missing values for race/ethnicity, and this school was dropped from the analysis in table 2-3. No data on FRPL eligibility was available for private schools, and so these are not included in the analysis in table I-5.

There were no statistically significant differences between participating and eligible schools with respect to student enrollment (table I-3). Participating schools had a higher mean percentage of Hispanic students than the eligible sample (21.1 vs. 18.1 percent, respectively; table I-4). Participating schools had a higher mean percentage of students eligible for free or reduced-price lunch than the eligible sample (39.3 vs. 36.1 percent, respectively; table I-5).

Table I-3. Mean enrollment of eligible and participating schools in the U.S. PISA original sample: 2012

	Sample schools				
Student enrollment	Eligible (mean) (*N*=207)	Participating (mean) (*N*=162)	Bias	Relative bias	*t* test *p*-value
Total school	1443.9	1449.8	5.93	0.004	0.862
Age-eligible	353.9	361.3	7.41	0.021	0.401

NOTE: Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-4. Mean percentage of students in eligible and participating schools in the U.S. PISA original sample, by race/ethnicity: 2012

Race/ethnicity	Sample schools: Eligible (mean) (N=206)	Sample schools: Participating (mean) (N=162)	Bias	Relative bias	*t* test *p*-value
White, non-Hispanic	59.1	56.1	-3.00	-0.051	0.065
Black, non-Hispanic	15.5	15.8	0.24	0.016	0.805
Hispanic	18.1	21.1	3.03	0.167	**0.014**
Asian	4.8	4.7	-0.12	-0.025	0.775
American Indian or Alaska Native	1.6	1.9	0.27	0.167	0.393
Hawaiian/Pacific Islander	0.1	0.1	-0.04	-0.317	0.424
Multiracial	0.7	0.4	-0.37	-0.513	0.296

NOTE: Information on race/ethnicity is missing for one of the 207 eligible schools in the sample. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-5. Mean percentage of students eligible for free or reduced-price lunch, in eligible and participating public schools in the U.S. PISA original sample: 2012

Students	Sample schools: Eligible (percent) (N=185)	Sample schools: Participating (percent) (N=126)	Bias	Relative bias	*t* test *p*-value
Percentage of students eligible for free or reduced-price lunch	36.1	39.3	3.18	0.088	**0.018**

NOTE: Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Logistic Regression Model

To examine the joint relationship of various characteristics to school nonresponse, the analysis used a logistic regression model with participation status as the binary dependent variable and frame characteristics as predictor variables. Since public and private schools were modeled together using the variables available for all schools, the percentage of students eligible for free or reduced-price lunch was not included in the main logistic regression analysis. One school was excluded from the analysis due to missing sampling frame information for race/ethnicity.

Standard errors and tests of hypotheses for the full model parameter estimates are presented in table I-6a (with six race/ethnicity variables) and table I-6b (with summed race/ethnicity percentage). Only *Town* was a significant predictor of school participation in table I-6a. The negative parameter estimates indicate that, relative to rural schools, schools in towns were somewhat underrepresented among the participating schools. The F test statistic to determine whether the race/ethnicity characteristics are simultaneously equal to 0 was 0.70 with a p-value of 0.6231, which indicates that no significant relationship with participation was detected. *Town* again was a significant predictor of school participation in table I-6b.

Because the percentage of students eligible for free or reduced-price lunch was not included in the main logistic regression analysis, a separate analysis with public schools only was conducted. To include free or reduced-price lunch eligibility in a model, public schools were modeled separately using a model with the summed race/ethnicity percentage and adding the percentage of students eligible for free or reduced-price lunch. Since poverty is derived from the percentage of students eligible for free or reduced-price lunch, an interaction term was also included in the model. Standard errors and tests of hypotheses for the full model parameter estimates are presented in table I-6c. Only the percentage of students eligible for free or reduced-price lunch was a significant predictor of school participation. The positive parameter estimates indicate that the percentage of students eligible for free or reduced-price lunch in participating schools was larger than in all eligible schools. The model with the six race/ethnicity variables is not shown due to complex interactions that make the results difficult to interpret.

Table I-6a Logistic regression model parameters (with six race/ethnicity variables) using the U.S. PISA original school sample: 2012

Parameter	Parameter estimate	Standard error	*t* test for H_0: parameter = 0	*p*-value
Intercept	1.582	0.6562	2.4116	0.0182
Private school	0.926	0.7547	1.2266	0.2236
Central city	-0.931	0.6664	-1.3972	0.1662
Suburb	-0.963	0.6062	-1.5879	0.1163
Town	-1.340	0.6222	-2.1543	**0.0342**
Northeast	-0.285	0.8336	-0.3417	0.7335
Midwest	-0.610	0.6846	-0.8906	0.3758
South	-0.276	0.6629	-0.4169	0.6779
High poverty	-0.303	0.6581	-0.4600	0.6467
Total school enrollment	-0.002	0.0014	-1.7375	0.0862
Age-eligible enrollment	0.009	0.0054	1.6752	0.0978
Black, non-Hispanic	0.007	0.0102	0.7049	0.4829
Hispanic	0.025	0.0161	1.5336	0.1291
Asian	0.002	0.0257	0.0668	0.9469
American Indian or Alaska Native	0.016	0.0207	0.7518	0.4544
Hawaiian/Pacific Islander	0.413	0.4940	0.8359	0.4057
Multiracial	-0.117	0.0972	-1.2056	0.2315

NOTE: One of the 207 eligible schools in the sample was excluded due to missing information for Race/ethnicity. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low poverty schools. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-6b. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA original school sample: 2012

Parameter	Parameter estimate	Standard error	t test for H0: parameter = 0	*p*-value
Intercept	1.584	0.5495	2.8822	0.0051
Private school	0.515	0.6999	0.7356	0.4641
Central city	-0.975	0.6570	-1.4845	0.1416
Suburb	-1.069	0.5953	-1.7952	0.0764
Town	-1.374	0.6002	-2.2891	**0.0247**
Northeast	-0.358	0.7612	-0.4702	0.6395
Midwest	-0.797	0.5119	-1.5578	0.1232
South	-0.453	0.4447	-1.0176	0.3119
High poverty	0.008	0.5630	0.0133	0.9894
Total school enrollment	-0.002	0.0011	-1.4207	0.1593
Age-eligible enrollment	0.007	0.0045	1.4612	0.1479
Summed race/ethnicity percentage	0.010	0.0076	1.2809	0.2039

NOTE: One of the 207 eligible schools in the sample was excluded due to missing information for Race/ethnicity. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low poverty schools. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-6c. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA original public school sample: 2012

Parameter	Parameter estimate	Standard error	t test for H0: parameter = 0	*p*-value
Intercept	0.612	0.7046	0.8680	0.3880
Central city	-0.719	0.6810	-1.0560	0.2941
Suburb	-0.658	0.5878	-1.1197	0.2662
Town	-1.276	0.6804	-1.8760	0.0643
Northeast	-0.523	0.7901	-0.6614	0.5103
Midwest	-0.845	0.5881	-1.4367	0.1547
South	-0.473	0.4814	-0.9833	0.3284
High poverty	-2.737	2.4358	-1.1236	0.2645
Free or reduced-price lunch eligibility	0.036	0.0171	2.1394	**0.0355**
High poverty * free or reduced-price lunch eligibility	0.029	0.0394	0.7382	0.4626
Total school enrollment	-0.002	0.0016	-0.9561	0.3419
Age-eligible enrollment	0.007	0.0062	1.0764	0.2850
Summed race/ethnicity percentage	-0.002	0.0099	-0.2122	0.8325

NOTE: Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Participating Final Sample with Substitutes

This section presents the nonresponse bias analysis based on the final sample of 207 eligible schools for PISA. The distribution of the participating final sample, including participating substitute schools, was compared to the schools in the total eligible final sample. The total eligible final sample includes participating final sample plus those original nonrespondents who were not replaced by substitutes. School base weights were used for both the eligible sample and the participating schools. Through the use of substitute schools, the unweighted school response rate for PISA was 78.3 percent, with 162 out of 207 schools participating. The weighted response rate was 77.7 percent.

Categorical Variables

The distribution of participating and eligible schools by the four characteristics is shown in table I-7. There are no statistically significant relationships between participation status and any of the

characteristics shown in table I-7. However, the absolute values of the relative bias for schools in towns and the Northeast region are greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected.

Table I-7. Percentage distribution of eligible and participating schools in the U.S. PISA final sample, by selected categorical variables: 2012

School characteristic	Sample schools: Eligible (percent) (N=207)	Sample schools: Participating (percent) (N=162)	Bias	Relative bias	Chi-square *p*-value
School control					0.620
Public	92.5	93.0	0.53	0.006	
Private	7.5	7.0	-0.53	-0.070	
Locale					0.391
Central city	27.9	28.9	0.95	0.034	
Suburb	36.4	34.6	-1.78	-0.049	
Town	11.2	9.9	-1.33	-0.119	
Rural	24.5	26.7	2.15	0.088	
Census region					0.492
Northeast	17.8	15.7	-2.14	-0.120	
Midwest	21.7	21.6	-0.01	-0.001	
South	36.9	37.4	0.48	0.013	
West	23.6	25.3	1.67	0.071	
Poverty level					0.548
High	24.6	25.7	1.06	0.043	
Low	75.4	74.3	-1.06	-0.014	

NOTE: Detail may not sum to totals because of rounding. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low poverty schools. Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Continuous Variables

Summary means for each continuous variable for participating and eligible schools are shown in tables I-8 through I-10. Again, one school had missing value for race/ethnicity and was deleted from the analysis.

There were no statistically significant differences between participating and eligible schools for enrollment or race/ethnicity (tables I-8 and I-9). Participating public schools had a higher mean percentage of students eligible for free or reduced-price lunch than the eligible public school sample (38.3 vs. 36.2 percent, respectively; table I-10).

Table I-8. Mean enrollment of eligible and participating schools in the U.S. PISA final sample: 2012

	Sample schools				
Student enrollment	Eligible (mean) (*N*=207)	Participating (mean) (*N*=162)	Bias	Relative bias	*t* test *p*-value
Total school	1442.6	1439.4	-3.17	-0.002	0.909
Age-eligible	353.7	356.6	2.87	0.008	0.667

NOTE: Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-9. Mean percentage of students in eligible and participating schools in the U.S. PISA final sample, by race/ethnicity: 2012

	Sample schools				
Race/ethnicity	Eligible (mean) (*N*=206)	Participating (mean) (*N*=162)	Bias	Relative bias	*t* test *p*-value
White, non-Hispanic	59.6	58.9	-0.69	-0.012	0.571
Black, non-Hispanic	15.0	14.9	-0.08	-0.005	0.931
Hispanic	18.3	19.5	1.26	0.069	0.174
Asian	4.7	4.5	-0.14	-0.030	0.675
American Indian or Alaska Native	1.6	1.7	0.12	0.074	0.558
Hawaiian/Pacific Islander	0.1	0.1	-0.05	-0.415	0.302
Multiracial	0.7	0.3	-0.42	-0.580	0.237

NOTE: Information on race/ethnicity is missing for one of the 207 eligible schools in the sample. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-10. Mean percentage of students eligible for free or reduced-price lunch, in eligible and participating public schools in the U.S. PISA final sample: 2012

Students	Sample schools: Eligible (percent) (N=185)	Sample schools: Participating (percent) (N=146)	Bias	Relative bias	*t* test *p*-value
Percentage of students eligible for free or reduced-price lunch	36.2	38.3	2.04	0.056	**0.036**

NOTE: Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Logistic Regression Model

To examine the joint relationship of various characteristics to school nonresponse, the analysis used a logistic regression model with participation status as the binary dependent variable and frame characteristics as predictor variables. Since public and private schools were modeled together using the variables available for all schools, the percentage of students eligible for free or reduced-price lunch was not included in the main logistic regression analysis. One school was excluded from the analysis due to missing sampling frame information for race/ethnicity.

Standard errors and tests of hypotheses for the full model parameter estimates are presented in table I-11a (with six race/ethnicity variables) and table I-11b (with summed race/ethnicity percentage). None of the parameter estimates are significant in table I-11a. The *F* test statistic to determine whether the race/ethnicity characteristics are simultaneously equal to 0 was 1.06 with a *p*-value of 0.3938, which indicates no significant relationship was detected with participation. None of the parameter estimates are significant in table I-11b.

Because the percentage of students eligible for free or reduced-price lunch was not included in the mian logistic regression analysis, a separate analysis with public schools only was conducted. To include free or reduced-price lunch eligibility in a model, public schools were modeled separately using a model with the summed race/ethnicity percentage and adding the percentage of students eligible for free or reduced-price lunch. Since poverty is derived from the percentage of students eligible for free or reduced-price

lunch, an interaction term was also included in the model. Standard errors and tests of hypotheses for the full model parameter estimates are presented in table I-11c. Only the percentage of students eligible for free or reduced-price lunch was a significant predictor of school participation. The positive parameter estimates indicate that the percentage of students eligible for free or reduced-price lunch in participating schools was larger than in all eligible schools. The model with the six race/ethnicity variables is not shown due to complex interactions that make the results difficult to interpret.

Table I-11a. Logistic regression model parameters (with six race/ethnicity variables) using the U.S. PISA final school sample: 2012

Parameter	Parameter estimate	Standard error	*t* test for H_0: parameter = 0	*p*-value
Intercept	2.724	0.9730	2.8000	0.0064
Private school	1.221	1.1675	1.0462	0.2986
Central city	-0.256	0.6368	-0.4014	0.6892
Suburb	-0.477	0.6328	-0.7533	0.4535
Town	-1.055	0.6844	-1.5420	0.1270
Northeast	-1.368	0.9756	-1.4022	0.1647
Midwest	-0.945	0.9872	-0.9570	0.3414
South	-0.942	0.8557	-1.1013	0.2741
High poverty	-0.096	0.6513	-0.1479	0.8828
Total school enrollment	#	0.0017	-0.0352	0.9720
Age-eligible enrollment	#	0.0069	-0.0144	0.9886
Black, non-Hispanic	-0.001	0.0121	-0.0990	0.9214
Hispanic	0.008	0.0163	0.4661	0.6424
Asian	-0.015	0.0306	-0.4746	0.6363
American Indian or Alaska Native	#	0.0230	0.0174	0.9862
Hawaiian/Pacific Islander	-0.402	0.5892	-0.6828	0.4967
Multiracial	-0.247	0.1325	-1.8675	0.0655

Rounds to zero.
NOTE: One of the 207 eligible schools in the sample was excluded due to missing information for Race/ethnicity. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low poverty schools. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-11b. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA final school sample: 2012

Parameter	Parameter estimate	Standard error	*t* test for H_0: parameter = 0	*p*-value
Intercept	2.248	0.6727	3.3410	0.0013
Private school	0.415	0.7843	0.5288	0.5984
Central city	-0.293	0.6440	-0.4544	0.6508
Suburb	-0.563	0.6087	-0.9243	0.3581
Town	-1.033	0.6478	-1.5942	0.1148
Northeast	-0.972	0.7819	-1.2436	0.2173
Midwest	-0.534	0.6439	-0.8286	0.4098
South	-0.512	0.4933	-1.0370	0.3029
High poverty	0.216	0.5841	0.3704	0.7121
Total school enrollment	-0.001	0.0005	-1.5553	0.1238
Age-eligible enrollment	0.003	0.0020	1.3539	0.1796
Summed race/ethnicity percentage	-0.002	0.0084	-0.2341	0.8155

NOTE: One of the 207 eligible schools in the sample was excluded due to missing information for Race/ethnicity. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low poverty schools. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-11c. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA final public school sample: 2012

Parameter	Parameter estimate	Standard error	t test for H0: parameter = 0	*p*-value
Intercept	1.100	0.8738	1.2583	0.2120
Central city	-0.073	0.6689	-0.1089	0.9136
Suburb	-0.040	0.6018	-0.0672	0.9466
Town	-1.096	0.7425	-1.4765	0.1437
Northeast	-1.223	0.8098	-1.5106	0.1348
Midwest	-0.580	0.7091	-0.8182	0.4156
South	-0.549	0.5389	-1.0196	0.3110
High poverty	-4.108	2.7487	-1.4944	0.1390
Free or reduced-price lunch eligibility	0.047	0.0186	2.5206	**0.0137**
High poverty * free or reduced-price lunch eligibility	0.051	0.0478	1.0663	0.2895
Total school enrollment	0.001	0.0022	0.4533	0.6516
Age-eligible enrollment	-0.003	0.0088	-0.3835	0.7024
Summed race/ethnicity percentage	-0.017	0.0109	-1.5271	0.1307

NOTE: Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Nonresponse-adjusted Final Sample with Substitutes

This section presents the nonresponse bias analysis based on the final sample of 207 eligible schools for PISA. The distribution of the participating final sample, including participating substitute schools, was compared to the schools in the total eligible final sample, just like the previous section. School base weights were used for the eligible sample of schools, whereas nonresponse-adjusted weights were used for the participating schools.

Categorical Variables

The distribution of participating and eligible schools by the four characteristics is shown in table I-12. There are no statistically significant relationships between participation status and any of the characteristics shown in table I-12. However, the absolute value of the relative bias for schools in towns is

greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected.

Table I-12. Percentage distribution of eligible and participating schools in the U.S. PISA nonresponse-adjusted sample, by selected categorical variables: 2012

School characteristic	Sample schools: Eligible (percent) (N=207)	Sample schools: Participating (percent) (N=162)	Bias	Relative bias	Chi-square *p*-value
School control					0.617
Public	92.5	92.5	#	#	
Private	7.5	7.5	#	#	
Locale					0.356
Central city	27.9	27.2	-0.72	-0.026	
Suburb	36.4	36.7	0.32	0.009	
Town	11.2	9.7	-1.44	-0.128	
Rural	24.5	26.4	1.84	0.075	
Census region					0.906
Northeast	17.8	17.8	0.01	#	
Midwest	21.7	21.7	0.03	0.002	
South	36.9	37.1	0.18	0.005	
West	23.6	23.4	-0.22	-0.009	
Poverty level					0.433
High	24.6	26.0	1.41	0.057	
Low	75.4	74.0	-1.41	-0.019	

Rounds to zero.
NOTE: Detail may not sum to totals because of rounding. Census region is the state-based region of the country (see technical notes for state listing.) For public schools, a high poverty school is defined as one in which 50 percent or more of the students are eligible for participation in the FRPL; all private schools are treated as low poverty schools. Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school nonresponse adjusted weights.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Continuous Variables

Summary means for each continuous variable for participating and eligible schools are shown in tables I-13 through I-15. Again, one school had missing value for race/ethnicity and was omitted from the analysis in table I-14.

There were no statistically significant differences between participating and eligible schools for enrollment or race/ethnicity (tables I-13 and I-14). Participating schools had a higher mean percentage than the eligible sample of students eligible for free or reduced-price lunch (38.4 vs. 36.2 percent, respectively; table I-15). To further examine this difference, the percentage of students eligible for free or reduced-price lunch for participating schools was compared to the total frame of eligible schools. There was not a statistically significant relationship between participating schools and the total frame of eligible schools for the percentage of students eligible for free or reduced-price lunch (38.4 versus 37.1 percent, respectively).

Table I-13. Mean enrollment of eligible and participating schools in the U.S. PISA nonresponse-adjusted sample: 2012

	Sample schools				
Student enrollment	Eligible (mean) (N=207)	Participating (mean) (N=162)	Bias	Relative bias	*t* test *p*-value
Total school	1442.6	1441.8	-0.80	-0.001	0.982
Age-eligible	353.7	356.8	3.06	0.009	0.700

NOTE: Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school nonresponse adjusted weights.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-14. Mean percentage of students in eligible and participating schools in the U.S. PISA nonresponse-adjusted sample, by race/ethnicity: 2012

Race/ethnicity	Sample schools: Eligible (mean) (N=206)	Sample schools: Participating (mean) (N=162)	Bias	Relative bias	*t* test *p*-value
White, non-Hispanic	59.6	58.8	-0.80	-0.013	0.468
Black, non-Hispanic	15.0	15.4	0.40	0.027	0.646
Hispanic	18.3	19.1	0.83	0.046	0.262
Asian	4.7	4.7	-0.02	-0.004	0.960
American Indian or Alaska Native	1.6	1.6	0.06	0.038	0.753
Hawaiian/Pacific Islander	0.1	0.1	-0.05	-0.423	0.283
Multiracial	0.7	0.3	-0.43	-0.585	0.234

NOTE: Information on race/ethnicity is missing for one of the 207 eligible schools in the sample. Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school nonresponse adjusted weights.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Table I-15. Mean percentage of students eligible for free or reduced-price lunch, in eligible and participating public schools in the U.S. PISA nonresponse-adjusted sample: 2012

Students	Sample schools: Eligible (percent) (N=185)	Sample schools: Participating (percent) (N=146)	Bias	Relative bias	*t* test *p*-value
Percentage of students eligible for free or reduced-price lunch	36.2	38.4	2.18	0.06	**0.034**

NOTE: Eligible schools have at least one 15-year-old student. Participating schools agreed to have their students assessed. The relative bias is calculated as the bias divided by the estimate from the eligible sample. Schools were weighted by their school nonresponse adjusted weights.
SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2012.

Summary

The investigation into nonresponse bias at the school level for the U.S. PISA effort shows no statistically significant relationship between response status and the majority of the available school characteristics that were examined in the analysis.

For original sample schools, the absolute values of the relative bias for schools in towns, rural locations, Midwest region, West region, and high poverty were greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected (table I-2). Participating schools had a higher mean percentage of Hispanic students than the total eligible sample of schools (table I-4). Participating original sample schools also had a higher mean percentage of students eligible for free or reduced-price lunch than the total eligible sample of schools (table I-5). When all factors were considered simultaneously in a logistic regression analysis, only *Town* was a significant predictor of participation (tables I-6a and I-6b). The percentage of students eligible for free or reduced-price lunch was not included in the logistic regression analysis as public and private schools were modeled together using only the variables available for all schools; however, poverty was included in the logistic regression analysis which was derived from free or reduced-price lunch eligibility. Public schools were also modeled separately and included the percentage of students eligible for free or reduced-price lunch. Only the percentage of students eligible for free or reduced-price lunch was a significant predictor of school participation (table I-6c).

For final sample schools (with substitutes), the absolute values of the relative bias for schools in towns and in the Northeast region were greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected (table I-7). Participating schools had a higher mean percentage of students eligible for free or reduced-price lunch than the total eligible sample of schools (table I-10). When all factors were considered simultaneously in a logistic regression analysis (again with free or reduced-price lunch eligibility omitted and poverty included), no variables were statistically significant predictors of participation (tables I-10a and I-10b). When public schools were modeled separately (including the free or reduced-price lunch eligibility), only the percentage of students eligible for free or reduced-price lunch was a significant predictor of school participation (table I-11c).

For final sample schools with school nonresponse adjustments applied to the weights, the absolute value of the relative bias for schools in towns was greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected (table I-12). Only the percentage of students eligible for free or reduced-price lunch was found to be significantly different between the participating schools and the total eligible sample of schools (table I-15). However, there was not a statistically significant relationship between participating public schools and the total frame of eligible public schools for the percentage of students eligible for free or reduced-price lunch (38.4 versus 37.1 percent, respectively). We therefore conclude that, despite the tendency of public schools with higher percentages of students eligible for free and reduced-price lunch to participate at a greater rate than other sampled schools, there is little evidence of resulting potential bias in the final sample. The multivariate regression

analysis cannot be conducted after the school nonresponse adjustments are applied to the weights. The concept of nonresponse adjusted weights does not apply to the nonresponding units, and, thus, we cannot conduct an analysis that compares respondents with nonrespondents using nonresponse adjusted weights.

The results of the analyses are summarized in table I-16.

Table I-16. Characteristics with *p*-values less than 0.05, U.S. PISA schools: 2012

Analysis	Characteristics with *p*-values less than 0.05
Original sample	Hispanic, Percentage of students eligible for free or reduced-price lunch
Regression model a	Town
Regression model b	Town
Sample with substitutes	Percentage of students eligible for free or reduced-price lunch
Regression model a	None
Regression model b	None
Nonresponse adjusted	Percentage of students eligible for free or reduced-price lunch

In sum, the investigation into nonresponse bias at the school level in the United States in PISA 2012 provides evidence that there is little potential for nonresponse bias in the PISA participating sample based on the characteristics studied. It also suggests that, while there is little evidence that the use of substitute schools reduced the potential for bias, it has not added to it. Moreover, the application of school nonresponse adjustments substantially reduced the potential for bias.

Technical Notes

Description of Variables

Frame characteristics for public schools were taken from the 2008-09 CCD and, for private schools, from the 2009-10 PSS.

Race/Ethnicity

Students' race/ethnicity was obtained through student responses to a two-part question. Students were asked first whether they were Hispanic or Latino, and then asked whether they were members of the following racial groups: American Indian/Alaska Native; Asian; Black, non-Hispanic; Native Hawaiian or other Pacific Islander; White, non-Hispanic: or two or more races.

Locale

Locale was derived from the urban-centric locale code that is based on the urbanicity of the school location.

- *City* consists of a large territory inside an urbanized area and inside a principal city with population of 250,000 or more, midsize territory inside an urbanized area and inside a principal city with a population less than 250,000 and greater than or equal to 100,000, or small territory inside an urbanized area and inside a principal city with a population less than 100,000.
- *Suburb* consists of a large territory outside a principal city and inside an urbanized area with population of 250,000 or more, midsize territory outside a principal city and inside an urbanized area with a population less than 250,000 and greater than or equal to 100,000, or small territory outside a principal city and inside an urbanized area with a population less than 100,000.
- *Town* consists of a fringe territory inside an urban cluster that is less than or equal to 10 miles from an urbanized area, distant territory inside an urban cluster that is more than 10 miles and less than or equal to 35 miles from an urbanized area, or remote territory inside an urban cluster that is more than 35 miles from an urbanized area.
- *Rural* consists of a fringe census-defined rural territory that is less than or equal to 5 miles from an urbanized area, as well as rural territory that is less than or equal to 2.5 miles from an urban cluster, distant census-defined rural territory that is more than 5 miles but less than or equal to 25 miles from an urbanized area, as well as rural territory that is more than 2.5 miles but less than or equal to 10 miles from an urban cluster, or remote census-defined rural territory that is more than 25 miles from an urbanized area and is also more than 10 miles from an urban cluster.

Census Region

Region is the census region of the country. Northeast consists of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Midwest consists of Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South consists of Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. West consists of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Percentage of students eligible for free or reduced-price lunch

The proportion of students in a school eligible for the free or reduced-price lunch program (FRPL), a federally assisted meal program under the National School Lunch Act that provides nutritionally balanced, low-cost or free lunches to eligible children each school day. The question on the CCD questionnaire asked what percentage of students at the school was eligible to receive free or reduced-price lunch through the FRPL around October 1, 2008. It is available only for public schools as the NCES Private School Universe Survey (PSS) data do not provide the same information for private schools.

Poverty level in public schools

The measure of school poverty is based on the percentage of students eligible for FRPL. Schools were classified as *low poverty* if less than 50 percent of the students were eligible for FRPL and as *high poverty* if 50 percent or more of the students were eligible. In the interest of retaining all of the schools and students in these analyses, private schools were assumed to be low-poverty schools—that is, they were assumed to be schools in which less than 50 percent of students were eligible for FRPL.

Statistical procedures

Weighting. Before the data are analyzed, responses from the groups of students assessed are assigned sampling weights to ensure that their representation in PISA 2012 results matches their actual percentage of the school population in the grade assessed.

Responses from the groups of students were assigned sampling weights to adjust for over- or under-representation during the sampling of a particular group. The use of sampling weights is necessary for the computation of sound, nationally representative estimates. The weight assigned to a student's responses is the inverse of the probability that the student would be selected for the sample. When responses are weighted, none are discarded, and each contributes to the results for the total number of students represented by the individual student assessed. Weighting also adjusts for various situations (such as school and student nonresponse) because data cannot be assumed to be randomly missing. The internationally defined weighting specifications require that each assessed student's sampling weight should be the product of (1) the inverse of the school's probability of selection, (2) an adjustment for school-level nonresponse, (3) the inverse of the classroom's probability of selection, and (4) an adjustment for student-level nonresponse.

In the analyses in this report, sometimes the appropriate weight (base weight) includes only the components of the reciprocals of the respective selection probabilities. This is the case when estimates are made based on the entire sample. In other cases nonresponse adjustments, as computed by the International Study Center, are also applied. In each case the text and tables make clear which of these weighting procedures has been applied. Whereas for substantive analyses using the PISA data, one would normally apply the nonresponse adjustments when analyzing the data from the respondents in the sample, this is not always the case when carrying out analyses of potential nonresponse bias analyses.

Sampling errors. Sampling errors occur when the discrepancy between a population characteristic and the sample estimate arises because not all members of the reference population are sampled for the survey. The size of the sample relative to the population and the variability of the population characteristics both influence the magnitude of sampling error. The particular sample of 15-year-old students from the 2011–12 school year was just one of many possible samples that could have been selected. Therefore, estimates produced from the PISA sample may differ from estimates that would have been produced had another student sample been drawn. This type of variability is called sampling error because it arises from using a sample of students in 15-year-old students, rather than all 15-year-old students in that year.

The standard error is a measure of the variability due to sampling when estimating a statistic and is often included in reports containing estimates from survey data. The approach used for calculating sampling variances in PISA was the balanced repeated replication (BRR)—the Fay method of BRR. In this report estimates of standard errors for each estimate are not shown. Rather the effects of sampling error are reflected in the test statistics (for *t* tests and chi-square tests, and *t* test used in logistic regression analyses) that are presented for each analysis. These descriptions follow.

The first step to compute the variance with replication is to calculate the estimate of interest from the full sample as well as each subsample or replicate. The variation between the replicate estimates and the full-sample estimate is then used to estimate the variance for the full sample. Suppose that $\hat{\theta}$ is the full-sample estimate of some population parameter θ. The variance estimator, $v(\hat{\theta})$, takes the form

$$v\left(\hat{\theta}\right) = \sum_{g=1}^{G}\left(\hat{\theta}_{(g)} - \hat{\theta}\right)^2$$

where

$\hat{\theta}_{(g)}$ is the estimate of θ based on the observations included in the *g*-th replicate, and
G is the total number of replicates formed (G=80 for U.S. PISA).
c is the constant appropriate to the replication method (c=0.05 for U.S. PISA).

The standard error is then

$$se\left(\hat{\theta}\right) = \sqrt{v\left(\hat{\theta}\right)}.$$

The Fay method of BRR algorithm used in PISA 2003 assumes that there are *G* replicates, each containing two sampled schools selected independently. The element $\hat{\theta}_{(g)}$ denotes the estimate using the *g*-th jackknife replicate. Each of the replicate weights are formed by multiplying the sampling weight for all cases associated with one of the units of the pair by 1.5, and the sampling weight for the elements associated with the other unit in the pair by 0.5. The determination as to which PSUs received inflated weights, and which received deflated weights, was carried out in a systematic fashion, based on the entries in a Hadamard matrix of order 80. A Hadamard matrix contains entries that are +1 and –1 in value, and has the property that the matrix, multiplied by its transpose, gives the identity matrix of order 80, multiplied by a factor of 80. (Examples of Hadamard matrices are given in Wolter 1985.) The computation of the Fay method of BRR variance for any estimate requires the computation of the statistic 81 times for any given country: once to obtain the estimate for the full sample, and 80 times to obtain the estimate for each of the jackknife replicates ($\hat{\theta}_{(g)}$).

Tests of significance. Comparisons made in the text of this report have been tested for statistical significance. For example, when comparing results obtained from the full sample for a given grade, with those obtained only from the responding sample units, tests of statistical significance were used to establish whether or not the observed differences are statistically significant. The estimation of the standard errors that are required in order to undertake the tests of significance is complicated by the complex sample and assessment designs which both generate error variance. Together they mandate a set of statistically complex procedures in order to estimate the correct standard errors. As a consequence, the estimated standard errors contain a sampling variance component estimated by the Fay method of BRR. Details on the procedures used can be found in the *WesVar 5.0 User's Guide* (Westat 2007).

Two kinds of statistical tests are included in the report: *t* tests and chi-square tests. In addition, logistic regression analyses were conducted.

***t* tests.** *t* tests were used for testing for the hypothesis that no difference exists between the means of continuous variables for two groups (namely, the full sample and the responding sample). Suppose that

$\bar{x}_A$ and $\bar{x}_B$ are the means for two groups that are being compared and $se(\bar{x}_A - \bar{x}_B)$ is the standard error of the difference between the means, which accounts for the complex survey design. Then the *t* test is defined as

$$t = \frac{|\bar{x}_A - \bar{x}_B|}{se(\bar{x}_A - \bar{x}_B)}.$$

This statistic is then compared to the critical values of the appropriate student *t*-distribution to determine whether the difference is statistically significant. The appropriate number of degrees of freedom for the distribution is given by the number of primary sampling units in the design (in this case the number of schools), minus the number of sampling strata.

Note that this procedure took account of the fact that the two samples in question were not independent samples, but in fact the responding sample was a subsample of the full sample. This effect was accounted for in calculating the standard error of the difference. Note also that, in those cases where both samples were weighted just using base weights, the test is exactly equivalent to testing that the mean of the respondents was equal to the mean of the nonrespondents.

Consider for example the data in table 2-2. The first row shows that the weighted mean total school enrollment for the full eligible sample of grade 4 schools is 1,443.9. For the subsample of schools that participated, the corresponding mean is 1,449.8, resulting in a difference of 5.93. The standard error of this estimated difference, calculated so as to reflect the dependency between these two samples, and the complex sample design, is 34.08 (not shown in table). This gives rise to a *t* statistic of 0.17 (not shown in table), and using 80 degrees of freedom (the appropriate figure for the PISA design), the resulting significance (or *p*-value) is 0.862. This last figure appears in the table.

t tests were also used in the logistic regression for testing for the hypothesis for whether each estimated parameter estimate is significantly different from 0. Then the *t* test is defined as

$$t = \frac{b_k}{\sqrt{v(b_k)}}$$

where b_k is a parameter estimate and $v(b_k)$ is the replication variance estimate for that parameter. This statistic is then compared to the critical values of the appropriate student *t* distribution, as described above, to determine whether the difference is statistically significant. The appropriate number of degrees

of freedom for the distribution is again given by the number of primary sampling units in the design (in this case the number of schools), minus the number of sampling strata.

Chi-square tests. Chi-square tests are used for testing whether two distributions of a given categorical variable are different, conducted in a way that reflects the impact of the complex sample design on sampling variance. In this instance one distribution is for the full sample and one for the responding sample. Suppose that the categorical variable in question has *c* levels, cross-tabulated producing weighted proportions *p*. The usual Pearson chi-square statistic is calculated as

$$X^2 = n\sum_{i=1}^{2}\sum_{j=1}^{c}\left(p_{ij} - p_{i\cdot}p_{\cdot j}\right)^2 \Big/ p_{i\cdot}p_{\cdot j}$$

where *j* denotes the categories of the categorical variable, *i* indexes the samples (full sample and respondents), and *n* indicates the overall sample size. This statistic is not suitable for use directly in a statistical test with these data, for two reasons. First, the fact that the respondents are a subset of the full sample violates the standard assumptions for a chi-square test of this kind. Second, this statistic does not account for the complex sample design used to collect the data.

Thus the Pearson chi-square statistic is modified appropriately to account for the impact of these two features. The resulting test statistic is referred to as the Rao-Scott Adjusted chi-square statistic. It is sometimes also referred to as the Satterthwaite-adjusted chi-square statistic. The number of degrees of freedom for the chi-square test, normally given as (*c* -1), where *c* is the number of categories of the categorical variable for each distribution, is also modified on account of the complex design. The modified test statistic is then compared to the chi-square distribution with the appropriate number of degrees of freedom, to determine whether the difference in the two distributions is statistically significant. For a detailed description of the technique, see Rao and Scott (1984) or Rao and Thomas (2003).

The first step in the calculation of the Satterthwaite-adjusted chi-square statistic is to form the following vector:

$$\mathrm{Y} = \sqrt{n}\begin{pmatrix} p_{11} - p_{1\cdot}p_{\cdot 1} \\ p_{12} - p_{1\cdot}p_{\cdot 2} \\ \\ p_{rc} - p_{r\cdot}p_{\cdot c} \end{pmatrix} = \begin{pmatrix} y_1 \\ y_2 \\ \\ y_{rc} \end{pmatrix}.$$

An *rc* x 1 vector made up of the products of the marginal proportions is defined as

$$\mathrm{p} = \begin{pmatrix} p_{1\cdot}p_{\cdot 1} \\ p_{1\cdot}p_{\cdot 2} \\ \\ p_{r\cdot}p_{\cdot c} \end{pmatrix} = \begin{pmatrix} p_1 \\ p_2 \\ \\ p_{rc} \end{pmatrix}.$$

For each replicate, an *rc* x *rc* matrix is calculated whose *ij*-th element is made up of

$$\left(y_{ig} - y_i\right)\left(y_{jg} - y_j\right),$$

where y_{ig} and y_{jg} are the *i*-th and *j*-th elements of **Y** calculated for the *g*-th replicate and y_i and y_j are the corresponding full-sample values. The *ij*-th element of the estimated covariance matrix for Y, B=cov(Y), is calculated using the following formula:

$$B_{ij} = \sum_{g=1}^{G}\left(y_{ig} - y_i\right)\left(y_{jg} - y_j\right),$$

where *c* is the constant appropriate to the replication method (c=0.05 for U.S. PISA). The Satterthwaite's approximation to degrees of freedom for the chi-square statistic to be calculated is

$$v = \frac{\left(\sum_{i=1}^{rc}\frac{B_{ii}}{p_i}\right)^2}{\sum_{i=1}^{rc}\sum_{j=1}^{rc}\frac{B_{ij}^2}{p_i p_j}}.$$

Since v will generally not be an integer, interpolation in standard chi-square tables is required.

Finally, the adjusted chi-square statistic is defined as

$$RS3 = \frac{X^2}{\sum_{i=1}^{rc}\frac{B_{ii}}{p_i}}.$$

Logistic regression models. Let p_i denote the probability that the *i*-th sampled school will participate. Under the logistic regression model, the log odds of response propensity (expressed in terms of the logarithm of $p_i/(1-p_i)$), is assumed to have the following linear form:

$$\log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots + \beta_p X_{pi}$$

where X_{1i}, X_{2i} ..., X_{pi} are p auxiliary variables associated with the i-th sampled school, and β_0, β_1, ..., β_p are coefficients to be estimated. Asymptotic assumptions are used to develop statistical tests to determine which, if any, of the coefficients are significantly different from zero. In the analyses in this report the standard procedures for carrying out logistic regression analyses have been modified both to incorporate the sampling weights in the estimation of the coefficients and to reflect the effect of the complex sample design on the variance-covariance matrix of the coefficients.

The Newton-Raphson algorithm is used to iteratively solve for parameter solutions in the logistic regression. Let $q(\beta) = \partial L_n(\beta)/\partial\beta$ be the vector of first partial derivatives of the sample log-likelihood with respect to β. Let $H(\beta)$ be the matrix of second partial derivatives (or Hessian) of the sample log-likelihood having entries $\partial^2 L/\partial\beta_a\partial\beta_b$, where β_a and β_b are two separate components of β. Denote by q^t and H^t the values of $q(\beta)$ and $H(\beta)$ evaluated at b^t, the value of the estimate b at step t.

The general approach is to approximate the sample log-likelihood at the desired estimate, $L_n(b)$, at step t in the iterative process near the point b^t by a second-order Taylor series expansion:

$$L_n^t(b) \cong L_n(b^t) + q^{t\prime}(b - b^t) + \tfrac{1}{2}(b - b^t)' H^t (b - b^t).$$

Solving $\partial L^t/\partial b = q^t + H^t(b\text{-}b^t) = 0$ for b yields the iteration equations

$$b^{t+1} = b^t - \left[H^t\right]^{-1} q^t,$$

assuming H^t has an inverse. Given an initial value for $t = 0$, the set of iteration equations is solved for b^1, b^1 is used to solve for b^2, and so on, until the convergence criterion is satisfied. The $se(\hat{\beta})$ is calculated using BRR and repeating the procedure for each replicate.

References

Rao, J.N.K., and Scott, A.J. (1984). On Chi-Squared Tests for Multiway Contingency Tables with Cell Proportions Estimated from Survey Data. *Annals of Statistics 12*: 46-60.

Rao, J.N.K., and Thomas, D.R. (2003). Analysis of Categorical Response Data from Complex Surveys: an Appraisal and Update. In R.L. Chambers and C.J. Skinner (Eds.), *Analysis of Survey Data* (pp. 85-108). West Sussex, England: John Wiley and Sons.

Westat. (2007). *WesVar 5.0 User's Guide.* Rockville, MD: Westat.

Wolter, K.M. (1985). *Introduction to Variance Estimation.* New York: Springer-Verlag.