

Technical Report and User Guide for the 2018 Program for International Student Assessment (PISA)

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

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Technical Report and User Guide for the 2018 Program for International Student Assessment (PISA)

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

July 2021

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1. Overview of PISA 2018

1.1 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, and in the 2018 cycle, additional optional assessments in global competence and financial literacy. The United States administered the core PISA assessments as well as the optional financial literacy assessment and teacher questionnaire in 2018. The 2018 cycle of the study was carried out in 79 education systems, including the United States, and more than 600,000 students participated worldwide. 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 2018, 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. 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 is coordinated by the Organization for Economic Cooperation and Development (OECD), based in Paris, France, and is conducted in the United States by the National Center for Education Statistics (NCES). The initial PISA 2018 results for reading, mathematics and science literacy were released on December 3, 2019. The results for financial literacy were released in May 2020.

As shown in figure 1, PISA began in 2000 and assesses one of three core subject areas in depth (considered the major domain; shown in capital letters in figure 1). Since 2015, the main mode of administration has been via a computer-based assessment (CBA). A paper-based option exists and only a few countries chose this mode in 2018. All three core subjects are assessed in each cycle (the other two subjects are considered minor subject areas for that assessment year), which allows countries to have a consistent source of achievement data in each of the three subjects while rotating one area as the major domain year. In 2018, reading was the major domain, as it was during the 2009 and 2000 cycles.

1.2 What's New in PISA 2018?

The PISA 2018 main study in the United States consisted of four major elements: (1) a 2-hour core student assessment of mathematics, reading, science, and financial literacy; (2) a 1-hour student questionnaire session including a core questionnaire, a financial literacy questionnaire, and an information communication technology familiarity (ICT) questionnaire; (3) an online teacher questionnaire to be completed by English Language Arts (ELA) and non-ELA teachers that required approximately 30 minutes to complete; and (4) an online school questionnaire to be completed by the principal or designee that also required approximately 45 minutes to complete. An assessment of global competence was the innovative domain in PISA 2018, but the United States did not administer global competence.

PISA 2018 introduced adaptive testing in reading, the major domain. Instead of using fixed, predetermined test forms, as was done through PISA 2015, the reading assessment given to each student was dynamically determined or adapted based on how the student performed through a series of assessment stages. Student responses were computer-scored and students were routed to the next stage based on their scores.¹

Similar to past administrations, PISA 2018 collected students' demographic information, attitudes towards English/Language arts, information about learning English/language arts in school, school schedule and learning time, and students' general affect. School principals of participating schools provided information on the school's demographics and learning environment, and teachers provided information about themselves and their teaching experience, initial education and professional development, the student body, and teacher views on school policies and evaluation.

¹ For a more detailed description on the adaptive testing design and a discussion of the considerations that guided its development see: *PISA 2018 Technical Report* (OECD forthcoming); and Yamamoto, K., Shin, H.J., and Khorramdel, L. (2018). Multistage Adaptive Testing Design in International Large-Scale Assessments. *Educational Measurement*, 37 (4), 16–27.

Figure 1. PISA subjects assessments by year

Assessment year		2000	2003	2006	2009	2012	2015	2018
Subjects assessed in the United States	Core domains	READING	Reading	Reading	READING	Reading	Reading	READING
		Mathematics	MATHEMATICS	Mathematics	Mathematics	MATHEMATICS	Mathematics	Mathematics
		Science	Science	SCIENCE	Science	Science	SCIENCE	Science
	Additional domains		Problem solving			Problem Solving	Collaborative problem solving	Global competence
						Financial Literacy	Financial literacy	Financial literacy

NOTE: Reading, mathematics, and science literacy are assessed in each assessment cycle of the Program for International Student Assessment (PISA). The subject in capital letters is the major domain for that cycle. A separate problem-solving assessment was administered in 2003 and 2012. The United States participated in a problem-solving assessment administered in 2003 and 2012 and financial literacy in 2012, 2015, and 2018. The United States did not administer global competence in 2018.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

1.3 What PISA Measures

PISA assesses the application of knowledge in reading, mathematics, and science literacy to problems within a real-life context. In addition to the core assessments, the United States, along with 20 other countries also participated in the optional financial literacy assessment (OECD 2020). 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 reading, PISA examines how well 15-year-old students can understand, use, and reflect on reading 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 skills. PISA also provides ranges of proficiency levels for each subject area that describe what a student is typically capable of at each level (OECD 2019c).

The PISA frameworks explain the theoretical underpinnings of the mathematics, science, and reading assessments and are described in detail in the [PISA 2018 Assessment and Analytical Framework](#) (OECD 2019a). The framework for a specific domain is updated each time the given domain is the major domain to be assessed. Since science and mathematics were assessed as minor domains in 2018, the science framework in the 2018 administration of PISA did not change from 2015 and the mathematics framework was the same as the one used in 2012. However, since reading was the major domain for 2018, the reading framework was updated for the 2018 administration of PISA. The revised framework is intended to integrate reading in a traditional sense together with the new forms of reading that have emerged, incorporate constructs involved in basic reading processes, revisit the way the domain is organized to incorporate reading processes, and consider new technology options. For more detail on the frameworks, see the [PISA 2018 Assessment and Analytical Framework](#) (OECD 2019a).

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 the United States, this population is defined as all students born on or between July 1, 2002 and June 30, 2003 attending school in grade 7 and higher. The modal age of PISA students is 15 years. For the PISA 2018 assessment, 0.5 percent of the U.S. students were enrolled in 8th grade, 10 percent in 9th grade, 72 percent in 10th grade, 17 percent in 11th grade, and 0.1 percent in 12th grade. In addition, the PISA target population includes students in all programs of study (e.g., academic, vocational). A minimum of 6,300 students from at least 150 schools was required in each education system that administered the CBA. 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 2019b).

1.4 PISA 2018 Administration

PISA 2018 was administered in the United States from October through December 2018, and a total of 6,731 U.S. students and 174 U.S. schools participated.

PISA 2018 was implemented internationally by the PISA International Consortium, led by the Educational Testing Service (ETS), through a contract with the OECD. Technical standards and a series of manuals provided standardized procedures for all countries to follow.

NCES is responsible for the U.S. implementation of PISA. PISA 2018 data collection and associated tasks were carried out through a contract with Westat and its subcontractor, Pearson. 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; data collection; analysis; and reporting. Pearson was responsible for the 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 three assistant administrators (both the test administrator and assistant administrators were Westat employees). A field manager (also Westat employee) oversaw data collection activities.²

1.5 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 2018, as well as with information on how to access the PISA 2018 data. This information is meant to supplement OECD publications by describing those aspects of PISA 2018 that are unique to the United States. Chapter 2 provides information about sampling requirements and sampling in

² Chapter 5 describes the U.S. data collection activities for PISA 2018.

the United States. Chapter 3 describes the details of how schools and students were recruited, and chapter 4 provides information on instrument development. Chapter 5 describes field operations used for collecting data; chapter 6 describes participation rates at the school, teacher, and student level; and chapter 7 provides details 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 in analyzing the PISA 2018 data.

2. Sampling

The PISA 2018 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 6,300 assessed students from a minimum of 150 schools was required in each education system that participated in CBA with Global Competence or 5,250 assessed students in CBA without Global Competence.

The international guidelines specified that within schools, a sample of 52 PISA-eligible students was to be selected in an equal probability sample unless fewer than 52 students PISA-eligible students were available (in which case all PISA-eligible 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, 2002 and June 30, 2003.

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 2018 also required a minimum participation rate of 80 percent of sampled students from schools within each education system. A student was considered a participant if he or she responded to a significant portion of the student questionnaire and one cognitive item or half of the cognitive items in his or her assessment form. 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 students 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 2018 PISA school sample was drawn for the United States in October 2017. The sample design was developed to retain most of the sample design properties of the 2015 national sample and to follow international requirements as described in the *PISA 2018 Technical Report* (OECD 2019b). 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, <https://nces.ed.gov/ccd>) and private schools in the Private School Universe Survey (PSS, <https://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 2018 school frame was constructed using the 2015–2016 CCD and PSS, the most current data at the time of the PISA frame construction.

Eligible schools in the PISA 2018 school frame included 68,622 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.

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

The number of enrolled 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 2015 (Kastberg et al. 2017). Table 1 shows the percentage distribution of ENR students by grade in PISA 2015 and the student enrollment, estimated number ENR, and percentage distribution of ENR students in the PISA 2018 school frame. Most 15-year-olds in the United States were high school students—72.4 percent in 10th grade, 17.3 percent in 11th grade, 9.6 percent in 9th grade, and 0.1 percent in 12th grade. Less than 1 percent of them were middle school students—0.5 percent in 8th grade and 0.1 percent in 7th grade.

Table 1. Percentage of PISA-eligible students in 2015 and student enrollment, number, and percentage of PISA-eligible students in PISA 2018, by grade

Grade	PISA 2015 ¹	PISA 2018 school frame	
	Percent ENR	Number of students enrolled	Number ENR
Total	100.0	24,125,386	4,058,637
Ungraded ²	N/A	15,395	5,642
Grade 7	0.1	4,042,003	4,042
Grade 8	0.5	4,026,659	20,133
Grade 9	9.6	4,055,043	389,284
Grade 10	72.4	4,043,200	2,927,277
Grade 11	17.3	4,094,771	708,395
Grade 12	0.1	3,863,710	3,864

¹ Technical Report and User Guide for the Program for International Student Assessment (PISA). NCES 2017–095, Table 1.

² The ENR was set to 14 students for ungraded schools.

NOTE: ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 PISA School Sample, Final Report.

The total estimated number of ENR students in the PISA 2018 school frame was 4,058,637 students. The census population estimate³ of 15-year-old children during the 2017–2018 academic year was 4,133,719 children as of June 2016. The ENR estimated from enrollment data was 98 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 2018 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 2015.

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 due to a number of reasons. Excluded schools included special education schools for students with physical disabilities, schools in hospitals, training centers, and detention centers. A total of 1,067 schools were excluded from sampling. The student loss as a result of these exclusions was estimated at 10,177 students, or 0.25 percent of the ENR.

³ The census population estimate was derived from the American FactFinder on the census website (<https://www.census.gov/>) that has been decommissioned and is no longer available. The site previously had population estimates by single year of age by gender as of June for every year from 2010 to 2016.

2.2.1.c Stratification

Stratification was used for sample efficiency by ensuring an appropriate representation of each type of school in the selected sample, thereby making survey estimates more reliable.

Eight explicit strata⁴ were formed by crossing the following two variables, shown in alphabetical order:

1. Census region—Northeast, Midwest, South, and West;⁵ and
2. School type—public or private; 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 explicit stratum, schools were sorted by the following variables, shown in alphabetical order:

1. Gender;
2. Grade range—schools with grade 7 or 8 as highest grade, schools with grade 9 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;
3. Locale—urban-centric locale code, (i.e., city, suburb, town, rural);⁶
4. 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 students with Two or more races;
5. State; and
6. Estimated grade enrollment.

⁴ The eight explicit strata were Northeast public, Midwest public, South public, West public, Northeast private, Midwest private, South private, and West private.

⁵ For the definition of Census region as of the year on the school frame, 2016, see <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>.

⁶ Locale was derived from the urban-centric locale code that is based on the urbanicity of the school location: *Central 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.

The following tables show the total number and percentage of ENR students and schools in the PISA 2018 U.S. school frame by census region (table 2), school type (table 3), and sampling stratum (table 4).

Table 2. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by region: 2018

Region	ENR students	Percent	Schools	Percent
Total	4,048,460	100	68,622	100
Northeast	683,149	16.87	12,855	18.73
Midwest	863,691	21.33	17,853	26.02
South	1,526,291	37.70	22,158	32.29
West	975,329	24.09	15,756	22.96

NOTE: Detail may not sum to totals because of rounding. Region of country is based on census definitions, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 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: 2018

School type	ENR students	Percent	Schools	Percent
Total	4,048,460	100.00	68,622	100
Private	328,152	8.11	22,241	32.41
Public	3,720,308	91.89	46,381	67.59

SOURCE: U.S. 2018 PISA School Sample, Final Report.

Table 4. Number and percentage of students and schools included in the PISA U.S. school sampling frame, by region and school type: 2018

Region	School type	ENR students	Percent	Schools	Percent
Total		4,048,460	100	68,622	100
Northeast	Private	87,712	2.2	5,556	8.1
Northeast	Public	595,437	14.7	7,299	10.6
Midwest	Private	68,717	1.7	5,407	7.9
Midwest	Public	794,974	19.6	12,446	18.1
South	Private	111,170	2.7	7,069	10.3
South	Public	1,415,121	35.0	15,089	22.0
West	Private	60,553	1.5	4,209	6.1
West	Public	914,776	22.6	11,547	16.8

NOTE: Detail may not sum to totals because of rounding. Region of country is based on census definitions, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 PISA School Sample, Final Report.

2.2.2 School Sample

The United States 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 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 52 ENR students in each school. This means that in each large school with at least 52 ENR students, the sample target is to sample with equal probability 52 ENR students at random. In each small school with fewer than 52 ENR students, the target is to sample all ENR students with certainty.

The PISA Consortium selected the U.S. school sample for PISA 2018. Detailed information on sampling steps can be found in the *PISA 2018 Technical Report* (OECD 19b). Very briefly, school sampling involved stratification (as described in the previous section), 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 2018 (as described in the next section), the very small schools (VSS) were split into two groups, smallest schools with ENR less than or equal to 2 (VSS1) and very small schools with ENR between 2 and 21 (VSS2).

Table 5 shows the number of schools in the U.S. sample by stratum. The sample included 257 schools—27 smallest schools (VSS1, ENR \leq 2), 19 very small schools (VSS2, $2 < \text{ENR} < 21$), 15 moderately small schools ($21 \leq \text{ENR} < 42$), and 196 large schools (ENR \geq 42). The sample allocation by stratum was proportional to the distribution of ENR students in each stratum.

Table 5. Number of schools in the PISA U.S. school sample, by sampling stratum: 2018

Stratum	All schools	Smallest schools (VSS1)	Very small schools (VSS2)	Moderately small schools (MSS)	Large schools
Total	257	27	19	15	196
Northeast private	9	2	2	3	2
Northeast public	34	3	0	1	30
Midwest private	9	3	2	1	3
Midwest public	48	4	2	4	38
South private	12	3	5	1	3
South public	82	5	2	4	71
West private	7	2	3	1	1
West public	56	5	3	0	48

NOTE: ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 PISA School Sample, Final Report.

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 VSS1 schools and TCS/2 for VSS2 schools because of the relatively large proportion of small schools in the United States (about 4 percent of ENR students were in VSS). This means that for the U.S. school sample, VSS1 schools were undersampled by a factor of 4 (school probability of selection reduced by half) and VSS2 schools were undersampled by a factor of 2 (school probability of selection reduced by three-fourths) as compared to equal-probability sampling. The VSS schools were undersampled to reduce the administrative burden of handling small schools. Table 6 shows the estimated student yield (the expected number of sampled students) from the U.S. sample by stratum and the parameters (proportion ENR and mean ENR) used to estimate student yield.

Table 6. Estimated student yield and estimation parameters for PISA U.S. school sample, by sampling stratum: 2018

Stratum	Estimated student yield	Proportion ENR from school					Mean ENR		
		VSS1	VSS2	MSS	Large	Factor	VSS1	VSS2	MSS
		P1	P2	Q	R	L= 1+ P/4	(V1ENR)	(V2ENR)	(MENR)
Total	10,947	0.4	3.7	4.3	91.5	1.0219	0.6	9.0	38.0
Northeast private	232	0.6	18.8	10.2	70.4	1.0985	0.2	8.1	37.3
Northeast public	1,601	0.4	1.0	2.4	96.2	1.0079	0.7	8.4	39.2
Midwest private	211	0.8	15.7	12.1	71.4	1.0843	0.2	7.9	38.3
Midwest public	2,156	0.5	3.3	5.7	90.5	1.0201	0.7	12.1	38.3
South private	235	0.6	25.6	15.3	58.5	1.1327	0.3	8.1	37.2
South public	3,869	0.4	1.7	2.7	95.2	1.0111	0.9	8.7	38.9
West private	114	0.8	21.4	9.9	68.0	1.1126	0.2	7.8	37.8
West public	2,529	0.4	3.0	4.0	92.7	1.0176	0.7	9.8	37.0

NOTE: Detail may not sum to totals because of rounding. Region of country is based on Census definitions, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. ENR refers to the number of PISA-eligible students enrolled. VSS1 refers to the smallest schools with ENR less than or equal to 2. VSS2 refers to very small schools with ENR between 2 and 21, MSS refers to moderately small schools with ENR greater or equal to 21 and less than 42. P1 is the percentage of ENR in VSS1 schools, P2 is the percentage of ENR in VSS2 schools. Q is the percentage of ENR in MSS schools, R is the percentage of ENR in large schools. P is the sum of P1 and P2.
SOURCE: U.S. 2018 PISA School Sample, Final Report.

The *PISA 2018 Technical Report* (OECD 2019b) shows the method for conducting the small school analyses and calculating the estimated student yield. To balance the two objectives of selecting an adequate sample of small schools but not too many small schools so as to hurt student yield, the small

school analysis assumed the underlying idea of undersampling the very small schools and proportionally increasing the number of large schools to sample. For example, in stratum 4—public schools in the Midwest region—the percentage of ENR was $P1 = 0.5$ percent in very small schools (VSS1), $P2 = 3.3$ percent in very small schools (VSS2), $Q = 5.7$ percent in moderately small schools (MSS), and $R = 90.5$ percent in large schools. The small school sampling factor was $L = 1 + P/4 = 1.0201$. The mean ENR was 0.7 for very small schools (V1ENR), 12.1 for very small schools (V2ENR), 38.3 for moderately small schools (MENR), and 52 for large schools (i.e., the mean is equal to the TCS for all large schools). The sample size allocation in this stratum was 48 schools—4 VSS1, 3 VSS2, 3 MSS, and 38 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: $(4 \times 0.7 + [3 \times 12.1] + [3 \times 38.3] + [38 \times 52]) = 2,130$ students. The total estimated student yield summed across the eight strata was 11,017 students.

2.2.2.b *Substitute Schools*

The *PISA 2018 Technical Report* (OECD 2019b) describes the use of substitute schools for sampled schools that refused participation. 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. For each school, 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.

2.2.2.c *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 7 through 9) and the total number and percentage of schools in the PISA 2018 school sample. The probability proportional to size (PPS) sampling and stratification worked effectively: the sample percentage of schools is close to the ENR student percentage of the frame for all the strata. By each explicit stratification variable, the tables are Census region (table 7), school type (table 8), and school type and region (table 9).

Table 7. Number and percentage of students and schools included in the PISA U.S. school sample, by Census region: 2018

Region	Frame		Sample	
	ENR students	Percent	Schools	Percent
Total	4,048,460	100	257	100
Northeast	683,149	16.9	43	16.7
Midwest	863,691	21.3	57	22.2
South	1,526,291	37.7	94	36.6
West	975,329	24.1	63	24.5

NOTE: Detail may not sum to totals because of rounding. Region of country is based on Census definitions, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 PISA School Sample, Final Report.

Table 8. Number and percentage of students and schools included in the PISA U.S. school sample, by school type: 2018

School type	Frame		Sample	
	ENR students	Percent	Schools	Percent
Total	4,048,460	100	257	100
Private	328,152	8.1	37	14.4
Public	3,720,308	91.9	220	85.6

NOTE: ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 PISA School Sample, Final Report.

Table 9. Number and percentage of students and schools included in the PISA U.S. school sample, by region and school type: 2018

Region	School type	ENR students	Percent	Sample schools	Sample percent
Total		4,048,460	100	257	100
Northeast	Private	87,712	2.2	9	3.5
Northeast	Public	595,437	14.7	34	13.2
Midwest	Private	68,717	1.7	9	3.5
Midwest	Public	794,974	19.6	48	18.7
South	Private	111,170	2.7	12	4.7
South	Public	1,415,121	35.0	82	31.9
West	Private	60,553	1.5	7	2.7
West	Public	914,776	22.6	56	21.8

NOTE: Detail may not sum to totals because of rounding. Region of country is based on census definitions, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. ENR refers to the number of PISA-eligible students enrolled.

SOURCE: U.S. 2018 PISA School Sample, Final Report.

2.3 Student Sampling in the United States

To achieve the required student yield of 41 assessed students per school (taking into account student exclusions and absences), the United States set a TCS of 52 students per school. The TCS for the main study is larger than the 42 TCS used on PISA 2015 in the United States. Of the 52 sampled students in each school about 11 students were sampled for financial literacy, where they received financial literacy and mathematics or reading assessment items. Financial literacy in PISA 2018 was administered in the same session as regular PISA, a change from PISA 2015 where students took the financial literacy assessment in a second session. If fewer than 52 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. The process for obtaining student samples from school-provided student lists is described in chapter 5.

A total of 58,168 students were listed from the 162 participating schools. The average list size was 355 students. A total of 7,958 students (an average of 46 per school) were randomly sampled.

2.4 Teacher Sampling in the United States

A teacher for PISA was defined as “one whose primary or major activity in the school is student instruction, involving the delivery of lessons to students. Teachers may work with students as a whole class in a classroom, in small groups in a resource room, or one-to-one inside or outside regular classrooms.” A teacher who can or will be teaching the PISA modal grade was eligible to be sampled. Grade 10 was the PISA modal grade in the United States.

An equal probability sample of up to 25 teachers was selected in each participating PISA school. Ten reading/language teachers were sampled in schools having at least that many listed, or all, if there were fewer than 10. Fifteen teachers of other subjects were sampled in schools having at least that many listed, or all, if there were fewer than 15. A total of 3,780 teachers (an average of 23 per school) were randomly sampled. As with the student sampling, the process for selecting teacher samples within schools is described in chapter 5.

3. School and Student Recruitment

3.1 Overview

The PISA 2018 main study school recruitment began in January 2018, 10 months prior to the data collection window, and continued into data collection. The goal was to meet or surpass the minimum requirement of original sample schools participation of 65 percent. The general approach taken with schools was to contact them well before the 2017–18 school year ended. As in past rounds of PISA, this early contact was believed to be necessary for schools to get PISA on their calendars before the start of the next school year. A set of incentives was presented to schools to attempt to provide information back to schools in the form of a customized school report to eligible schools and monetary incentives offered to schools, school coordinators, teachers, and students to recognize their effort and acknowledge the burden of participation. The school report provided comparative information on a school's performance. The incentive structure offered schools \$250, school coordinators \$200, and students received \$25 and 4 hours of community service for participating in the assessment. Teachers that participated by completing a teacher questionnaire received \$25.

Despite this incentive structure, there was some resistance from schools to participate in PISA and this required several additional activities to build the school response rate. Examples of such activities include contacting states, districts, and education organizations for letters of endorsement; using NAEP State Coordinators (NSCs) to assist in recruiting; making in-person visits to certain pending and refusing schools; developing a website to assist with recruiting schools and facilitating participation, and offering an increased incentive amount later in the recruitment window. Efforts focused on original sample schools because the original school response rate was the primary requirement to having the data accepted and being included in reporting. Resistance from schools also required the recruitment period and data collection to extend beyond what was planned. Table 10 provides a summary of recruitment activities and resulting outcomes from these actions and the resulting number of participating original schools in each action. These activities were not mutually exclusive and school participation was often the result of a combination of actions.

Table 10. Summary of U.S. PISA school recruitment activities and outcomes: 2018

Date	Activity and outcomes for original schools	Original sample	
		School count	Percent
October 2017	School sampled selected In-scope original schools	214	100
January 2018	NSCs informed of PISA sample and provided with materials for contacting districts and schools		
	Full assistance schools contacted	61	28.5
	Partial assistance schools contacted	59	27.6
	No assistance schools contacted	75	35.0
March 2018	Training for Westat gaining cooperation recruiters 5 recruiters completed a 2-day interactive training with added independent practice	†	†
March 2018	Notification packages sent to private and public schools and districts in states with no NSC assistance		
	In-scope private schools contacted	22	10.3
	Public schools recruited with no state assistance	75	35.0
March – September 2018	Special district approval in required districts		
	District submissions prepared	12	5.6
	District submissions approved	7	3.3
May – December 2018	Offered additional school incentive to pending and refusing schools		
	Number of schools offered school incentive of \$800	74	36.0
	Number of participating schools accepting incentive	20	9.3
June – September 2018	In-person visits made to refusing schools		
	Number of in-person visits	77	36.0
	Number of participating schools gained	20	9.3
October – December 2018	Assistance with refusing schools from state chiefs, state test directors, and representatives of education organizations		
	Number of school contacts	34	15.9
	Number participating schools gained	12	5.6
November 2018	Data collection period extended to December 14		
	Number of schools assessed in December	14	6.5
December 2018	School recruitment ended		
	Participating original schools	139	64.9

† Not applicable.

NOTE: NSC refers to NAEP State Coordinators. NSCs provided different levels of action in assisting school recruitment. “Full assistance” involved making initial and follow-up communication with the schools and securing cooperation. “Partial assistance” meant that the NSC made the initial contact but no more and Westat made follow-up communication to secure participation. “No assistance” meant the state was not assisting the recruitment of PISA schools and Westat made all communication with the schools.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

3.2 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 50 schools. The GCR training for gaining cooperation was designed to incorporate a large amount of independent study along with distance training via a 2-day webinar. This training took place on March 23 and 25, 2018.

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 WebEx training sessions.

The WebEx delivered PowerPoint presentations that walked GCRs through an introduction to PISA, an overview of their role, materials for their assignment, contacting schools, security and confidentiality, conversion techniques, using the MyPISA website and the School Control System (SCS), and administrative procedures. GCRs were given role-play exercises to perform in pairs and were observed by the field manager. A second WebEx session was held following the completion of the role-plays to discuss what occurred in the calls and further share ideas for how to gain cooperation from schools, avoid refusals, and convert refusals when they occurred. A few days after training, the field manager followed up with each GCR to ensure that all questions had been answered and that GCRs were ready to proceed with recruitment activities.

3.3 Recruitment of Schools

During December 2017, PISA information packages were sent to the Chief Education Officer in each state with sampled schools, NAEP State Coordinators (NSCs), and state testing directors. The information packages (see appendix A) contained the following:

- Letter from the NCES Commissioner;
- PISA 2018 overview brochure;
- Summary of activities for schools;
- Study timeline;

- FAQs for states; and
- Affidavit of nondisclosure.

Westat and NCES met with the NSCs over a series of WebEx meetings and individual phone calls to alert them about PISA and discuss the participation of the selected schools in their state. An ideal plan for notifying schools, gaining their participation, and handing the schools off to Westat’s GCRs was reviewed with the NSCs. Once the NSCs completed and returned an affidavit of nondisclosure, Westat provided them with information on the sampled schools, and they began their outreach to the schools. The level of involvement from the NSCs varied greatly, with some doing all of the work to contact schools and obtain their cooperation, some only notifying schools of their selection for the study (and then passing it over to the GCRs to do the recruitment), some providing a letter from the state that Westat could use to contact schools, and some opting to not assist with PISA recruitment.

Some districts required explicit approval before schools could be contacted. In states where the NSCs were fully assisting, the NSC obtained the necessary approval for PISA by sending notification to districts and schools and following up to gain cooperation. Other NSCs offered partial assistance by sending notification but performing no active follow-up. In these instances, Westat GCRs made personal contact after the notification was sent. There were NSCs who offered no assistance in gaining cooperation of schools, usually due to a state position that did allow them to assist with studies such as PISA, either due to other required activities or the state’s policy regarding outside, voluntary studies. Westat identified 12 districts where special approval was required in states where the NSCs did not assist with this process. 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 took months. Fortunately, once approved, most districts assisted with getting the school(s) to participate.

School packages were mailed to principals in mid-March with phone contact from recruiters beginning a few days after the mailing. GCRs began contacting schools in March 2018 and continued working their assignments through summer 2018. Over the course of the recruitment period, GCRs, Westat project staff, NCES, state and district 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 rates from previous cycles. All recruitment materials can be found in appendix A.

3.3.1 Contacting States, Districts, and Schools

The school sample for the main study was selected in October 2017. The contact information for each state, district, and school office was verified. 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 December 2017. School contact began in January in states where NSCs were contacting schools and in March in states where Westat staff were contacting schools. The mailing sequence for states, districts, and schools contacted by Westat was as follows:

- State mailing: December 2017;
- District mailing: January 2018; and
- School mailing: January 2018.

3.3.1.a *State Contact*

As described above, in states where NSCs were assisting with school recruitment, the NSC, Chief Education Officer, and state testing director received the state package, and an affidavit was returned in order to allow the NSC to access a list of the sample schools in their state via the MyPISA website. In states where NSCs were not assisting school recruitment, the package was sent to the state leadership, and implied consent to approach districts and schools was assumed.

3.3.1.b *District Contact*

District contacts were made by GCRs only in states where NSCs were not assisting with recruitment. District superintendents and test administrators were sent similar packages to that of the states. Generally, districts were not actively recruited. However, our experience with previous cycles of PISA school recruitment 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 package of information and provided the GCR the opportunity to answer any questions about the study. In states where NSCs were actively helping with school recruitment, the NSCs took care of the district notification and let Westat know when the GCRs could begin making contact with the schools.

3.3.1.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 handling districts across the nation and submitted a complete proposal to each of these districts in states where NSCs were not assisting with recruitment. Twelve proposals were submitted. Of those, two districts never responded and the schools did not participate in the study, three districts sent refusal letters, and seven districts approved the PISA 2018 study. In states where NSCs assisted with recruitment, the NSC took care of any special approval procedures with the districts.

3.3.1.d *Initial School Contact*

Between January and April 2018, schools were contacted with an initial request to participate and received a PISA information package. Following the mailing of the package, GCRs began contacting schools to gain cooperation. In their contact(s), they verified the receipt of the notification 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 SCS. These were reviewed in the weekly calls with the field manager, particularly with initial refusals in order to generate strategies to convert the schools.

In states where the NSCs gained the cooperation of the schools, the GCRs' initial contact with the schools served to confirm the assessment date and other logistics and answer any questions they had regarding PISA. In these cases, the GCR was not required to actively recruit the schools, as they were already planning to participate in the study before the school contact was handed over to the GCR.

3.3.2 *Reasons for School Refusal to Participate*

The most prevalent reasons for refusal were the time burden and too much testing being conducted in the schools. There was significant pushback from many refusing schools because of the instructional time students would lose. In addition, mandated state and federal testing currently in place for the target population of 15-year-old students, who are mostly 10th-graders in the United States, was the reason cited

by many of the refusal schools. Both of these reasons were mentioned across states and in both public and private schools.

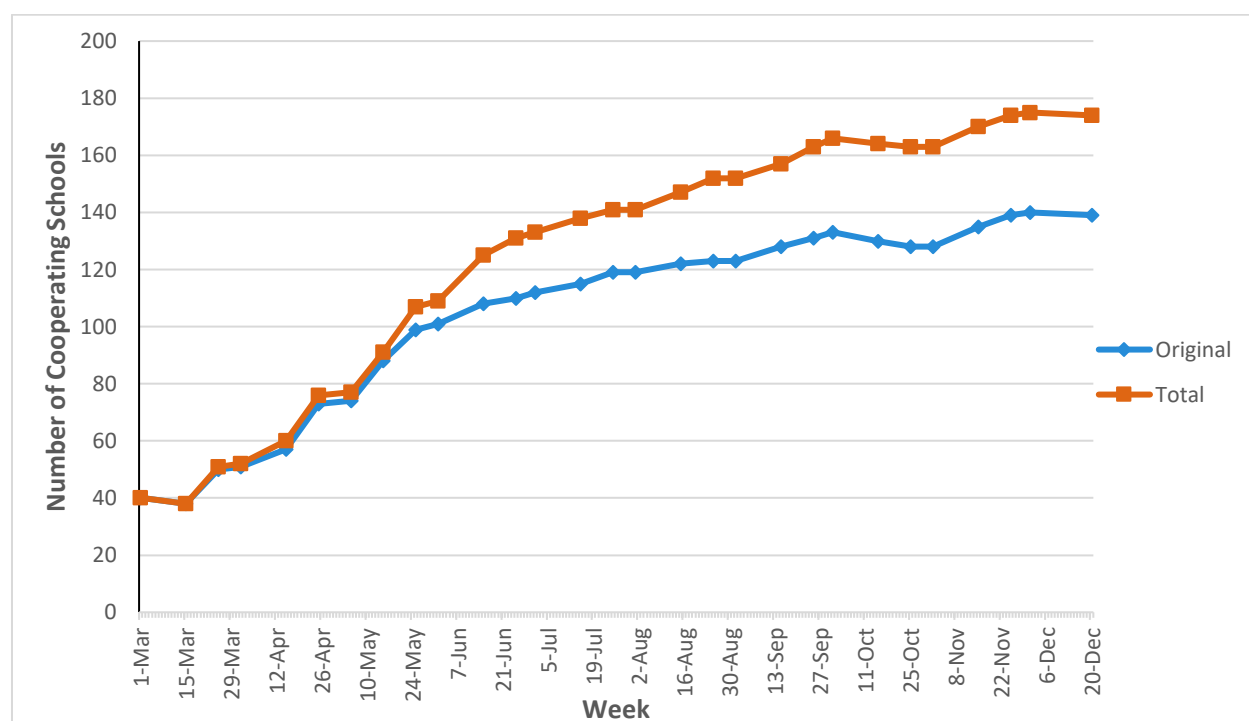
School attrition was another factor impacting school participation. Later in summer 2018, as recruitment staff were attempting to verify the assessment schedule of the participating schools, some schools that had initially agreed to participate withdrew their participation. The reasons tended to involve the reasons stated above. Also, staff turnover caused some schools to drop out because the decisionmaker who had initially agreed to participate was no longer at the school when school began in fall 2018.

3.3.3 Solutions and Approaches Used with Refusing Schools

Several approaches at the school, district, and state levels were implemented to increase participation. PISA added additional recruiters and made personal visits to schools beginning in June 2018 and continuing throughout summer. A total of 77 in-person visits were made to refusing schools. Westat staff 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 NSCs who requested them. This e-mail was targeted to states that were especially difficult to recruit, and the e-mail proved successful in some cases. In midsummer 2018 original schools that were still pending or interim refusals were offered an increased school incentive of \$800. Twenty schools received the increased school incentive. The data collection period was also extended into December to accommodate schools that could not participate in October or November. For schools assessed in December the birthday range for sampled students was shifted by one month so that the students assessed in December were the same age as those assessed in October and November.

Figure 2 shows the school cooperation by each week of recruitment from March 1, 2018, to December 20, 2018. There were 166 participating schools (85 percent) on October 1, 2018 and the number decreased as the data collection was carried out. Similarly, the original school participation number fell to 123 schools (50 percent) on September 1 and increased to 132 (59 percent) at the time the assessments began in October, but was short of the number needed to achieve the required original school response rate. NCES made further outreach to states that had refusing original schools and also obtained help from other contacts in select educational organizations like the Council of Great City Schools to reach out to districts and encourage participation. Once districts were contacted, Westat communicated with the district or school to facilitate onboarding the school for assessment.

Figure 2. PISA 2018 original and total school participation, by week



SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

3.3.4 Final Results of School Recruitment

School recruitment continued into December 2018, beyond the original recruitment end date. Table 11 provides the response status of original and substitute schools through the field period.

Table 11. PISA 2018 school type, by response status

	Original schools		Substitute schools		Total schools	
	Number	Percent	Number	Percent	Number	Percent
Total schools recruited	257	100.0	122	100.0	379	100.0
Ineligible/closed	43	16.7	10	8.2	53	14.0
Total eligible	214	83.3	112	91.8	326	86.0
Refusal	73	28.4	67	54.9	140	36.9
Other (pending, no contact)	2	0.8	10	8.2	12	3.2
Participating	139	54.1	35	28.7	174	45.9

NOTE: Percentages are based on the total school sample. Counts of substitute schools include only those substitutes that were activated to be contacted.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

This additional recruitment effort raised the final number of assessed original schools. Of the 174 participating schools, 139 original schools were assessed. Thirty-five replacement schools were assessed, though some of these schools would drop out of the final data because they were tied to original schools that were already participating as a result of the late recruitment efforts. Some original schools also dropped out of the final count due to inadequate student participation. Chapter 6 reports the final response rates after data adjudication.

3.4 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 B). 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). Table 12 reports participating schools by type of consent. The level of consent used was determined by school or district requirements. 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 B). In addition, test administrators conducted a student meeting with the selected students before assessment day to encourage and motivate students to participate and do their best on the assessment.

Table 12. PISA 2018 participating schools, by type of parental consent

	Original schools		Substitute schools		Total schools	
	Number	Percent	Number	Percent	Number	Percent
Total schools participating	139	100.0	35	100.0	174	100.0
Parental consent						
Notification	91	65.5	22	62.9	113	64.9
Implicit consent	35	25.1	13	37.1	48	27.6
Explicit consent	13	9.4	0	0.0	13	7.5

NOTE: Percentages are based on the total participating schools.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

4. Instrument Development and Distribution

4.1 Test Instrument Design

PISA 2018 assessment included both multiple choice and open-ended constructed response items across the cognitive assessments and the questionnaires. The 2018 assessment instruments were developed by international experts and PISA international contractors. The assessment also included items 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 were required to field test the assessment items in spring 2017. The screen design and interface of the PISA computer-based design of the assessment is fully described in chapter 2 of the *PISA 2018 Technical Report* (OECD 2019b).

The final assessment consisted of 245 reading items, 83 mathematics items, 115 science items, and 43 financial literacy items, arranged in units. PISA items are designed so that related questions are asked about a single stimulus, typically based on a real-life scenario such as buying vegetables at a market or possible pizza topping combinations. These item-to-stimulus groupings are referred to as units. The items listed above make up 50 reading units, 45 mathematics units, 35 science units, and 25 financial literacy units. Units are situated within clusters based on content and timing and form the major unit grouping for assignment to assessment forms. All together there were 21 reading clusters, 6 mathematics clusters, 9 science clusters, and 2 financial literacy clusters. Each cluster is designed to be approximately 30 minutes of material. Clusters, which are specific unit sets, are assigned to test forms that are approximately 2 hours in length, so each student is assigned 4 clusters. The computer assessment design for 2018 used by the United States and other education systems that did not administer global competence included 36 base forms with rotating science and mathematics clusters and the adaptive reading units. Table 13 provides the number of items by domain for those administered by the United States in 2018.

Table 13. Number of new and trend items in PISA 2018, by domain

Domain	New	Trend	Total
Reading literacy	173	72	245
Mathematics literacy	0	83	83
Science literacy	0	115	115
Financial literacy	14	29	43

NOTE: The number of new and trend items shown in this table reflect the design for the computer-based PISA assessment only. The number of reading items in the 2018 cycle was much larger than in previous cycles due to the multistage adaptive design. In addition to the 245 items shown, reading included 65 reading fluency sentences. The table reflects the U.S. assessment design that did not include the global competence assessment.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

To provide the most comprehensive measure of reading literacy, PISA would have to present each student with the complete set of test items. Asking students to answer all such items would be the best way to eliminate any gaps or biases in the assessment. However, this would result in a test that would take more than 6 hours to complete.

To make it feasible to measure student proficiency in all domains, the test material in all PISA cycles, up to and including PISA 2018, was divided into several 30-minute clusters or test booklets. There were six 30-minute trend clusters of test material for math and science each and two 30-minute clusters of test material for financial literacy with a mix of new and trend items. A multistage adaptive design was adopted for the reading assessment in PISA 2018 (more details on the PISA multistage adaptive test in reading literacy are provided below). Materials equivalent to 15 30-min clusters, but organized into units, rather than clusters were used for the reading adaptive design (5 trend clusters and approximately 10 new clusters).

These clusters were linked across domains and organized into test forms, which were then randomly allocated to students. Students received 1 hour of test material in the major domain (reading) along with two clusters of test material in one or two of the other domains (math and science). Students sampled for financial literacy received two clusters of financial literacy items and either an hour of reading or two clusters of mathematics. Each student saw only a small subset of the test material and was thus assessed on only a selection of the skills and competencies that comprise each domain. Nonetheless, students in an education system, when taken as a group, were examined on the complete set of skills.

For countries like the United States that took part in the core CBA and the optional financial literacy assessment but did not opt to take part in the optional global competency domain, a total of 36 base CBA testing forms and 12 financial literacy forms were assembled for the assessment. These forms included the following groups or clusters of test items: six clusters (each 30-min testing time) from each of the trend domains of mathematics and science literacy, two clusters (each 30-min testing time) of financial literacy items, and fifteen 30-min reading units (equivalent to 5 trend clusters and approximately 10 new clusters). As reading literacy is the major domain for 2018, reading tasks are included in all base test forms and paired with one or two of the other minor domains (i.e., mathematics, science), and each of the different combinations of domains is balanced in terms of position. Financial literacy assessment forms contained two clusters of financial literacy items with either adaptive reading or two clusters of mathematics. Each student took 2 hours of testing: they all took 60 minutes of reading tasks and another 60 minutes of tasks (2 clusters) from one or more of the other domains (i.e., science, mathematics, or financial literacy).

The PISA test design reflects a random assignment of a form within a school following a specific pre-assigned probability distribution. In the United States, 92 percent of students received forms numbered 1–24 of these 36 forms while 8 percent of students received forms numbered 25–36. These percentages are based on random assignment of test forms to students across schools. Each student had a probability of receiving any of the forms. The combinations of test material within forms numbered 1–24 include: (i) reading and science literacy and (ii) reading and mathematical literacy. These forms were sampled at a higher rate and provided the necessary covariance information between reading literacy and each of the two minor domains. In addition, forms numbered 25–36 provided tri-variate information about the three domains and included 2 reading clusters and 1 math and 1 science cluster each. These forms were sampled at a lower rate so that only 8 percent of students receive one of these forms and received 1 hour of reading literacy plus two 30-minute clusters of items from each of the other two minor domains.

PISA Multistage Adaptive Test in Reading Literacy. Despite the randomization procedure used in the design of the PISA test, one source of inaccuracy remains. Most students in OECD countries score near the middle of the score, or at around 500 points. Most of the test material is also targeted to middle-performing students, which allows for more refined differentiation of student ability at this level. However, this means that there is a relative lack of test material at the higher and lower ends of student ability, and that the scores of both high- and low-performing students are determined with less accuracy than the scores of middle-performing students.

In order to increase the accuracy of such measurements, PISA 2018 introduced adaptive testing in its reading assessment. Instead of using fixed, predetermined test booklets as was done through PISA 2015, the reading assessment given to each student was dynamically determined, based on how the student performed in prior stages.

There were three stages to the PISA 2018 reading literacy assessment: Core, Stage 1, and Stage 2. Students first saw a short Core stage, which consisted of between 7 and 10 items. The vast majority of these items (at least 80 percent and always at least 7 items) were automatically scored. Students' performance in this stage was provisionally classified as low, medium, or high, depending on the number of correct answers to these automatically scored items.

The various Core reading literacy items delivered to students did not differ in any meaningful way in their difficulty. Stage 1 and 2, however, both existed in two different forms: comparatively easy and comparatively difficult. Students who displayed medium performance in the Core stage were equally likely to be assigned an easy or a difficult Stage 1. Students who displayed low performance in the Core

stage had a 90 percent chance of being assigned to an easy Stage 1 and a 10 percent chance of being assigned to a difficult Stage 1. Students who displayed high performance in the Core stage had a 90 percent chance of being assigned to a difficult Stage 1 and a 10 percent chance of being assigned to an easy Stage 1. Students were assigned to easy and difficult Stage 2 blocks of material in much the same way. In order to classify student performance as precisely as possible, however, responses to automatically scored items from both the Core stage and Stage 1 were used.

This routing approach ensured broad content coverage of the item pool and a minimum sample size per item for both lower and higher performing countries on difficult and easy stage 1 and stage 2 items. For example, if all the students in a country were to display low performance on the core stage, then at least 10 percent of them would be randomly assigned to difficult stage 1 items. As a result, the 90/10 percent split ensured that at least 20 percent of students were assigned to difficult/easy items for all countries. The *PISA 2018 Technical Report* (OECD 2019b) explains the development of the MSAT reading literacy assessment design in full detail.

Adaptive testing was made possible through the use of computers. One potential drawback of an adaptive design is that students are unable to return to a question after it has been answered or skipped. This was already the case in the PISA 2015 CBA. However, with adaptive testing, students' responses in the Core stage and in Stage 1 affected not only their performance but also the questions that they saw later in the assessment. The *PISA 2018 Technical Report* (OECD 2019b) presents further indicators of the impact of adaptive testing on students' test-taking behavior.

Reading Fluency. In addition to the typical reading literacy items, the 2018 reading literacy instrument included a measure of reading fluency in the form of sentence processing. This measure required students to make a sensibility judgment about sentences of increasing complexity and was designed to provide additional information about the reading skills of students at the lower end of the reading proficiency scale. Information from this task, combined with the typical reading literacy items allowed for a more thorough understanding of how students differ at various levels of the proficiency scale. In the Main Survey, there were 65 reading fluency sentences organized into 5 clusters of 11 sentences and 1 cluster of 10 sentences. Each student was assigned two fluency clusters for a total of 21 or 22 sentences right before the administration of the reading literacy item clusters. These reading fluency tasks were administered within a 3-minute, timed session, which means that any sentences not completed within the 3-minute session were automatically skipped by the SDS and the student was advance to the first reading literacy unit. Reading fluency items were considered in the computation of students' overall score. However, as their content and format tend to differ from that of the "regular" reading literacy items, the reading fluency items could affect the existing reading literacy scale. In order to maintain the existing reading

literacy scale and avoid any potential issues that could weaken the comparability of reading literacy scale across cycles, the calibration of reading fluency items was done after the estimation of reading literacy items had been finalized. Thus, the 2018 reading literacy assessment (reading and reading fluency) provided more information at the lower end of the scale without making substantial changes to the trend and comparability of existing reading scale. Chapter 9 in the *PISA 2018 Technical Report* discusses the reading literacy scale and the reading fluency items in more detail (OECD 2019b).

Data for the financial literacy sample was analyzed separately from the regular PISA data, and a set of plausible values for financial literacy, reading, and mathematics was produced that can be used to study relationships among these three domains.

In addition to the cognitive assessment, students also completed three questionnaires in a 60-minute session asking about themselves, their attitudes, their experiences in school, information computer technology familiarity, and financial matters. The student questionnaire session was administered on a laptop computer after the cognitive assessment in all schools. Up to 25 teachers (up to 10 English/Language arts teachers and 15 general teachers) in each school were also sampled to take a 30-minute online questionnaire about teaching practices, their school, and their experience as teachers. English/Language arts teachers received a domain-specific questionnaire. Principals in schools where PISA was administered also completed a 45-minute questionnaire about their schools.

4.2 Assessment Materials Development

The materials for PISA 2018 in the United States included (1) the CBA (500+ items); (2) a student questionnaire; (3) two teacher questionnaires (English/Language Arts (ELA) and general); (4) a school questionnaire; (5) a test administrator manual and an assistant administrator manual; (6) a school coordinator handbook; (7) four separate coding guides for test items assessing reading literacy, mathematics literacy, science literacy, financial literacy; and (8) a shortened form called the UH (*une heure* or “1 hour” in French) form for use with special needs students. The UH form was designed with 1 hour’s worth of assessment items administered in a longer assessment session that allows some extra time. 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, 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.

These adaptations were checked and reviewed by the international contractors through an iterative process that occurred from November 2017 to March 2018. After the adaptations had been approved by the international contractors, the final versions of the cognitive instruments and questionnaire were produced by the international contractors and checked a final time before being administered. The coding guides, manuals and handbooks were all adapted, negotiated, reviewed, and verified in a similar manner.

4.3 Preparation of Instruments

The PISA 2018 data collection instruments for the United States were prepared according to the international guidelines, which included adaptation and verification for all cognitive and non-cognitive materials and manuals. The student cognitive and noncognitive instruments were prepared using software provided by the international contractors, and once final, the instruments were loaded onto laptop computers for field deployment. The online teacher and school questionnaires were developed using a questionnaire authoring tool provided by the international contractors and hosted on servers in the United States. Laptop computers were prepared by Westat to be carried into schools and used to administer the assessments.

4.4 Packaging and Distribution of Materials to Field Staff

In each school, up to 52 students may be eligible to be assessed. Each test administrator (TA) was assigned 52 laptop computers, 1 administrative laptop, 2 routers, and 4 USB flash drives. Each assessment machine consisted of a laptop, a mouse, and power cords. Each flash drive contained all forms of the assessment and the student questionnaire. These materials were shipped to test administrators prior to the data collection period. Sampling forms that listed the students and teachers sampled to participate in PISA were distributed to TAs using the secure MyPISA website. Once sampling for a school was complete, the TA was alerted via e-mail to log in and print the school’s forms. These forms included the student login forms that were created for each student and then destroyed after the assessment.

5. Field Operations

Data collection consisted of the following seven major elements:

- An online school questionnaire requiring approximately 45 minutes to complete that was e-mailed to principals prior to data collection (with hardcopy backup);
- Online teacher questionnaires requiring approximately 30 minutes to complete that was e-mailed to selected teachers prior to data collection (with hardcopy backup);
- A core student CBA administered in a 2-hour testing session, with a short break in the middle;
- A computer-based core student questionnaire taking approximately 35 minutes for students to complete;
- A computer-based financial literacy assessment administered with the core student questionnaire taking approximately 10 minutes to complete;
- A computer-based information/communication technology assessment administered with the core student questionnaire taking approximately 15 minutes to complete; and
- A shortened form (UH booklet) of the computer-based assessment administered to students who would otherwise be excluded.

Data collection consisted of a series of communications between Westat and the participating school and students beginning in the summer of 2018 through the assessment period in fall of 2018. An in-person training meeting was held for school coordinators in summer of 2018, followed by preassessment communications regarding student and teacher sampling and assessment preparation. The assessments were conducted between October and December 2018.

PISA assessments were administered by teams of Test Administrators (TAs) and Assistant Administrators (AAs). The study employed 21 TAs and 64 AAs with each TA supported by three AAs in four-person teams. TAs were assigned to one field manager who coordinated and monitored their work. During the testing period, TAs reported to their field manager almost on a daily basis. The AAs assisted in preparing assessment materials, transporting computer equipment, setting up the testing areas, and monitoring students during the testing sessions.

Test administrators were responsible for the following:

- Familiarizing themselves with the test administrator manual, successfully completing TA training, and training their AAs;

- Conducting preassessment calls and visits with school coordinators within 2 weeks of the assessment, follow-up contacts with school coordinators 1–2 days before the assessments to ascertain if there are any problems with student attendance;
- Maintaining the security of the assessment equipment and successfully transporting it to/from the school on assessment day;
- Ensuring that each student received the correct testing materials and administering the test(s) in accordance with the internationally specified procedures, including following the assessment session script;
- Ensuring the correct timing of the testing sessions and recording student participation on the Session Attendance Form;
- Securely transmitting student assessment data to Westat, typically within 24 hours after the completion of the assessment;
- Reporting any issues or problems with the assessment to the field manager immediately after the assessment; and
- Updating the School Control System (SCS) with assessment completion status, final student counts, and changes from the STF.

5.1 Preassessment Contacts with School Staff

School coordinators received a school coordinator handbook to use in preparing for the assessment. A significant portion of this document provided instruction on identifying students with special education needs (SEN) and their required accommodations and determining which students could not participate in the assessment.

Prior to beginning their activities, all school coordinators from participating schools were invited to attend a school coordinator training held on July 20, 2018 in Washington, DC. The training had two purposes: (1) to prepare school coordinators for the activities and tasks to be completed prior to the assessment and (2) to provide information about the overall PISA project through presentations and discussions with other National Project Managers from other PISA education systems, representatives from the U.S. Department of Education, the OECD, and other education experts.

The primary responsibilities of the school coordinator were scheduling the assessment and providing lists of eligible students and teachers to PISA for sampling. The United States sampled the students and then asked that students with special needs be identified from the sampled students listed on the Student Tracking Form (shown in exhibit D-1 in appendix D), thus 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 four times.

1. In August 2018, school coordinators were e-mailed instructions for preparing and submitting their student and teacher lists for sampling on the secure MyPISA website. An electronic student listing form was attached in this e-mail. The e-Filing of student and teacher lists began in August 2018.
2. 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 and a Teacher Tracking Form (TTF), indicating which teachers had been chosen to participate. Once the STF and TTF were complete, an e-mail was sent to school coordinators notifying them that their forms were available for download from the MyPISA website.
3. In mid-August 2018, school coordinators were sent the school coordinator handbook and a cover letter outlining the process for reviewing and updating the STF and TTF and preparing for the preassessment visit with the PISA test administrator (TA).
4. An in-person preassessment visit was scheduled and conducted by the TA staff, typically 2 weeks prior to the scheduled assessment. Following the preassessment contact booklet, TAs reviewed the logistics for assessment day (e.g., room location, school entry procedures), the STF, and anticipated student participation (e.g., known parent or student refusals, SEN exclusions). During the preassessment visit, TAs also asked school coordinators to encourage the selected teachers and principal to complete the teacher and school questionnaires, if not already completed.

During the in-person preassessment visit, the TA reviewed the STF with the school coordinator to update any student statuses for SEN and accommodations and determine if any students needed to be excluded from the PISA assessment. The steps completed during the preassessment visit with the school coordinator were as follows:

- Confirmed demographic data for each sampled student, identified and corrected missing or incorrect information about student names, grade, gender, and birth dates;
- Checked appropriate use of special education needs codes;
- Discussed any students requiring accommodations and recorded accommodation codes on the STF;
- Confirmed student exclusions and recorded reason for exclusion on the STF. For students who were excluded because of SEN status, the test administrator encouraged

the school coordinator to consider including SEN students with PISA-allowed accommodations; and

- Determined if a UH session was needed for students identified by the school coordinator as excluded due to an SEN (UH sessions are expanded on below).

At the end of the preassessment visit the TA and school coordinator had determined which students would be assessed and how many separate sessions would be conducted. After completing the preassessment visit, the TA updated the SCS with the students' SEN and accommodation information. Once these statuses had been completed, the Session Attendance Form (SAF), Student Payment Receipt Form (SPRF) and Student Logon Forms (SLF) were generated. Test administrators were expected to check the MyPISA website to print out the generated forms prior to the school assessment date. In addition to the student-related study forms, the teachers selected to complete the teacher questionnaire were tracked using the TTF. These PISA study forms are presented in appendix D.

Test administrators were instructed to make a courtesy call or e-mail 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 communications were made in fielding questions from school coordinators via the PISA help desk telephone line or e-mail and generally dealt with questions or clarifications about student and teacher sampling. A majority of the student and teacher lists required some level of verification or further communication with the school.

5.2 Data Collection Training

Test Administrator training for data collection was held August 21–23, 2018, at the Westat headquarters in Rockville, Maryland. Twenty-one TAs attended this training. One week before training, each TA received a test administrator manual containing the instructions for preassessment work and for conducting the assessment in schools. TAs were given 6 hours of home-study time to familiarize themselves with the PISA procedures. The TAs also completed a short quiz prior to training designed to take the test administrator through the manual and become familiar with specific information about PISA procedures. The training agenda is provided in appendix E.

Day 1 focused on an introduction and overview of the study, key PISA forms and materials, procedures for handling SEN students and accommodations, the preassessment call and visit with the school coordinator, and the School Control System (SCS). Day 2 focused on preparing materials for the assessment and the assessment day activities, including arriving at the school and setting up the assessment area, administering the CBA, and distributing student incentives. Day 3 focused on the procedures and activities after the assessment, including determining if a makeup session is needed, organizing the school folder, and updating the SCS and transmitting student assessment data. Throughout the training the importance of maintaining the security of equipment and materials and the confidentiality of respondents was emphasized.

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

5.3 Data Collection Approach

The CBA main session administration consisted of three segments. The students were assessed in two cognitive 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 received another longer break and were then administered the student core questionnaire, financial literacy questionnaire, and information communication technology familiarity questionnaire in the third segment. The questionnaires took approximately 60 minutes.

Exhibit 1 provides the timing of the CBA sessions.

Exhibit 1. Timing of PISA 2018 CBA sessions

Activity	CBA timing
Total	Student time: 3 hours, 30 minutes (approximately) Room time: 6 hours (approximately)
Room setup	60 minutes (approximately)
Student logins, passwords, and introduction of the assessment	15 minutes (approximately)
General introduction	5 minutes (approximately)
First 60 minutes of the assessment	60 minutes (exactly)
Short break	Generally, no more than 5 minutes
Introduction to second 60 minutes	5 minutes (approximately)
Second 60 minutes of the assessment	60 minutes (exactly)
Break	30–60 minutes
Student questionnaire	60 minutes (approximately) <ul style="list-style-type: none"> ■ 35 minutes for StQ ■ 10 minutes for FL ■ 15 minutes for ICT
Collecting the materials and ending the session	10 minutes (approximately)
Packing up and resetting room	30–40 minutes (approximately)

NOTE: StQ refers to the student questionnaire, FL refers to the financial literacy questionnaire, and ICT refers to the information communication technology familiarity questionnaire.

Administration of UH Sessions

As mentioned in section 4.2, the United States also offered the shortened UH form to schools administered in a session in which students who would otherwise be excluded were given a shorter version of the assessment. A different session script was used to administer the UH session, and the assessment timing was different from the standard CBA. Students received the same general orientation but were given two 30-minute assessment segments (a total of 1 hour of cognitive items), and these segments could each be extended by an additional 20 minutes. The total assessment time allowed was 1 hour and 40 minutes. Students in the UH session also received an abbreviated version of the student questionnaire, which took approximately 15 minutes. In the U.S. national sample 41 students (0.6 percent) were assessed with the UH option.

Exhibit 2 provides the timing of the CBA UH sessions.

Exhibit 2. Timing of PISA 2018 CBA UH sessions

Activity	Timing
Total	Student time: 2 hours and 15 minutes (approximately, can be extended up to an additional 50 minutes) Room time: 3 hours and 15 minutes (approximately)
Room setup	30 minutes (approximately)
Student logins, passwords, and introduction of the assessment	15 minutes (approximately)
General introduction	5 minutes (approximately)
First 30 minutes of the assessment	30 minutes (can extend by 20 minutes if necessary)
Short break	Generally, no more than 5 minutes
Second 30 minutes of the assessment	30 minutes (can extend by 20 minutes if necessary)
Break	30–60 minutes
Student questionnaire	15 minutes (approximately) (can be extended by 10 minutes if necessary)
Collecting the materials and ending the session	5 minutes (approximately)
Packing up and resetting room	30 minutes (approximately)

5.4 Data Collection Activities

The PISA 2018 data collection was administered between October and December 2018. The initial data collection window of 8 weeks, from October 8 to November 30, was extended by Westat to accommodate schools that were recruited late in the data collection window. Of the 174 assessments completed during the field period, 73 assessments (42 percent) were completed in October, 87 assessments (50 percent) in November, and 14 assessments (8 percent) in December. One school requested a Saturday assessment. All other assessments were conducted during school hours.

Makeup sessions were scheduled if the schools had an absence rate of 10 percent and if three or more students were likely to attend the makeup session. Thirty-five makeup sessions were conducted.

6. Response Rates

PISA has a set of technical standards for school and student participation rates that education systems must meet. These standards were described in chapter 2 and are also listed below for reference. The response rates presented in this chapter reflect the OECD criteria for inclusion and exclusion into the national database and inclusion as a participant in the reporting of results and can be found in the OECD's PISA 2018 Technical Report (2019a). For PISA 2018, a total of 162 schools are included in the U.S. database.

PISA 2018 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 2018 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 responded to a significant portion of the student questionnaire and one cognitive item or half of the cognitive items in his or her assessment form. Data from education systems not meeting this response rate requirement could be excluded from international reports.

The PISA 2018 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 of less than 85 percent. The United States sample required a nonresponse bias analysis. The U.S. nonresponse bias analysis is provided in appendix I.

6.1 Participation Rates for the U.S. Schools, Students, and Teachers

Table 14 reports the raw numbers along with the corresponding unweighted and weighted participation rates. Explanations of these numbers are given for the school, student, and teacher participation rates in sections 6.1 through 6.2.

Table 14. PISA U.S. schools, by response status: 2018

Item	Number	Participation rates	
		Unweighted	Weighted
Schools			
Sampled	257	†	†
Excluded and ineligible	42	†	†
Eligible	215	†	†
Participating	136	63.3	65.0
Substitutes	26	†	†
Participating (all schools)	162	75.3	76.4
Students in participating schools			
Sampled	7,958	†	†
Ineligible	229	†	†
Excluded	252	†	†
Eligible to be assessed	7,477	†	†
Not participating	1,156	†	†
Participating assessed	6,321	84.5	84.7
Teachers in participating schools			
Sampled	3,779	†	†
Ineligible	0	†	†
Excluded	0	†	†
Not participating	745	†	†
Participating	3,034	80.3	†

† Not applicable

NOTE: Detail may not sum to totals because of rounding. Student participation numbers are reported only for schools that are counted as participating in OECD response rates. Weighted rates for teacher participation are not reported because teacher weights were not available.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

6.1.1 School Participation

The school sample contained 257 schools. From the sample, 42 schools were ineligible or excluded, leaving 215 eligible schools. Of the 162 participating schools, 136 schools were original schools and 26 schools were substitutes. For the purposes of calculating response rates, international PISA standards stipulated that schools with a student participation rate between 25 percent and 50 percent were not considered as a participating school. However, data from these schools were included in the database and contributed to the estimates included in the initial PISA international report. Data from schools with a student participation rate of less than 25 percent were not included in the database, and these schools were regarded as nonrespondents. In the United States, two original sample schools with less than 50 percent of students participating had a student response rate of at least 25 percent, so these schools did not contribute to the participation rates shown in table 14, but were included in the database.

6.1.2 Student Participation

For the assessment, a total of 7,958 students were sampled from within participating schools. Of these, 229 students were ineligible due to being withdrawn from the school and another 252 were excluded due to special education needs. Of the 7,477 students eligible to be assessed, 1,156 students did not participate due to parent refusal or student absence, and 6,321 students were assessed for PISA (84.5 percent). Student participation numbers are reported only for schools that are counted as participating in OECD response rates, so students from the two schools mentioned in the previous section are not included.

6.1.3 Teacher Participation

For the PISA 2018 assessment, including teachers of both English/language arts and other subjects, there were 3,779 teachers sampled from within participating schools. Of those, 3,034 teachers responded to the PISA teacher questionnaire. The unweighted teacher response rate was 80.3 percent. Teacher weights were not produced for PISA 2018.

6.2 Excluded and Ineligible Schools and Students

The nationally defined target population is described in chapter 2 of this document and in chapter 4 of *PISA 2018 Technical Report* (OECD 2019b). Exclusions could occur at the school level, with entire schools being excluded, or within schools, with specific students being excluded. These exclusions were often for special education needs or language differences.

6.2.1 School Exclusions and Ineligibility

School-level exclusions were limited due to certain school characteristics that made them difficult to assess such that PISA would be not feasible within the school, such as a school containing only students that would be within-school exclusions. Often small private schools and middle schools become ineligible because they have no PISA-eligible students. Schools can be excluded both from the school frame prior to school sampling and from the sample of schools.

6.2.2 Within-School Exclusions and Ineligibility

Within-school exclusion of students were allowed for the following groups:

- **Functional disability**—Students were excluded if they had a moderate to severe permanent physical disability such that they could not participate with allowable accommodations.
- **Cognitive, behavioral, or emotional disability**—Students were excluded if, the student had a cognitive, behavioral, or emotional disability such that in the opinion of qualified staff, the student could not participate in the PISA testing situation even with allowable accommodations. This includes students who are cognitively, behaviorally, or emotionally unable to follow even the general instructions of the assessment.
- **Limited assessment language experience**—Students were excluded if school coordinators determined that the students met all of the following conditions:
 - not a native speaker in the assessment language;
 - had limited proficiency in the assessment language; and
 - had received less than 1 year of instruction in the assessment language.
- **Home schooled**—Students identified as homeschooled were excluded if they never attended campus, or they were home schooled because of cognitive or physical impairment and attended campus at any time.

Students that were born outside of the specified birth range or who were not in grade 7 or higher were ineligible.

6.2.3 Exclusions and Ineligibility Rates in the United States

The U.S. school sample had a number of schools found to be ineligible but few school-level exclusions. Of the 42 schools identified as ineligible and excluded, a total of 41 schools were ineligible. There were 35 schools ineligible because they had no PISA-eligible students, another six schools were closed. One school was excluded that had only special educational needs students that met one of the categories in the previous section. For students sampled within schools, 229 were ineligible and 252 were excluded.

The population coverage of the U.S. sample was 96 percent of the national desired population (data not shown). The school-level exclusion rate was 0.6 percent and the within-school exclusion rate was 3.2 percent leading to an overall exclusion rate of 3.8 percent, meeting the allowable international standard exclusion rate of 5 percent or less.

6.3 Participation Rates for All Education Systems

The weighted school participation rates before and after school replacement and the number of participating schools after replacement for each participating education system can be found in the technical notes of the U.S. PISA 2018 highlights web report (2019d). These notes also provide information on coverage of the target population, overall exclusion rates, weighted student response rates after school replacement, and the number of participating students after replacement for each participating education system.

7. Data Management

As noted earlier, the PISA 2018 main study CBA included both multiple choice and open-ended constructed response items across the cognitive and the survey sections (both student and teacher). Multiple choice data was machine scored while open-ended items required coding.

Westat was responsible for extracting the student assessment and student questionnaire data from the Student Delivery System (SDS), the tracking data from the KeyQuest system, and the computer-based school and teacher questionnaire data from the Online Survey System (OSS). Westat provided FTE (free text editor) files from the Data Management Expert (DME) to Pearson from Westat through a Secure File Transfer Protocol (SFTP) site. Pearson imported the open-ended constructed student response data files into the Open-Ended Coding System (OECS). After coding was completed, Pearson sent the data back to Westat to be imported into the DME software, completed the required validation checks in the DME, reconciled the data, and prepared data files for delivery to the international core contractors.

7.1 Occupational Coding

On the PISA 2018 assessment, students were asked to respond to questions concerning their parent's occupation and the job the students expect to have when they were older. These responses were then coded using the International Standard Classification of Occupations (ISCO-08) codes. The ISCO-08 codes categorize occupations according to their typical tasks/duties and the skills required to perform these tasks. ISCO-08 has been developed to facilitate international comparison of occupational statistics.

Coding of the approximately 19,800 occupational student responses occurred from December 10, 2018 through January 4, 2019. Upon the completion of the assessment, the student responses were sent from Westat to Pearson via a SFTP site. Pearson used their electronic scoring system to code the students' open-ended responses.

Six coding staff members were employed for coding the occupational student responses with each coder assigned a subset of student responses. Each Pearson coder viewed their assigned responses on a PC screen and entered in the appropriate ISCO-08 occupational code. Sample responses from the field test were used to train the coders. A 25 percent inter-rater reliability was also completed on each set of

occupational responses. In this coding application, 25 percent of the responses in each category (Father, Mother, and Student) were coded by a second person. The following approach was used:

- First level of verification was done blindly
 - Second coder assigned codes without seeing first coder information; and
 - If matched, record is clean and ready for output.
- Second level of verification
 - Used if first level was not a match;
 - Expert coder, then first level of verification; and
 - Agreement with coder or first level or make final decision.

After coding was completed, Pearson’s development staff verified the correct codes were used and all responses were coded.

7.2 Coding Open-Ended Student Responses

The PISA 2018 main study CBA consisted of 148 open-ended constructed response items that require human coding: 85 reading items (46 new/39 trend), 18 math items, and 32 science items. Human coding was also required for 13 financial literacy items for those students sampled for financial literacy.

Training and coding of the items was completed at Pearson’s Mesa, Arizona, facility from January 2 through January 15, 2019, using the international OECS. Approximately 179,000 constructed-response items from the national sample were coded. This included responses selected for multiple-coding and anchor coding responses. Multiple-coding required two coders to code the same response. This was done in order to document the degree to which the responses are being classified into the same categories (i.e., full, partial or no credit) regardless of the coder, and also identified items and coders that had low levels of agreement. The OECS software determined how many of each response and selected the coders. Anchor coding is cross-country coding designed to check consistency across countries and ensure coders were applying the same criteria when coding the items. The process consisted of 30 responses for each coded item presented in English from real students and coded by two coders per country.

Four possible coding designs were available within the OECS. These designs met the psychometric and reliability requirements needed to ensure comparability both within and across countries. Countries were not permitted to deviate from these designs. The United States used the 4501–8000 design, see exhibit 3 below.

Exhibit 3. PISA 2018 OECS coding designs

Number of Assessed Students*	Recommended number of coders:				
	Reading	Science	Math	Financial Literacy	Global Competence
< 4,500	2 – 8	2 – 3	2 – 3	2 – 3	2 – 3
4,501 – 8,000	12 – 16	4 – 5	4 – 5	4 – 5	4 – 5
8,001 – 13,000	16 – 24	6 – 9	6 – 9	6 – 9	6 – 9
< 19,000	24 – 32	10 – 12	10 – 12	10 – 12	10 – 12

* The range of assessed students should be based on the test options: the three main domains (reading, science, and math), the three main domains + financial literacy, the three main domains + global competence, and the three main domains + financial literacy + global competence.

7.2.1 Lead Coder Training

Pearson’s coding task leader attended the 2018 PISA International training in Valletta, Malta, in late January 2018. The focus was to present and model the expected standards for coder training of the new PISA reading and financial literacy items. Presentation of training for trend subjects reading, mathematics, science, and financial literacy were available for countries with new coding leaders.

The goals of the coding process were to

- Code each response at least once;
- Recode some of the responses—Anchor and Multiple coding responses;
- Ensure that coders within countries are applying consistent coding rules; and
- Ensure that coders across countries are applying consistent coding rules.

A summary of the PISA 2018 Coding Approach for CBA countries (i.e., the United States):

- The OECS is in its second year as an online system.
- Coders were placed into teams of a specific size and each assigned a coder number. Once logged into the online scoring system, he or she coded a queue of preassigned responses.
- The OECS organized students' responses per the coding design in a way that was invisible to countries and coders.
- In addition to placing codes for their assigned portion of the current year responses, the file also included 100 within-country monitoring responses for the coders to score.
- Reliability reports using the multi-scored reliability reports were generated by the OECS.
- Cross-country aka Anchor responses were scored and seamless to the U.S. scorers as all 10 responses per item were in English.

After the international training, updated coding guides and workshop materials for the new reading and financial literacy items were provided. Pearson reviewed these and identified any adaptation/translation changes that needed to be made based on changes made to the CBA items. The changes were noted and sent to the international contractor for approval. Coding guides for the trend items (reading, math, science, and financial literacy) were updated based on the approved coding guides from PISA 2015.

The content lead trained six lead coders— four for reading, one for science, and one for math and financial literacy—on the items that each trained to their teams.

The lead coder's responsibilities included training the items, monitoring the quality of individual coders' work, answering coder questions, and escalating content questions/issues to the Content Lead. Any unresolved questions about an item or response content were posted to the PISA Coder Query Service for further review and resolution. The United States used the Coder Query site for any additional questions, comments, and outcomes from other countries that coded their assessment data earlier in the year.

7.2.2 Coder Training/Coding

Pearson hired four financial literacy/mathematics, four science, and 12 reading coders based on the coding design used by the United States. The lead coders guided coders through reading the item's coding guide, carefully pointing out any special rules or interpretations and reiterating any pertinent general

coding guidelines. After discussion of the item and coding guide, the coders independently coded the example responses from the workshop materials. The lead coder reviewed each example and provided the correct code before the coders began coding the U.S. student responses. In other words, the lead coder trained one item at a time, and then, the lead coder and coders coded all responses for that item before moving on to the next item.

7.2.3 Open Ended Coding System (OECS)

A portion of the items were coded multiple times to obtain measures of inter-rater reliability. This was done in order to document the degree to which the responses were being classified into the same categories (i.e., full, partial, or no credit) regardless of the coder, and also to identify items and coders that had low levels of agreement.

The goal in PISA coding is to reach a within-country, inter-rater reliability of 92 percent agreement across all items, and at least 85 percent agreement for each item.

The OECS generated several types of diagnostic reports:

- Summary report. Provided summaries of a range of progress indicators.
 - (i) Overall progress: overall coding is Complete or Not Complete.
 - (ii) Overall progress at the item level: shows how many items are Complete and Incomplete.
 - (iii) Items with deferred responses: shows items where a coder is unable to determine the correct code, and they defer the response to an “expert” coder.
 - (iv) Overall quality of the coding process: average coder reliability is Satisfactory (inter-rater agreement is or above 92 percent)/Not Satisfactory (inter-rater agreement is below 92 percent or above).
 - (v) Number of items that show low inter-rater agreement rates (below 85).
 - (vi) Number of items with unexpected coding category distributions: shows items where the distribution of response categories given by any single coder differs from the average distribution across coders.
- Coder report. Provided a summary of progress by coder, including which coders have uncoded or deferred responses as well as unexpected coding category distribution.

- Proportion agreement. Showed proportion inter-rater agreement. Agreement below 85 percent was investigated to identify whether a systematic pattern of irregularities exists that could be attributable to a particular coder or item.
 - (i) average agreement per item across all coders;
 - (ii) average agreement per coder across all items; and
 - (iii) coder agreement per item (agreement between two coders).
- Coding category distributions. Compared coding distributions across coders for each item and compared counts of the response categories for each item across all coders. The report identified whether the distribution of response categories given by any single coder differed from the average distribution across coders.
- Deferred and uncoded responses. Provided counts of responses that had not been coded during the coding process because they were either deferred or uncoded.

7.3 Data Editing and File Delivery

After all coding was completed, Pearson generated files from the OECS and sent them to Westat via a secure FTP site. Westat imported all data into the DME. This included the student questionnaire and assessment data from the SDS, the tracking data from KeyQuest, the coded open-ended and occupation responses from Pearson, and the OSS teacher and school questionnaires stored on the secure Westat server. Various data reviews were run to ensure that the data corresponded accurately with the DME codebook and that the test forms aligned with the student and teacher tracking data. These reviews included range checks, logic checks, identification checks, and examining frequencies. Westat reviewed and reconciled discrepancies between the assessment/questionnaire data and the tracking data.

After these data files were verified, they were exported and converted to SAS datasets, in preparation for statistical disclosure control (SDC) analyses. Details for the disclosure analyses were described in the Disclosure Analysis Plan (DAP) provided to the PISA NCES Project Officer and the Institute for Education Sciences (IES) Disclosure Review Board (DRB) for review and approval. Based on the results of the disclosure analyses and SDC procedures, the data were perturbed. The disclosure analyses were rerun to ensure no risk of data disclosure, and then, the confidential files were prepared for data delivery. The data step for delivery included converting the perturbed SAS files into Excel formatted files before importing them into the DME system. The DME system generated a data validation review. Any questions that arose during the Westat internal review and the DME system review were responded to by Westat and Pearson.

Final U.S. data was delivered to ETS through a secure FTP site that ETS designed to meet the strict international, as well as NCES, standards for data security.

8. Processing, Scaling, and Weighting

This chapter provides an overview of the data processing and weighting procedures for the U.S. component of PISA 2018. The data processing section begins with a section on the processing performed by the PISA Consortium after the U.S. data are delivered to the Consortium. Following the data processing, an overview of the weighting and scaling details is provided. Significantly more detail on each of these topics may be found in the OECD’s PISA 2018 Technical Report (2019a).

8.1 International Data File Cleaning and Editing

The Educational Testing Service (ETS) applied two procedures to ensure that data cleaning was standardized and validated among all participating education systems for PISA 2018. 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 ETS’s automated and systemic edit checks. National project managers had to ensure that their 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 ETS that were shared with the national data managers. The national data managers reviewed the data and provided ETS 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 ETS and shared with the national project managers for final questionnaire data review. ETS compiled background univariate statistics and preliminary classical and Rasch item analysis for final national data manager review of the assessment items. These data were verified by the national centers to ensure that they linked back correctly to the student IDs.

8.2 Missing Data

The international databases contain five kinds of missing data codes:

1. System missing/Blank—used to indicate that the respondent was not presented the question according to the survey design or ended the questionnaire early and did not see the question.

2. No Response/Omit—used to indicate the respondent had an opportunity to answer the question but did not respond. For derived variables, it is often used as an indicator for all different types of missing data.
3. Invalid—used to indicate that the response was not appropriate or contradicted a prior response (e.g., the response to a question asking for a percentage was greater than 100).
4. Not Applicable—used to indicate in the questionnaire that the question was not asked by design or could not be determined due to a printing problem or torn booklet. In the cognitive data, it is used to indicate that the question was dropped/deleted during item calibration and not used during scaling.
5. Valid skip—used in the questionnaire data to indicate that the question was not answered because a response to an earlier question directed the respondent to skip the question.
6. Not Reached—used in the cognitive scored variables to indicate that a student was unlikely to have seen the question and the response should be treated as such.

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 2018 was carried out by the PISA consortium.

The internationally defined weighting specifications for PISA 2018 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 (public/private) 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. The

school-level trimming adjustment was applied to schools that turned out to have a much larger number of eligible students than was expected at the time of school sampling. Student weights that were unusually large compared to those of other students within the same original explicit stratum were trimmed to four times the median weight for that explicit stratum. In most countries, only one or two schools' weights were trimmed. All PISA analyses were conducted using these adjusted sampling weights.

8.4 Scaling of Student Test Data

For PISA 2018, the CBA without global competence consisted of 36 forms for reading, mathematics, and science items for the United States. In addition, because the United States participated in the optional financial literacy assessment, 12 additional forms were used for financial literacy. Detailed descriptions of the PISA 2018 assessment design are included in chapter 2 of the international PISA technical report (OECD 2019b).

Scaling techniques were used to establish a common scale for all students. Item response theory (IRT) was used to estimate scores for reading, mathematics, science literacy, and financial literacy. The reading literacy subscales—text source (single source or multiple source) and process (locating information, understanding, and evaluating and reflecting)—were determined using IRT techniques.⁷

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. Detailed descriptions of the scaling techniques applied to the PISA 2018 data can be found in chapters 9 and 12 of the international PISA Technical Report (OECD 2019b).

⁷ The combined reading scale and the reading subscales are each computed separately through item response theory (IRT) models. Therefore, the combined reading scale score is not the average of the reading subscale scores.

9. The PISA 2018 Data

The PISA 2018 data for the United States exists in the following three forms:

1. **U.S. international data files**, which are part of the PISA international database and allow for comparisons of the United States with any of the other education systems participating in PISA in virtually all respects. These files are available from the OECD at <https://www.oecd.org/pisa/data/2018database/>. Note that these data files do not include the variables from U.S.-specific adaptations or additions made to the U.S. versions of the questionnaires, nor do they include data for global competence.
2. **U.S. national public-use data files**, which are considered add-on files and can only be used once merged with the international files. The U.S. national public-use files include U.S.-specific variables that are not part of the U.S. international data files. These U.S.-specific variables based on adapted or added questions are listed in table 14 in section 9.3. The U.S. national public-use data files are available from the National Center for Education Statistics by download from the PISA NCES “Publications and Products” webpage at <https://nces.ed.gov/pubsearch/getpubcats.asp?sid=098https://nces.ed.gov/pubsearch/getpubcats.asp?sid=118>. Users may search for specific items and variables by using the Data Inventory at <https://datainventory.ed.gov/>.

Please note that the U.S. national public-use data files do not contain weight variables, and therefore must first be merged with the U.S. international files before any analyses can be conducted. Information on merging the files is available in chapter 10, section 10.3. Because the U.S. national public-use data files are considered supplementary, the most comprehensive and detailed references for the PISA 2018 data are the *PISA 2018 Technical Report* (OECD 2019b). Most of the information provided in this chapter refers primarily to the U.S.-specific variables.

3. **U.S. national restricted-use data files**, which can only be obtained by completing a restricted-use license agreement with NCES. Restricted-use data files are provided only on CD. Among the additional variables included on the U.S. restricted-use files are *NCESSCH* (the NCES unique public school identification code) and *PPIN* (the private school’s unique identification number). These two variables allow users with restricted-use licenses to link PISA school ID numbers to the school ID numbers as they appear in the publicly available Common Core of Data (CCD) or the Private School Universe Survey (PSS). Because these data can reveal the identities of participating U.S. schools, the U.S. national restricted-use data files are only made available to those who obtain a NCES restricted-use data license. Directions on how to obtain the license can be found at <https://nces.ed.gov/pubsearch/licenses.asp>.

Each of these data sources are described in more detail in the following sections.

9.1 National and International Variables

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 well-being (WB) questionnaire, and the education career (EC) questionnaire. Several variables included in the international version of the main student questionnaire were related to global competence. The United States did not administer the global competence assessment and thus did not include these items in the U.S. student questionnaire. The global competence questionnaire module is described in the *PISA 2018 Assessment and Analytical Framework* (OECD 2019a).

9.2 PISA 2018 U.S. International Datasets

Data from PISA 2018 for all countries can be obtained from the OECD website at <https://www.oecd.org/pisa/data>. Additional details on the international database, appropriate analysis using these data files, and detailed documentation on all aspects of the data collection, processing, and production of the PISA data files, are available in the *PISA 2018 Technical Report* (OECD 2019b).

Users can download entire data files or choose only selected variables and run simple queries using the PISA Data Explorer. Files available for download include the following (note that the parent questionnaire, the information and communication technology familiarity questionnaire, and the education career questionnaire were not administered in the United States):

■ Questionnaires

— Student questionnaires

- Student questionnaire;
- Student questionnaire (*une heure* version);
- Financial literacy questionnaire (optional, administered in the United States);
- Information and communication technology familiarity (ICT) questionnaire (optional, administered in the United States);
- Education career (EC) questionnaire (optional, not administered in the United States); and

- Well-being (WB) questionnaire optional, not administered in the United States).
 - School questionnaire;
 - Teacher questionnaire for teachers of the test language (optional, administered in the United States);
 - Teacher questionnaire for other teachers (optional, administered in the United States); and
 - Parent questionnaire (optional, not administered in the United States).
- **Codebooks**
- Codebook for student questionnaire data file;
 - Codebook for student financial literacy questionnaire;
 - Codebook for school questionnaire data file;
 - Codebook for teacher questionnaire;
 - Codebook for parent questionnaire data file; and
 - Codebook for scored and raw cognitive (assessment) item response data files.
- **SAS dataset files** *Note that some of these files are very large*
- SAS dataset of student questionnaire data for main sample;
 - SAS dataset of student questionnaire data for financial literacy assessment;
 - SAS dataset of school questionnaire data;
 - SAS dataset of teacher questionnaire data;
 - SAS dataset of scored and raw cognitive (assessment) item response data for main assessment;
 - SAS dataset of scored and raw cognitive (assessment) item response data for financial literacy assessment;
 - Additional SAS data files for Vietnam and Moscow City; and
 - SAS dataset of questionnaire timing data.
- **SPSS dataset files** *Note that some of these files are very large*
- SPSS dataset of student questionnaire data file for main sample;
 - SPSS dataset of student questionnaire data file for financial literacy;

- SPSS dataset of school questionnaire data file;
 - SPSS dataset of teacher questionnaire data file;
 - SPSS dataset of scored and raw cognitive (assessment) item response data file for main sample;
 - SPSS dataset of scored and raw cognitive (assessment) item response data file for financial literacy;
 - Additional SPSS data files for Vietnam and Moscow City; and
 - SPSS dataset of questionnaire timing data.
- **Compendia.** The compendia provide percentages for both cognitive and questionnaire items for the main and financial literacy assessments. The performance means per category are also provided. All statistics are calculated using weighted data, with their corresponding standard errors taking into account sampling and measurement uncertainty. The OECD average is created from the 37 current OECD member countries.
- Compendium for the student questionnaire;
 - Compendium for the school questionnaire;
 - Compendium for the teacher questionnaire;
 - Compendium for the parent questionnaire;
 - Compendium for the ICT and EC questionnaire; and
 - Compendium for the scored cognitive item responses.

9.3 U.S. National Data Files

The files on the international website contain data from all countries, including the United States. The NCES files include only national variables not included in the international file. Data collected in the United States for PISA 2018 can be downloaded from the international site. Data for the variables only administered in the United States can be downloaded from the NCES website at <https://nces.ed.gov/surveys/pisa/datafiles.asp>. These data are intended to be merged with the international data to create a complete data set with all variables.

The “U.S. National Data Files” contains student, teacher, and school data (for the United States only) and are described below. There is a description of the supplementary files, which are also included with the “U.S. National Data Files.” Table 15 reports the variables included in the U.S. national student, school,

and teacher datasets. Appendix F lists those student and school questionnaire variables not administered on the United States.

U.S. public-use data

■ **Student data**

- The data are contained in ASCII file `pisa18_us_stud_pud.dat`. This file contains questionnaire items and derived variable and index scores based on the student questionnaire unique to the United States, not included in the international data release. There are 4,838 cases in this file. Since the data are hierarchical (students are clustered within schools), each student record contains identification variables that enable the user to merge the school data with the student data, using the variable `CNTSCHID`.
- An SPSS syntax file, `pisa18_us_stud_pud.sps`, to read the ASCII file into SPSS.
- A SAS syntax file, `pisa18_us_stud_pud.sas`, to read the ASCII file into SAS.
- A codebook file, `pisa18_us_stud_pud.html`, that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

■ **School data**

- The data are contained in ASCII file `pisa18_us_schl_pud.dat`. This file contains items from the school questionnaire, derived variables, and index scores based on the school questionnaire unique to the United States and not found in the international data release. There are 164 cases in this file. The variable `CNTSCHID` can be used to merge school data with the student data.
- An SPSS syntax file, `pisa18_us_schl_pud.sps`, to read the ASCII file into SPSS.
- A SAS syntax file, `pisa18_us_schl_pud.sas`, to read the ASCII file into SAS.
- A codebook file, `pisa18_us_schl_pud.html`, that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

■ **Teacher data**

- The data are contained in ASCII file `pisa18_us_tchr_pud.dat`. This file contains items from the teacher questionnaire, derived variables, and index scores based on the teacher questionnaire unique to the United States and not found in the international data release. There are 3,526 cases in this file. As no teacher weights were developed for the teacher questionnaire data, the teacher data should be merged with the school data to conduct analyses. The variable `CNTSCHID` can be used to merge the teacher data with the school data.

- An SPSS syntax file, `pisa18_us_tchr_pud.sps`, to read the ASCII file into SPSS.
- A SAS syntax file, `pisa_us_tchr_pud.sas`, to read the ASCII file into SAS.
- A codebook file, `pisa18_us_tchr_pud.html`, that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

■ **Other supplementary files included with the U.S. public-use datasets**

- A Readme document that provides the files associated with the school, student and teacher public-use data set.
- A Quick Guide that lists the public-use data file contents, how to create working files, and a data-use agreement.
- Illustrative code to merge data sets for SPSS and SAS.

U.S. restricted-use data

■ **Student data**

- The data are contained in ASCII file `pisa18_us_stud_rud.dat`. This file contains questionnaire items and derived variable and index scores based on the student questionnaire unique to the United States, not included in the international data release. There are 4,838 cases in this file. Since the data are hierarchical (students are clustered within schools), each student record contains identification variables that enable the user to merge the school data with the student data, using the variable `CNTSCHID`.
- An SPSS syntax file, `pisa18_us_stud_rud.sps`, to read the ASCII file into SPSS.
- A SAS syntax file, `pisa18_us_stud_rud.sas`, to read the ASCII file into SAS.
- A codebook file, `pisa18_us_stud_rud.html`, that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

■ **School data**

- The data are contained in ASCII file `pisa18_us_schl_rud.dat`. This file contains items from the school questionnaire, derived variables, and index scores based on the school questionnaire unique to the United States and not found in the international data release. There are 164 cases in this file. The variable `CNTSCHID` can be used to merge school data with the student data.
- An SPSS syntax file, `pisa18_us_schl_rud.sps`, to read the ASCII file into SPSS.
- A SAS syntax file, `pisa18_us_schl_rud.sas`, to read the ASCII file into SAS.

- A codebook file, `pisa18_us_schl_rud.html`, that includes variable names, variable location and format information, variable labels, question text, values, and frequencies.

■ **Other supplementary files included with the U.S. restricted-use datasets**

- A Readme document that provides the files associated with the school and student restricted-use data set.
- A Quick Guide that lists the restricted-use data file contents, how to create working files, and a data-use agreement.
- Illustrative code to merge data sets for SPSS and SAS.

Table 15. Variables used only in the United States: 2018

Variable name	Questionnaire item wording
Student questionnaire	
RACETHC	Which of these categories best describes your race? (Derived, collapsed)
RACETH	Which of these categories best describes your race? (Derived)
ST001C01TA	What grade are you in?
ST005C01TA	What is the highest level of schooling (not including college) completed by your mother?
ST007C01TA	What is the highest level of schooling (not including college) completed by your father?
ST011C17TA	Which of the following are in your home? A guest room
ST011C18TA	Which of the following are in your home? A high-speed internet connection
ST011C19TA	Which of the following are in your home? A musical instrument
ST019AC01T	In what country were you and your parents born? You
ST019BC01T	In what country were you and your parents born? Mother
ST019CC01T	In what country were you and your parents born? Father
ST022C01TA	What language do you speak at home most of the time?
ST127A01TA	Have you ever repeated a grade? In kindergarten
ST127C01TA	Have you ever repeated a grade? In grades 1–6
ST127C02TA	Have you ever repeated a grade? In grades 7–9
ST127C03TA	Have you ever repeated a grade? In grades 10–12
ST225C01HA	Which of the following do you expect to complete? Less than high school
ST225C02HA	Which of the following do you expect to complete? High school (high school diploma or GED)
ST225C03HA	Which of the following do you expect to complete? Vocational or technical certificate (such as cosmetology or auto mechanics)
ST225C04HA	Which of the following do you expect to complete? Associate's degree (2-year degree from a community college)
ST225C05HA	Which of the following do you expect to complete? Bachelor's degree (4-year college degree)
ST225C06HA	Which of the following do you expect to complete? Master's degree or doctoral degree or professional degree (e.g., J.D. or M.D.)

See note at end of table.

Table 15. Variables used only in the United States: 2018—Continued

Variable name	Questionnaire item wording
School questionnaire	
NCESSCH	Common Core of Data (CCD) unique school identification number
PPIN	Private School Survey (PSS) school identification number
FRPL	Approximately what percentage of students at this school last year were eligible for free or reduced-price lunches through the National School Lunch Program? (Derived from SC801C01HA)
SC801C01HA	Approximately what percentage of students at this school last year were eligible for free or reduced-price lunches through the National School Lunch Program?
Teacher questionnaire	
TC186C01HA	In what country were you born?
TC800C01HA	What is the highest level of formal education you have completed?

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

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 questions ST005Q01TA and ST007Q01TA (“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 (ST005C01TA_US and ST007C01TA_US) have four valid responses rather than five and have value labels different from the international versions.
- The international questions ST225Q01HA-ST225Q06HA (“Which of the following do you expect to complete?”) included six options, one of which (ISCED level 3B or C) was not relevant in the United States, and one of which (ISCED level 5A or 6) was split into two in the United States. Thus the U.S. version of these variables (ST225C01HA_US-ST225C06HA_US) has six valid responses that have value responses that have value labels different from the international versions.
- The international questions ST127Q01TA-ST127Q03TA (Have you ever repeated a grade?) included three options (ISCED level 1, 2, or 3). A category for Kindergarten (ISCED level 0) was added to the U.S. version of this variable (ST127A01TA_US).

9.4 Variable Names

The variable names created by the SPSS and SAS syntax files are those used in international datasets. 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 next to each question on the questionnaires. The U.S. PISA questionnaires are located at:

<https://nces.ed.gov/surveys/pisa/questionnaire.asp>.

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 F, which is summarized from the second volume of the international report (OECD 2019a). A more complete explanation of these variables will be provided in the international *PISA 2018 Technical Report* (OECD 2019b).

9.6 U.S. National Restricted-Use Variables

The school and student restricted-use datasets contain a small set of variables that allow users with restricted-use licenses to link PISA 2018 data to school data from the Common Core of Data (CCD) and the Private School Survey (PSS), as well as providing other variables not included in the public-use file.

The NCESSCH (the NCES unique public school identification code) from the PISA file is used to merge with the NCESSCH school code from the CCD file. The PPIN (the private school's unique identification number) from the PISA file is used to merge with the PPIN from the PSS file. The PISA school frame was constructed using the 2015–16 CCD and the 2015–16 PSS, the most current data at the time of the PISA frame construction.

The following additional variables are also included in the school restricted user data:

- CNT—Country code 3-character;
- CNTRYID—Country identifier;

- CNTSCHID—International School ID; and
- SC801C01HA—Percentage of students eligible for free- or reduced-price lunches.

The following additional variables are included in the student restricted-user data:

- CNT—Country code 3-character;
- CNTRYID—Country identifier;
- CNTSCHID—International School ID; and
- RACETH—National derived race/ethnicity (derived).

10. Using the PISA 2018 Data Files

The PISA 2018 data consists of three independent data sets—school data, student data, and teacher data. The school and student data sets have their own set of weights. The teacher data does not include weight variables. In using these data sets, there are some considerations that need to be taken to ensure proper file creation and analysis. A detailed guide and examples of possible analyses are provided in the *PISA Data Analysis Manual: SPSS, Second Edition* (OECD 2009).

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 simple 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. These are described in detail in the *PISA Data Analysis Manual: SPSS, Second Edition* (OECD 2009).

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.⁸ For analysis purposes, PISA datasets include sets of 10 plausible values for each of the PISA 2018 scales. Thus, if any analysis were to be undertaken with any of the PISA scales, it should be undertaken 10 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 10 sets of results. A special provision also needs to be made in the estimation of the standard errors.

A number of free tools are available that have been developed for this purpose to perform these analyses and are described below.

International Association for the Evaluation of Educational Achievement (IEA)’s International Database (IDB) Analyzer. The IDB Analyzer is available at www.iea.nl/data. The IDB Analyzer can be used to combine and analyze data from PISA. The analyzer is a downloadable tool that creates SPSS or SAS syntax that can be used to combine files from across different countries and levels (student, teacher, school, etc.) and perform analysis. It generates SPSS or SAS syntax that takes into account information from the sampling design in the computation of sampling variance, and handles the plausible values. The code generated by the IEA IDB Analyzer enables the user to compute descriptive statistics and conduct statistical hypothesis testing among groups in the population without having to write any programming code. The following analyses can be performed within the analysis module:

- Percentages and means;
- Linear regression;
- Logistic regression;
- Calculation of benchmarks;
- Correlations;
- Percentiles; and
- Differences by performance groups.

PISA Data Explorer (PDX): The PDX is a web-based application that allows the user to query an OECD- hosted secure PISA International Database via a web browser. In addition to the PISA 2018 micro-data (or unit-level data) the PDX database contains micro-data from previous PISA cycles released

⁸ For theoretical and empirical justification of the procedures used, see Mislevy (1988). For more information about the methodology used in PISA, see the *PISA 2018 Technical Report* (OECD 2019c).

in public use files. The PDX is available on the OECD website (<https://www.oecd.org/pisa/data/>). Using the PDX, the user can navigate, analyze, and produce report-quality tables and graphics.

Like the IDB Analyzer, the PDX can be used to compute a diverse range of statistics including, but not limited to the following:

- Means;
- Standard deviations;
- Standard errors;
- Percentages by subgroup;
- Percentages by performance levels; and
- Percentiles.

All statistics are computed taking into account the sampling and assessment design. In addition, the PDX has the capability of conducting significance testing between statistics from different groups and displaying the results in graphical form.

NCES International Data Explorer (IDE): The IDE is another tool available to researchers for summarizing and describing the PISA data. The IDE produces tabular reports and, like the IDB Analyzer and PDX, performs statistical hypothesis testing and significance tests, gap analysis, and simple linear regression. The IDE is available at <https://nces.ed.gov/surveys/international/ide>.

EdSurvey: EdSurvey is an R statistical package designed for the analysis of national and international education data (including PISA) from the NCES. The steps needed to install and load EdSurvey are shown below. For additional information on EdSurvey, visit: <https://www.air.org/project/nces-data-r-project-edsurvey>.

The steps needed to install and load EdSurvey are as follows:

1. Inside R, run the following command to install EdSurvey as well as its package dependencies: `install.packages("EdSurvey")`
2. Once the package is successfully installed, EdSurvey can be loaded with the following command: `library(EdSurvey)`

10.2 Nonresponse Bias

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.

Detailed analyses were conducted to determine if nonresponse at the school level resulted in apparent biases in the results. The results indicated that school nonresponse to the study resulted in limited apparent bias of results. There was some potential for nonresponse bias in the PISA participating original sample, the use of substitute schools did not reduce the potential for bias substantially, and there was little evidence of resulting potential bias after the application of school nonresponse adjustments in the available frame variables and correlated variables. (The full nonresponse bias analysis report is included in appendix I).

10.3 Merging School, Student, and Teacher Data

The PISA sample was designed to yield a nationally representative sample of 15-year-old students enrolled in schools; the school sample was designed to optimize the selection of these students. For meaningful and valid analyses, it is recommended that the school data be disaggregated across students and school attributes be treated as “student characteristics.” This disaggregation can be accomplished by merging the school-level data to the student file using CNTSCHID and the resulting file analyzed at the student level using the replicate weights (W_FSTURWT1– W_FSTURWT80).

Merge code is included with the PISA 2018 U.S. data files and provides aid in performing three specific merges of the PISA 2018 data:

1. U.S. national public-use data to international public-use data (i.e., school to school, student to student, teacher to teacher);
2. U.S. national restricted-use data to international public-use data; and
3. U.S. national public-use school data to U.S. national public-use student data and U.S. national public-use school data to U.S. national public-use teacher data.

When conducting specialized analysis solely on the school level (e.g., computing descriptive information for school variables, teacher variables, or connecting information from the teacher questionnaire with information from the school questionnaire), use school weights provided in the school data file.

Treatment of Teacher Data in PISA 2018

In PISA 2018, teacher variables are treated as descriptors of the school-level learning environment. Therefore, as a rule, teacher variables should be aggregated at the school level and treated as school-level measures. Aggregated variables need to be matched with the school-file based variables on the school ID variable (CNTSCHID).

Please note that teacher variables may represent either (1) the population of English/Language art teachers eligible for teaching 15-year-old students, or (2) the population of non-ELA teachers eligible for teaching 15-year-old students. Teachers are not linked to individual students and are not treated or analyzed as a representative sample of teachers.

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Appendix A. PISA 2018 School Recruiting Materials

Exhibit A-1. State PISA 2018 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]:

The United States is participating in the 2018 Program for International Student Assessment (PISA). As the largest international education study in the world, PISA measures the reading, mathematics, and science literacy of students nearing the end of compulsory education. PISA results are used by researchers and policymakers to chart national progress against international standards and the educational progress of our global economic peers and competitors. The United States and more than 70 other countries and education systems will participate in the next round of PISA. *Some schools in your state have been randomly selected to participate in PISA in fall 2018, and I am writing to ask your agency to support the participation of those schools.*

PISA provides comparative information on the performance of U.S. students in reading, mathematics, and science with their peers in other countries. In 2018, PISA will also include an assessment of students' financial literacy.

PISA is described in more detail in the enclosed materials. PISA is conducted in the United States by the National Center for Education Statistics (NCES) in the U.S. Department of Education and is administered by Westat, a firm in Rockville, Maryland. The U.S. Office of Management and Budget (OMB) has approved the data collection under OMB# 1850-0755. For information on the confidentiality of the data collected, please see the enclosed FAQ. While participation in this study is voluntary, we ask your agency to support participation in your state so that the United States has a sample of schools that is representative of the entire country.

Within the next few weeks, a representative of Westat will contact sampled school districts and schools to discuss participating in PISA. We are in contact with your state assessment director and NAEP State Coordinator to try to ensure that we are not conflicting with other state efforts and to help districts and schools understand how PISA fits in with other data collections conducted by NCES. The administration of PISA is also coordinated with NAEP and other NCES data collection activities to minimize burden and duplication. In the meantime, if you have questions about the study, please do not hesitate to call David Kastberg at 1-301-294-3811 or send an email to PISAHELP@westat.com. You may also get more information by contacting Patrick Gonzales at NCES at 415-920-9229 or patrick.gonzales@ed.gov, or by visiting the PISA website at <http://nces.ed.gov/surveys/pisa>.

Thank you for your time and support.

Sincerely,

Peggy Carr, Ph.D.

Acting Commissioner

cc: [State assessment coordinator name]

Enclosures

The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts the Program for International Student Assessment (PISA) in the United States as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Exhibit A-2. School district PISA 2018 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]:

The United States is participating in the 2018 Program for International Student Assessment (PISA). As the largest international education study in the world, PISA measures the reading, mathematics, and science literacy of students nearing the end of compulsory education. The United States and more than 70 other countries and education systems will participate in the next round of data collection. PISA results are used by researchers and policymakers to chart national progress against international standards and the educational progress of our global economic peers and competitors. *Some schools in your district have been randomly selected to participate in PISA in fall 2018, and I am writing to ask your agency to support the participation of those schools.*

PISA provides comparative information on the performance of U.S. students in reading, mathematics, and science with their peers in other countries. In 2018, PISA will also include an assessment of students' financial literacy.

Schools participating in PISA will receive \$250, and each school's PISA school coordinator (a school staff person designated to liaise with PISA staff) will receive \$200 as a thank you for the coordinator's time and effort. Selected teachers will receive \$25 for completing a questionnaire. Each student who participates will be eligible to receive \$25 and a volunteer service certificate of 4 hours from the U.S. Department of Education.

PISA is conducted in the United States by the National Center for Education Statistics (NCES) in the U.S. Department of Education and is administered by Westat, a firm in Rockville, Maryland. The U.S. Office of Management and Budget has approved the data collection under OMB# 1850-0755. For information on the confidentiality of the data collected, please see the enclosed FAQ. While participation in this study is voluntary, we ask your agency to support participation in your district so that the United States has a sample of schools that is representative of the entire country.

Within the next few days, a representative of Westat will contact the following school(s) in your district that have been selected for the main study data collection: [LIST SAMPLED SCHOOLS HERE...]. Please include the PISA assessment window (October 1 to November 23, 2018) on your district test calendar.

If you have any questions, please do not hesitate to call 1-888-638-2597 or send an email to PISAHHELP@westat.com. You may also get more information about this study by contacting Patrick Gonzales at NCES at 415-920-9229 or patrick.gonzales@ed.gov, or by visiting the PISA website at <https://nces.ed.gov/surveys/pisa>.

Thank you for your time and support.

Sincerely,

Peggy Carr, Ph.D.
Acting Commissioner

Enclosures: PISA folder with Brochure, FAQs
CC: Assessment Director

The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts the Program for International Student Assessment (PISA) in the United States as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Exhibit A-3. Public school principal 2018 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]:

The United States is participating in the 2018 Program for International Student Assessment (PISA). As the largest international education study in the world, PISA measures the reading, mathematics, and science literacy of students nearing the end of compulsory education. The United States and more than 70 other countries and education systems will participate in the next round. PISA results are used by researchers and policymakers to chart national progress against international standards and the educational progress of our global economic peers and competitors. *Your school is one of about 250 across the United States that has been randomly selected to take part in the PISA in fall 2018.*

Beyond providing comparative information on the performance of students, PISA fosters international engagement across education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. In addition to reading, mathematics, and science literacy, PISA 2018 includes an assessment of students' financial literacy, and will provide a range of contextual data that offer insight into students' school and home environments, socioeconomic advantages and disadvantages, sense of well-being, and use of time outside of school.

Schools participating in PISA will receive \$250, and each school's PISA school coordinator (a school staff person designated to liaise with PISA staff) will receive \$200 as a thank you for their time and effort. Selected teachers will receive \$25 for completing a questionnaire. Each student who participates will be eligible to receive \$25 and a volunteer service certificate of 4 hours from the U.S. Department of Education. NCES will also sponsor a delegate from your school to attend a PISA training workshop in Washington, D.C. during the summer of 2018. In addition, when the national results of the 2018 assessment are released, your school may also receive a school-level report highlighting the performance of students in your school compared to their peers in other schools like yours, U.S. schools, and high-performing OECD countries (pending sample size and response rate requirements).

The PISA assessment experience and the benefits of participating are described in more detail in the enclosed materials, which I invite you to review. PISA is conducted in the United States by the National Center for Education Statistics (NCES) in the U.S. Department of Education and is administered by Westat, a firm in Rockville, Maryland. The U.S. Office of Management and Budget (OMB) has approved the data collection under OMB# 1850-0755. For information on the confidentiality of the data collected, please see the enclosed FAQ. While participation in this study is voluntary, each school plays an important role in ensuring that the U.S. sample is representative of the knowledge and skills of *all* students in our country's education system.

The PISA assessment window is from October 1 through November 23, 2018. Within the next few days, a representative of Westat will contact you to discuss your school's participation. 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 Patrick Gonzales at NCES at 415-920-9229 or patrick.gonzales@ed.gov, or by visiting the PISA website at <https://nces.ed.gov/surveys/pisa>.

Your school's participation in PISA 2018 is vital to the overall success of the study in the United States. Thank you for your time and for supporting this important international education study.

Sincerely,
Peggy Carr, Ph.D.
Acting Commissioner
Enclosures

The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts the Program for International Student Assessment (PISA) in the United States as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Exhibit A-4. Private school principal 2018 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]:

The United States is participating in the 2018 Program for International Student Assessment (PISA). As the largest international education study in the world, PISA measures the reading, mathematics, and science literacy of students nearing the end of compulsory education. The United States and more than 70 other countries and education systems will participate in the next round. PISA results are used by researchers and policymakers to chart national progress against international standards and the educational progress of our global economic peers and competitors. *Your school is one of about 250 across the United States that has been randomly selected to take part in the PISA in fall 2018.*

Beyond providing comparative information on the performance of students, PISA fosters international engagement across education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. In addition to reading, mathematics, and science literacy, PISA 2018 includes an assessment of students' financial literacy, and will provide a range of contextual data that offer insight into students' school and home environments, socioeconomic advantages and disadvantages, sense of well-being, and use of time outside of school.

Schools participating in PISA will receive \$250, and each school's PISA school coordinator (a school staff person designated to liaise with PISA staff) will receive \$200 as a thank you for their time and effort. Selected teachers will receive \$25 for completing a questionnaire. Each student who participates will be eligible to receive \$25 and a volunteer service certificate of 4 hours from the U.S. Department of Education. NCES will also sponsor a delegate from your school to attend a PISA training workshop in Washington, D.C. during the summer of 2018. In addition, when the national results of the 2018 assessment are released, your school may also receive a school-level report highlighting the performance of students in your school compared to their peers in other private schools, U.S. schools, and high-performing OECD countries (pending sample size and response rate requirements).

The PISA assessment experience and the benefits of participating are described in more detail in the enclosed materials, which I invite you to review. PISA is conducted in the United States by the National Center for Education Statistics (NCES) in the U.S. Department of Education and is administered by Westat, a firm in Rockville, Maryland. The U.S. Office of Management and Budget (OMB) has approved the data collection under OMB# 1850-0755. For information on the confidentiality of the data collected, please see the enclosed FAQ. While participation in this study is voluntary, each school plays an important role in ensuring that the U.S. sample is representative of the knowledge and skills of *all* students in our country's education system.

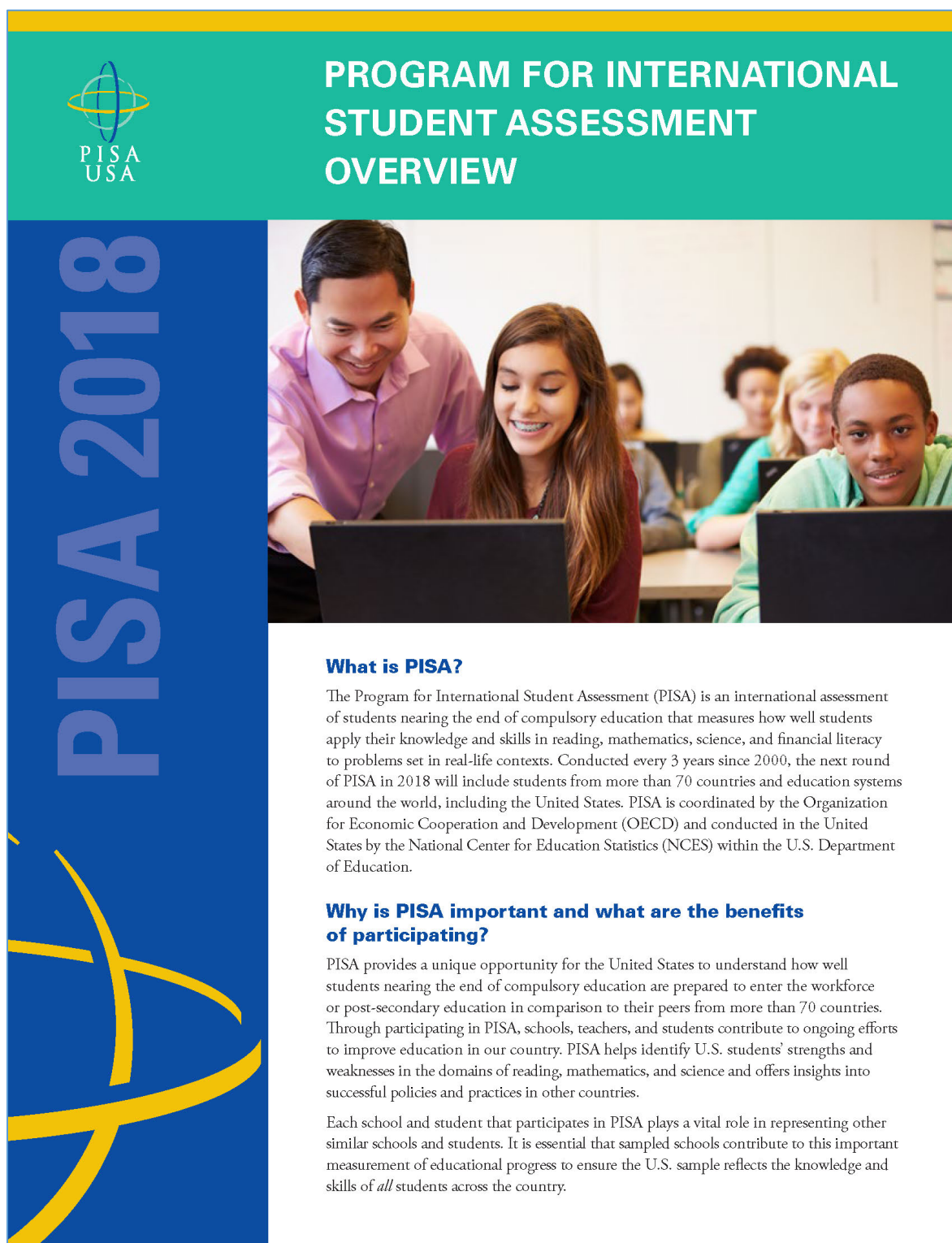
The PISA assessment window is from October 1 through November 23, 2018. Within the next few days, a representative of Westat will contact you to discuss your school's participation. If you have any questions, please do not hesitate to call 1-888-638-2597 or send an email to PISAHELP@westat.com. You may also get more information about this study by contacting Patrick Gonzales at NCES at 415-920-9229 or patrick.gonzales@ed.gov, or by visiting the PISA website at <https://nces.ed.gov/surveys/pisa>.

Your school's participation in PISA 2018 is vital to the overall success of the study in the United States. Thank you for your time and for supporting this important international education study.

Sincerely,
Peggy Carr, Ph.D.
Acting Commissioner
Enclosures

The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts the Program for International Student Assessment (PISA) in the United States as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Exhibit A-5. PISA 2018 study brochure and schedule of activities

The image shows the cover of the PISA 2018 study brochure. The top section has a teal background with the PISA USA logo on the left and the title 'PROGRAM FOR INTERNATIONAL STUDENT ASSESSMENT OVERVIEW' in white. Below the title is a photograph of a teacher and students working on laptops. The left side of the brochure features a blue vertical band with 'PISA 2018' written vertically in large white letters, and a yellow graphic at the bottom. The right side contains text about PISA and its benefits.

PROGRAM FOR INTERNATIONAL STUDENT ASSESSMENT OVERVIEW

PISA 2018

What is PISA?


The Program for International Student Assessment (PISA) is an international assessment of students nearing the end of compulsory education that measures how well students apply their knowledge and skills in reading, mathematics, science, and financial literacy to problems set in real-life contexts. Conducted every 3 years since 2000, the next round of PISA in 2018 will include students from more than 70 countries and education systems around the world, including the United States. PISA is coordinated by the Organization for Economic Cooperation and Development (OECD) and conducted in the United States by the National Center for Education Statistics (NCES) within the U.S. Department of Education.


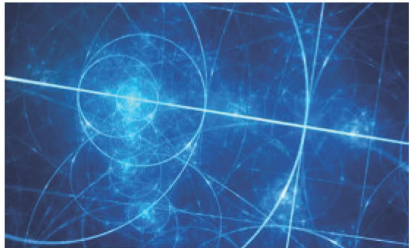
Why is PISA important and what are the benefits of participating?

PISA provides a unique opportunity for the United States to understand how well students nearing the end of compulsory education are prepared to enter the workforce or post-secondary education in comparison to their peers from more than 70 countries. Through participating in PISA, schools, teachers, and students contribute to ongoing efforts to improve education in our country. PISA helps identify U.S. students' strengths and weaknesses in the domains of reading, mathematics, and science and offers insights into successful policies and practices in other countries.

Each school and student that participates in PISA plays a vital role in representing other similar schools and students. It is essential that sampled schools contribute to this important measurement of educational progress to ensure the U.S. sample reflects the knowledge and skills of *all* students across the country.

Exhibit A-5. PISA 2018 study brochure and schedule of activities—Continued





In addition to receiving a U.S. national report with PISA 2018 results, schools may also receive a school-level report (pending sample size and response rate requirements). The school report, provided only to your school, presents comparisons of your school's average scores with the average scores of participating education systems, including the United States, and can serve as a benchmark for your students' performance among other similar U.S. schools based on specific school-level characteristics.

As a token of appreciation for participating, schools will receive \$250, the school coordinator will receive \$200, students who participate will each receive \$25 as well as 4 hours of volunteer service time, and teachers who complete an online questionnaire will each receive \$25. NCES also sponsors one delegate from each school to attend a summer training workshop in Washington, D.C. to learn about PISA.

What will schools, students, and teachers be asked to do in PISA 2018?

PISA 2018 has four primary components: (1) a computer-based student assessment, (2) a computer-based student questionnaire (3) an online school questionnaire, and (4) an online teacher questionnaire.

- Up to 52 students in each school will be selected to take a computer-based assessment followed by a questionnaire that students complete about themselves. The assessment session is divided into two 1-hour blocks. The questionnaire session is administered after the assessment, and after a long break, typically in the afternoon. Students will answer questions in various combinations of reading, mathematics, science, and financial literacy.
- The principal of each school will be asked to appoint a staff member to act as the PISA school coordinator. The school coordinator will work with Westat staff to coordinate the assessment and submit student and teacher lists for sampling. The principal of each school will also be asked to complete a 45-minute online questionnaire about school and student body characteristics and policies.
- Up to 25 teachers in each school will be asked to complete a 30-minute online teacher questionnaire about their background, education, and teaching experiences. Participation is voluntary but important for ensuring that the sample is representative of schools and students across the country.


How is PISA developed?

PISA is developed through an international collaborative process involving input from U.S. and international experts in reading, mathematics, science, financial literacy, and educational measurement. The PISA assessment materials are thoroughly reviewed by within-country experts to make sure the materials are appropriate for each country's students. Finally, the final assessment materials are endorsed by all participating countries.

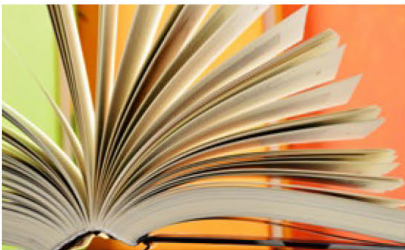

Exhibit A-5. PISA 2018 study brochure and schedule of activities—Continued

		<h2>SUMMARY OF ACTIVITIES FOR PISA 2018</h2>		
	Mar–Aug 2018	Aug–Oct 2018 Pre-assessment Contact	Sep–Nov 2018 Assessment Visit	Benefits
Principal and Teachers	<ul style="list-style-type: none"> Identify a school coordinator. 		<ul style="list-style-type: none"> Complete an online School Questionnaire on the characteristics of your school. Complete an online Teacher Questionnaire on education and teaching experiences 	<ul style="list-style-type: none"> Represent other similar U.S. schools. Schools will receive \$250 for participating. Teachers will receive \$25 for completing the Teacher Questionnaire.
School Coordinator	<ul style="list-style-type: none"> 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. Provide a list of eligible students to PISA staff. Provide a list of eligible teachers to PISA staff. 	<ul style="list-style-type: none"> Notify teachers, selected students, and students' parents of the study and benefits of participating. Coordinate the principal's completion of the school questionnaire. Coordinate the teachers' completion of the teacher questionnaire. Confirm the date and location of the assessment for PISA staff. Collect parental consent forms where required and submit to PISA staff. 	<ul style="list-style-type: none"> Arrange assessment space. Help ensure all sampled students attend the assessment. Ensure all sampled students are released from class for the assessment. Meet with PISA staff after the assessment. 	<ul style="list-style-type: none"> Receive U.S. national report with PISA 2018 results. Receive \$200 as a thank you for time and effort in coordinating the assessment.
Students			<ul style="list-style-type: none"> Take the assessment and complete a student questionnaire. 	<ul style="list-style-type: none"> 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 our nation's students know and can do. Receive \$25 as a thank you for participating.
PISA Staff	<ul style="list-style-type: none"> Provide school with materials explaining PISA and its importance. Work with the school coordinator to set an assessment date. Safeguard data collected from schools, staff, and students. 	<ul style="list-style-type: none"> Call the school coordinator to discuss assessment day, space, and student participation. Select a random sample of eligible students and teachers to participate. Provide online access information for the teacher and school questionnaires to the school coordinator. 	<ul style="list-style-type: none"> Conduct assessment from start to finish. Furnish all the assessment materials, and computers. Meet with school coordinator after the assessment. Pack up the materials to ensure that the assessments are complete and secure. 	
Find Out More	https://nces.ed.gov/surveys/pisa/			

Exhibit A-5. PISA 2018 study brochure and schedule of activities—Continued



PISA 2018

What do PISA questions look like?

PISA includes a mix of item types: some items require students to select from among possible responses, while others require students solve problems and provide written answers. Examples of PISA assessment questions are available at <http://nces.ed.gov/surveys/pisa/educators.asp> and <https://www.oecd.org/pisa/pisaproducts/pisa-test-questions.htm>.


Which countries are participating in PISA 2018?

Albania	Finland	Kosovo	Russian Federation
Algeria	Former Yugoslav	Latvia	Singapore
Argentina	Republic of	Lebanon	Slovak Republic
Australia	Macedonia	Lithuania	Slovenia
Austria	France	Luxembourg	Spain
Belgium	Georgia	Macao-China	Sweden
Brazil	Germany	Malaysia	Switzerland
Bulgaria	Greece	Malta	Thailand
Canada	Hong Kong-China	Mexico	Trinidad and Tobago
Chile	Hungary	Moldova	Tunisia
China	Iceland	Montenegro	Turkey
Chinese Taipei	Indonesia	Netherlands	United Arab Emirates
Colombia	Ireland	New Zealand	United Kingdom
Costa Rica	Israel	Norway	United States
Croatia	Italy	Peru	of America
Czech Republic	Japan	Poland	Uruguay
Denmark	Jordan	Portugal	Vietnam
Dominican Republic	Kazakhstan	Qatar	
Estonia	Korea	Romania	


Where do I find more information?


Visit the PISA website at <https://nces.ed.gov/surveys/pisa/>.

For additional questions about PISA 2018, contact the PISA U.S. home office at 1-888-638-2597 or email PISAHELP@westat.com.





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NATIONAL CENTER FOR
EDUCATION STATISTICS
Institute of Education Sciences





The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts the Program for International Student Assessment (PISA) in the United States as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB #1850-0755.

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Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Schools

PISA is an international assessment of students nearing the end of compulsory education that measures how well students apply their knowledge and skills to solve problems related to reading, mathematics, science, and financial literacy in real-life contexts. In PISA 2018, students will be assessed in reading, mathematics, science, financial literacy, or some combination of these subjects.

What does participating in PISA entail?

Each school is asked to designate a school coordinator to work with Westat and to submit a list of all students born on or between July 1, 2002 and June 30, 2003 and a list of teachers eligible to teach tenth-grade students (the modal grade of PISA-eligible students). Up to 52 students in each school will be sampled to participate in the PISA assessment. The assessment is divided into two 1-hour blocks. A questionnaire session is administered after the assessment, and after a long break, typically in the afternoon. Up to 25 teachers in each school will be asked to complete a 30-minute online teacher questionnaire about their background, education, and teaching experiences. The principal of each school will also be asked to complete a 45-minute online questionnaire about school and student body characteristics and policies.

Why should my school and students participate?

The participation of selected schools in the United States is vital to ensuring an accurate representation of the overall population of students nearing the end of compulsory education across the country—including U.S. public and private schools. Although the assessment is voluntary, we rely on school and student participation to ensure the results are complete and accurate. We cannot do that without the support of schools like yours.

PISA is administered worldwide in order to help participating school systems and countries understand their strengths and areas for improvement, with the ultimate goal of increasing both the quality and equity of education worldwide. As such, PISA fosters engagement among international education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. By taking part in PISA, your school will have the unique opportunity to impact the bigger picture of education in the United States and across the world.



What are the benefits to participating?

In addition to receiving a U.S. national report with PISA 2018 results, schools may also receive a school-level report (pending sample size and response rate requirements). The school report presents comparisons of your school's average scores with the average scores of participating education systems including the United States. The report also provides comparisons of your school with other similar U.S. schools based on specific school-level characteristics. The school report is provided only to your school and any published reports from PISA 2018 will not identify participating schools.

As a token of appreciation for participating, schools will receive \$250, the school coordinator will receive \$200, students who participate will each receive \$25 as well as 4 hours of volunteer service time, and teachers who complete an online questionnaire will each receive \$25.

Will all of our students be asked to participate?

Probably not. In each school, all students born on or between July 1, 2002 and June 30, 2003 and enrolled in grade 7 or higher will have an equal chance of selection. Up to 52 students in each school will be selected to participate. Only in very small schools will the school sample likely include all eligible students. In addition, some students with disabilities or limited English proficiency may be offered a limited set of accommodations to enable their participation; otherwise, they may be excused from the assessment.



Who conducts the PISA assessment?

The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts this study as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543) and with the approval of the U.S. Office of Management and Budget under OMB# 1850-0755. The assessment process will be undertaken by trained staff from Westat, a research organization under contract to NCES. In compliance with standard protocols, Westat field staff undergoes FBI background checks.

How are teacher and school questionnaires administered?

The teacher and school questionnaires are both administered online from a secure website. The online teacher questionnaire takes approximately 30 minutes to complete and asks about teachers' education and teaching experience. The school questionnaire, which looks at school characteristics such as enrollment and school practices, is also online and takes about 45 minutes to complete.

Will all of our teachers be asked to participate?

From a listing of teachers in the school eligible to teach grade 10 students, up to 25 teachers (10 English or English/language arts and 15 non-English subject areas) will be asked to participate in the online teacher questionnaire.

Do teachers or other school staff need to help administer the assessment?

No. Westat field staff will visit the school on the day of the assessment, bringing with them all the materials required, and will handle the entire administration of the assessment. Field staff will also bring all of the necessary computer equipment. There is no requirement for school resources such as school computers or access to the internet. All that is required is adequate space to set up the equipment and assess the students.

When will PISA be conducted?

PISA will be conducted between October 8 and November 30, 2018. Westat will work with schools to identify an assessment date convenient for the school in that time period.

How long does PISA take?



Students take a computer-based assessment followed by a questionnaire that students complete about themselves, each administered in a separate session. The assessment session is divided into two 1-hour blocks. The questionnaire session is administered after the assessment, and after a long break, typically in the afternoon. The assessment location will be used for about 5 hours total, including setup and breakdown by Westat staff. All assessment activities will take place in one day.

What will happen with the collected data?

The data collected for PISA will be used to report on students' knowledge and skills as group descriptions at the national level. All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755. Reports of the findings from PISA 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.

Where can I find more information?



Visit the PISA website at <https://nces.ed.gov/surveys/pisa/>. For additional questions about PISA 2018, contact the PISA U.S. home office at 1-888-638-2597 or email PISAHelp@westat.com.



U.S. DEPARTMENT OF EDUCATION
NATIONAL CENTER FOR
EDUCATION STATISTICS
Institute of Education Sciences

OMB No. 1850-0755

50742.0718



Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Schools

PISA is an international assessment of students nearing the end of compulsory education that measures how well students apply their knowledge and skills to solve problems related to reading, mathematics, science, and financial literacy in real-life contexts. In PISA 2018, students will be assessed in reading, mathematics, science, financial literacy, or some combination of these subjects.

What does participating in PISA entail?

Each school is asked to designate a school coordinator to work with Westat and to submit a list of all students born on or between July 1, 2002 and June 30, 2003 and a list of teachers eligible to teach tenth-grade students (the modal grade of PISA-eligible students). Up to 52 students in each school will be sampled to participate in the PISA assessment. The assessment is divided into two 1-hour blocks. A questionnaire session is administered after the assessment, and after a long break, typically in the afternoon. Up to 25 teachers in each school will be asked to complete a 30-minute online teacher questionnaire about their background, education, and teaching experiences. The principal of each school will also be asked to complete a 45-minute online questionnaire about school and student body characteristics and policies.

Why should my school and students participate?

The participation of selected schools in the United States is vital to ensuring an accurate representation of the overall population of students nearing the end of compulsory education across the country—including U.S. public and private schools. Although the assessment is voluntary, we rely on school and student participation to ensure the results are complete and accurate. We cannot do that without the support of schools like yours.

PISA is administered worldwide in order to help participating school systems and countries understand their strengths and areas for improvement, with the ultimate goal of increasing both the quality and equity of education worldwide. As such, PISA fosters engagement among international education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. By taking part in PISA, your school will have the unique opportunity to impact the bigger picture of education in the United States and across the world.

What are the benefits to participating?

In addition to receiving a U.S. national report with PISA 2018 results, schools may also receive a school-level report (pending sample size and response rate requirements). The school report presents comparisons of your school's average scores with the average scores of participating education systems including the United States. The report also provides comparisons of your school with other similar U.S. schools based on specific school-level characteristics. The school report is provided only to your school and any published reports from PISA 2018 will not identify participating schools.

As a token of appreciation for participating, schools will receive \$250, the school coordinator will receive \$200, students who participate will each receive \$25 as well as 4 hours of volunteer service time, and teachers who complete an online questionnaire will each receive \$25.

Will all of our students be asked to participate?

Probably not. In each school, all students born on or between July 1, 2002 and June 30, 2003 and enrolled in grade 7 or higher will have an equal chance of selection. Up to 52 students in each school will be selected to participate. Only in very small schools will the school sample likely include all eligible students. In addition, some students with disabilities or limited English proficiency may be offered a limited set of accommodations to enable their participation; otherwise, they may be excused from the assessment.

Exhibit A-7. PISA 2018 Private school FAQ—Continued



Who conducts the PISA assessment?

The National Center for Education Statistics (NCES), within the U.S. Department of Education, conducts this study as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543) and with the approval of the U.S. Office of Management and Budget under OMB# 1850-0755. The assessment process will be undertaken by trained staff from Westat, a research organization under contract to NCES. In compliance with standard protocols, Westat field staff undergoes FBI background checks.

How are teacher and school questionnaires administered?

The teacher and school questionnaires are both administered online from a secure website. The online teacher questionnaire takes approximately 30 minutes to complete and asks about teachers' education and teaching experience. The school questionnaire, which looks at school characteristics such as enrollment and school practices, is also online and takes about 45 minutes to complete.

Will all of our teachers be asked to participate?

From a listing of teachers in the school eligible to teach grade 10 students, up to 25 teachers (10 English or English/language arts and 15 non-English subject areas) will be asked to participate in the online teacher questionnaire.

Do teachers or other school staff need to help administer the assessment?

No. Westat field staff will visit the school on the day of the assessment, bringing with them all the materials required, and will handle the entire administration of the assessment. Field staff will also bring all of the necessary computer equipment. There is no requirement for school resources such as school computers or access to the internet. All that is required is adequate space to set up the equipment and assess the students.

When will PISA be conducted?

PISA will be conducted between October 8 and November 30, 2018. Westat will work with schools to identify an assessment date convenient for the school in that time period.

How long does PISA take?

Students take a computer-based assessment followed by a questionnaire that students complete about themselves, each administered in a separate session. The assessment session is divided into two 1-hour blocks. The questionnaire session is administered after the assessment, and after a long break, typically in the afternoon. The assessment location will be used for about 5 hours total, including setup and breakdown by Westat staff. All assessment activities will take place in one day.

What will happen with the collected data?

The data collected for PISA will be used to report on students' knowledge and skills as group descriptions at the national level. All of the information provided by 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 except as required by law (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755. Reports of the findings from PISA 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.

Where can I find more information?

Visit the PISA website at <https://nces.ed.gov/surveys/pisa/>. For additional questions about PISA 2018, contact the PISA U.S. home office at 1-888-638-2597 or email PISAHelp@westat.com.



OMB No. 1850-0755

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The graphic on the left side of the page features the PISA USA logo at the top, which consists of a stylized globe icon above the text "PISA USA". Below this, the text "PISA 2018" is written vertically in large, bold, blue letters. The background of this section is a solid blue color with yellow curved lines at the bottom.

Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Teachers

What is PISA?

The Program for International Student Assessment (PISA) is an international assessment of students nearing the end of compulsory education, conducted every three years, that measures how well students apply their knowledge and skills in reading, mathematics, science, and financial literacy. More than 70 countries and education systems, including the United States, will participate in PISA 2018. PISA is coordinated by the Organization for Economic Cooperation and Development (OECD) and conducted in the United States by the National Center for Education Statistics (NCES) within the U.S. Department of Education.

Why is PISA important?

The OECD administers PISA in order to help participating school systems and countries understand their strengths and areas for improvement, with the ultimate goal of increasing both the quality and equity of education worldwide. As such, PISA fosters engagement among international education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. Participation in PISA has even led to substantive education policy changes for several countries around the world. Both Germany and Brazil, for example, have raised their standards and made their education systems more inclusive to students from every background as a direct result of their PISA results.

PISA provides a unique opportunity for the United States to understand its educational standing in comparison to other nations. Through participating in PISA, schools, teachers, and students contribute to the improvement of education. PISA can help us identify U.S. students' strengths and weaknesses in these subjects and help us learn about successful policies and practices in other countries.

What will PISA tell us?


Beyond providing comparative information on the performance of U.S. students in reading, mathematics, science, and financial literacy with their peers in other countries, the assessment will provide a range of contextual data that offer insight into students' school and home environments, socioeconomic advantages and disadvantages, sense of well-being, use of time outside of school, and other factors that might impact their performance.

What role do teachers have in PISA?

Teachers are asked to complete an online questionnaire. This gives teachers an opportunity to provide information that is critical to understanding student performance as well as to voice perspectives on teaching and learning at your school. The teacher questionnaire asks about your background and teaching experience, the student body, and your views on school policies and evaluation.

Why should I participate?

Each school, student, and teacher who participates plays an important role in representing others similar to them. It is vital that teachers in every kind of education system and environment—including public and private schools—are able to contribute to PISA to ensure the U.S. sample is an accurate reflection of educational progress across the country.



How was I selected to take the PISA teacher questionnaire?

The PISA school coordinator in your school (the person designated by your school principal to communicate with PISA staff) provided a list of all teachers eligible to teach tenth-grade students in your school (whether or not they currently do; this is the modal grade of PISA-eligible students). You are one of about 25 teachers from your school who were selected to participate from this list. Your participation in PISA is vital to reaching a high response rate.

How long will it take to complete the PISA teacher questionnaire?

The teacher questionnaire will take approximately 30 minutes to complete online from any location with internet access, and you do not have to complete it all in a single session. The online software automatically saves your responses to each question as you navigate through the questionnaire so that if you wish to complete the questionnaire later, you may pick up right where you left off. Each teacher will be offered \$25 for completing the online questionnaire.

How can I access the PISA teacher questionnaire?

To access the teacher questionnaire (<https://portal.mypisa.us/TeacherQuestionnaire>), you will need to have an internet connection, a suitable internet browser (see list below), and your login credentials. You will be emailed a unique hyperlink that you can click on to access the questionnaire directly. The PISA staff is ready to work with you to make access and completion of the teacher questionnaire as easy and efficient as possible.

The following browsers are supported by PISA and can be downloaded for free if you do not already have them installed on the computer:

- Firefox: version 19 and above
- Google Chrome: version 25 and above
- Internet Explorer: version 8 and above
- Safari (Mac version): versions 6 and above

What is done with the information you collect from me?

Your responses to the PISA teacher questionnaire will be combined with those from other participating teachers across the United States to produce summary statistics and reports. All of the information you provide 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755. Reports of the findings will not identify participating districts, students, or individual staff. For a recent example of how PISA data are reported, please visit <https://nces.ed.gov/surveys/pisa/pisa2015/index.asp>.

Where can I go for help or technical support?

If you have any questions or experience any difficulties, please contact the PISA U.S. home office at 1-888-638-2597 or email PISAHelp@westat.com. For more information on PISA, including results from previous data collections, please visit <https://nces.ed.gov/surveys/pisa/>.



Department of Education
United States of America

ies NATIONAL CENTER FOR
EDUCATION STATISTICS
Institute of Education Sciences

OMB No. 1850-0755

50742.1017

The graphic on the left side of the page features a vertical banner. The top section is teal and contains the PISA USA logo, which consists of a stylized globe icon above the text 'PISA USA'. The bottom section is dark blue and features the text 'PISA 2018' in large, light blue, sans-serif capital letters. A yellow abstract graphic, resembling a stylized 'P' or a series of curved lines, is positioned at the bottom left of the banner.

Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Teachers

What is PISA?

The Program for International Student Assessment (PISA) is an international assessment of students nearing the end of compulsory education, conducted every three years, that measures how well students apply their knowledge and skills in reading, mathematics, science, and financial literacy. More than 70 countries and education systems, including the United States, will participate in PISA 2018. PISA is coordinated by the Organization for Economic Cooperation and Development (OECD) and conducted in the United States by the National Center for Education Statistics (NCES) within the U.S. Department of Education.

Why is PISA important?

The OECD administers PISA in order to help participating school systems and countries understand their strengths and areas for improvement, with the ultimate goal of increasing both the quality and equity of education worldwide. As such, PISA fosters engagement among international education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. Participation in PISA has even led to substantive education policy changes for several countries around the world. Both Germany and Brazil, for example, have raised their standards and made their education systems more inclusive to students from every background as a direct result of their PISA results.

PISA provides a unique opportunity for the United States to understand its educational standing in comparison to other nations. Through participating in PISA, schools, teachers, and students contribute to the improvement of education. PISA can help us identify U.S. students' strengths and weaknesses in these subjects and help us learn about successful policies and practices in other countries.

What will PISA tell us?


Beyond providing comparative information on the performance of U.S. students in reading, mathematics, science, and financial literacy with their peers in other countries, the assessment will provide a range of contextual data that offer insight into students' school and home environments, socioeconomic advantages and disadvantages, sense of well-being, use of time outside of school, and other factors that might impact their performance.

What role do teachers have in PISA?

Teachers are asked to complete an online questionnaire. This gives teachers an opportunity to provide information that is critical to understanding student performance as well as to voice perspectives on teaching and learning at your school. The teacher questionnaire asks about your background and teaching experience, the student body, and your views on school policies and evaluation.

Why should I participate?

Each school, student, and teacher who participates plays an important role in representing others similar to them. It is vital that teachers in every kind of education system and environment—including public and private schools—are able to contribute to PISA to ensure the U.S. sample is an accurate reflection of educational progress across the country.



How was I selected to take the PISA teacher questionnaire?

The PISA school coordinator in your school (the person designated by your school principal to communicate with PISA staff) provided a list of all teachers eligible to teach tenth-grade students in your school (whether or not they currently do; this is the modal grade of PISA-eligible students). You are one of about 25 teachers from your school who were selected to participate from this list. Your participation in PISA is vital to reaching a high response rate.

How long will it take to complete the PISA teacher questionnaire?

The teacher questionnaire will take approximately 30 minutes to complete online from any location with internet access, and you do not have to complete it all in a single session. The online software automatically saves your responses to each question as you navigate through the questionnaire so that if you wish to complete the questionnaire later, you may pick up right where you left off. Each teacher will be offered \$25 for completing the online questionnaire.

How can I access the PISA teacher questionnaire?

To access the teacher questionnaire (<https://portal.mypisa.us/TeacherQuestionnaire>), you will need to have an internet connection, a suitable internet browser (see list below), and your login credentials. You will be emailed a unique hyperlink that you can click on to access the questionnaire directly. The PISA staff is ready to work with you to make access and completion of the teacher questionnaire as easy and efficient as possible.

The following browsers are supported by PISA and can be downloaded for free if you do not already have them installed on the computer:

- Firefox: version 19 and above
- Google Chrome: version 25 and above
- Internet Explorer: version 8 and above
- Safari (Mac version): versions 6 and above

What is done with the information you collect from me?

Your responses to the PISA teacher questionnaire will be combined with those from other participating teachers across the United States to produce summary statistics and reports. All of the information you provide 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755. Reports of the findings will not identify participating districts, students, or individual staff. For a recent example of how PISA data are reported, please visit <https://nces.ed.gov/surveys/pisa/pisa2015/index.asp>.

Where can I go for help or technical support?

If you have any questions or experience any difficulties, please contact the PISA U.S. home office at 1-888-638-2597 or email PISAHelp@westat.com. For more information on PISA, including results from previous data collections, please visit <https://nces.ed.gov/surveys/pisa/>.



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Appendix B. Student and Parent Materials

Exhibit B-1. PISA 2018 Explicit parent materials

Sample Main Study Explicit Consent Letter, PISA

SCHOOL LETTERHEAD

Dear Parent or Guardian,

This letter is to inform you about an important international study of student learning being conducted in our school this fall. This study is called the Program for International Student Assessment, or PISA. PISA provides important information for internationally benchmarking performance in reading, mathematics, and science of students in the United States nearing the end of compulsory education against their peers in 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. A select few of our students on or born between July 1, 2002 and June 30, 2003, along with your teenager, will take part in this study. The enclosed summary sheet provides some background on 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.

To have an accurate picture of what U.S. students can do, it is important that each student selected takes part in the study. The PISA assessment is taken on a computer. Also, students will be asked to complete a questionnaire about themselves. 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 enjoy taking part, and all participating students will receive \$25 and a certificate from the U.S. Department of Education for 4 hours of volunteer service.

The information provided by students will not be shared with the school. NCES is authorized to conduct PISA by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by your teenager 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755. Students and schools are never identified in any reports. All reported statistics refer to the United States as a whole.

Before we can allow your teenager to participate in PISA we must have your written consent. Please complete the attached form and return it to the school.

Thank you for taking the time to learn about this important study and considering your teenager's participation in it.

Sincerely,

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

Main Study Explicit Consent Form

**Program for International Student Assessment (PISA)
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). Each student who participates will receive \$25 and a volunteer service certificate of 4 hours from the U.S. Department of Education. This assessment will be administered by a team of researchers from Westat who are operating under contract to the National Center for Education Statistics within the U.S. Department of Education.

☐ Yes, I grant permission for my teenager to participate in PISA.

☐ No, I do not grant permission for my teenager to participate in PISA.

(Signature of parent or guardian)

Date of signature: ____/____/____

PLEASE PRINT:

Student name: _____

School name: _____

FOR OFFICE USE ONLY:

Student ID: _____

Sample Main Study Implicit Consent Letter, PISA

SCHOOL LETTERHEAD

Dear Parent or Guardian,

This letter is to inform you about an important international study of student learning being conducted in our school this fall. This study is called the Program for International Student Assessment, or PISA. 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. A select few of our students born on or between July 1, 2002 and June 30, 2003, 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.

To have an accurate picture of what U.S. students can do, it is important that each student selected takes part in the study. The PISA assessment is taken on a computer. Also, students will be asked to complete a questionnaire about themselves. 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 enjoy taking part, and all participating students will receive \$25 and a certificate from the U.S. Department of Education for 4 hours of volunteer service.

The information provided by students will not be shared with the school. NCES is authorized to conduct PISA by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C §9543). All of the information provided by your teenager 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755. Students and schools are never identified in any reports. All reported statistics refer to the United States as a whole.

If you have an objection to your teenager joining in the PISA activities, please let us know by completing the attached consent form and returning it to the school.

Thank you for taking the time to learn about this important study.

Sincerely,

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

Main Study Implicit Consent Form

**Program for International Student Assessment (PISA)
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). Each student who participates will receive \$25 and a volunteer service certificate of 4 hours from the U.S. Department of Education. This assessment will be administered by a team of researchers from Westat, who are operating under contract to the National Center for Education Statistics within the U.S. Department of Education.

If you grant permission for your teenager to participate in PISA, you do not need to return this form.

If you do not consent to your teenager's participation in PISA, please return this form to your teenager's school as soon as possible.

I do not grant permission for my teenager, _____, to participate in the Program for International Student Assessment.

(Signature of parent or guardian)

Date of signature: ____/____/____

PLEASE PRINT:

Student name: _____

School name: _____

FOR OFFICE USE ONLY:

Student ID: _____

Sample Main Study Notification Letter, PISA

SCHOOL LETTERHEAD

Dear Parent or Guardian,

This letter is to inform you about an important international study of student learning being conducted in our school this fall. This study is called the Program for International Student Assessment, or PISA. PISA provides important information for internationally benchmarking performance in reading, mathematics, and science of students in the United States nearing the end of compulsory education against their peers in countries around the world.

Our school has accepted an invitation from the National Center for Education Statistics (NCES) within the U.S. Department of Education to participate in PISA. A select few of our students born on or between August 1, 2002 and July 31, 2003, along with your teenager, will take part in this study. The enclosed summary sheet provides some background on 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.

To have an accurate picture of what U.S. students can do, it is critically important that each student selected take part in the study. The PISA assessment is taken on a computer. Also, students will be asked to complete a questionnaire about themselves. 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 enjoy taking part, and all participating students will receive \$25 and a certificate from the U.S. Department of Education for 4 hours of volunteer service.

The information provided by students will not be shared with the school. NCES is authorized to conduct PISA by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543). All of the information provided by your teenager 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 (20 U.S.C. §9573 and 6 U.S.C. §151). Students and schools are never identified in any reports. All reported statistics refer to the United States as a whole. The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Thank you for taking the time to learn about this important study.

Sincerely,

Enclosures:
Facts for Parents about PISA

Facts for Parents About PISA

Between October and December of this year, your teenager's school will be one of about 250 nationwide taking part in the Program for International Student Assessment (PISA) 2018. Schools were selected randomly to represent the nation's schools and, within each school, up to 52 students were selected randomly to take part. Your teenager was among those students selected to take part in the study.

What is PISA?

PISA is the world's largest international assessment that measures student learning in reading, mathematics, and science. More than 70 countries and education systems representing more than 90 percent of the world's economy participate in PISA, which is coordinated through the Organization for Economic Cooperation and Development (OECD). The assessment occurs every 3 years (2000, 2003, 2006, 2009, 2012, 2015 and 2018) and provides information about how students in the U.S. compare in achievement with students in other countries. The National Center for Education Statistics within the U.S. Department of Education conducts PISA in the United States as authorized by the Education Sciences Reform Act of 2002 (ESRA 2002, 20 U.S.C. §9543).

Why is PISA important?

The OECD administers PISA in order to help participating school systems and countries understand their strengths and areas for improvement, with the ultimate goal of increasing both the quality and equity of education worldwide. As such, PISA fosters engagement among international education systems, allowing teachers, education professionals, and policy experts to compare shared experiences in the global learning community. Participation in PISA has even led to substantive education policy changes for several countries around the world. Both Germany and Brazil, for example, have raised their standards and made their education systems more inclusive to students from every background as a direct result of their PISA results.

PISA provides a unique opportunity for the United States to understand its educational standing in comparison to other nations. Through participating in PISA, schools, teachers, and students contribute to the improvement of education. PISA can help us identify U.S. students' strengths and weaknesses in these subjects and help us learn about successful policies and practices in other countries.

How did my teenager and their school get selected for PISA?

The schools that participate in PISA in the United States are randomly selected from a list of all schools in the country that enroll students born on or between August 1, 2002 and July 31, 2003 and in grade 7 or higher. This is done to ensure that U.S. participants accurately represent the entire population of eligible students in the United States and not just particular types of schools or groups of students.

The only criteria for students to be eligible to be selected for PISA are being born in the specific birth date range and being enrolled in grade 7 or higher. From a list of all eligible students provided by your school, up to 52 students are randomly selected to participate. Every eligible student enrolled in a PISA-selected school has an equal chance of being selected. Students in other countries are selected in exactly the same way to make sure each country is fairly represented and no country is advantaged or disadvantaged because of the types of schools or groups of students selected.

Why should I encourage my teenager to participate?

Each school and student who participates plays an important role in representing other schools and students that are similar to them. It's vital that students in every kind of education system and environment—including public and private schools—contribute to PISA to ensure the U.S. sample is an accurate reflection of educational progress across the country. Only about 6,000 students will have the unique opportunity to participate in PISA in the United States. How often will your teenager have the opportunity to represent our country? Participating is an opportunity to have an impact on the bigger picture of education in the United States and around the globe.

What is involved?

PISA staff will visit the school and administer the assessment. The assessment will take approximately 3 hours; it includes time for instructions, the assessment, breaks, and a questionnaire that students complete about themselves.

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 their peers in other countries. Schools that participate in PISA will receive \$800, and each student who participates will receive \$25 and a certificate from the U.S. Department of Education for 4 hours of volunteer service.

What is done with the information you collect from my teenager?

PISA is not designed to produce individual scores and your teenager's individual performance is not shared with teachers, the school, or the district in any way. Student responses are combined with other student responses and are only used for statistical purposes. The data collected for PISA will be used to report on students' knowledge and skills as group descriptions at the national level. All of the information provided by your teenager 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Where can I find out more about PISA?

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

Exhibit B-5. PISA 2018 Student invitation





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) 2018.



This fall, selected students from the United States will match their knowledge and skills in reading, mathematics, science, and financial literacy against students from more than 80 other countries and education systems.

Join us on....

PISA Date:

PISA Time:

PISA Location:



Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Students

What is PISA?

The Program for International Student Assessment (PISA) is an international assessment of students nearing the end of compulsory education that measures how well students apply their knowledge and skills in solving problems in reading, mathematics, science, and financial literacy. Conducted every three years, PISA presents problems that students are likely to encounter in the real world. This fall, students like you from more than 70 countries and education systems, including the United States, will participate in PISA.

Why should I participate in PISA?

You are one of up to 52 students in your school who have been selected to participate in PISA. Participation in PISA is voluntary, but each student who participates plays a vital role in ensuring the U.S. results are representative of *all* types of schools and education environments across the country—including public and private schools. Plus, if you participate in PISA you will...

- Receive a certificate for 4-hours of volunteer service from the U.S. Department of Education.
- Make an important contribution to this global measurement of educational progress by representing other students just like you across the United States.

Only 6,000 students will have the unique opportunity to participate in PISA across the United States. How often do you get the chance to represent your country? Participating in PISA is a national service. You can have an impact on the bigger picture of education in the United States and around the world.

What subjects are assessed in PISA?

Each student participating in PISA will be assessed in various combinations of the following subjects: reading, mathematics, science, and financial literacy.

How long does PISA take?

The PISA assessment is divided into two 1-hour blocks. A student questionnaire session is administered after the assessment, and after a long break, typically in the afternoon.

How did my school get selected to take PISA?

The schools that participate in PISA in the United States are randomly selected from a list of all schools in the country that enroll age-eligible students. This is done to ensure that U.S. participants accurately represent the entire population of students nearing the end of compulsory education and not just particular types of schools or groups of students.



How did I get selected to take PISA?

The only criteria for being eligible to be selected for PISA are a birth date on or between July 1, 2002 and June 30, 2003, and being enrolled in grade 7 or higher. From a list of all eligible students provided by your school, up to 52 students were randomly selected to participate. Every eligible student enrolled in a PISA selected school has an equal chance of being selected. Students in other countries are selected in the same way to make sure each country is fairly represented and no country is advantaged or disadvantaged because of the types of schools or groups of students selected.

What types of questions will I see on PISA?

PISA questions assess the knowledge and skills students have learned, both in and out of school, based on situations you may encounter in real life. Some PISA questions require that you select from a set of provided answers; other PISA questions require that you write out your response. PISA is administered on computer and many of the items are interactive, where you manipulate different pieces of information. To try PISA items on your own, please visit <http://www.oecd.org/pisa/test/>.

What is done with the information you collect from me?

PISA is not designed to produce individual test scores and your individual performance is not shared with your teachers, school, or district in any way. Student responses are combined with other student responses and are only used for statistical purposes. The data collected for PISA will be used to report on students' knowledge and skills as group descriptions at the national level. All of the information you provide 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Where can I find more information?

Visit the PISA website at <https://nces.ed.gov/surveys/pisa/>. For additional questions about PISA, contact the PISA U.S. home office at 1-888-638-2597 or email PISAHelp@westat.com.





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OMB No. 1850-0755

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Program for International Student Assessment

FREQUENTLY ASKED QUESTIONS

Information for Students

What is PISA?

The Program for International Student Assessment (PISA) is an international assessment of students nearing the end of compulsory education that measures how well students apply their knowledge and skills in solving problems in reading, mathematics, science, and financial literacy. Conducted every three years, PISA presents problems that students are likely to encounter in the real world. This fall, students like you from more than 70 countries and education systems, including the United States, will participate in PISA.

Why should I participate in PISA?

You are one of up to 52 students in your school who have been selected to participate in PISA. Participation in PISA is voluntary, but each student who participates plays a vital role in ensuring the U.S. results are representative of *all* types of schools and education environments across the country—including public and private schools. Plus, if you participate in PISA you will...

- Receive a certificate for 4-hours of volunteer service from the U.S Department of Education.
- Make an important contribution to this global measurement of educational progress by representing other students just like you across the United States.

Only 6,000 students will have the unique opportunity to participate in PISA across the United States. How often do you get the chance to represent your country? Participating in PISA is a national service. You can have an impact on the bigger picture of education in the United States and around the world.

What subjects are assessed in PISA?

Each student participating in PISA will be assessed in various combinations of the following subjects: reading, mathematics, science, and financial literacy.

How long does PISA take?

The PISA assessment is divided into two 1-hour blocks. A student questionnaire session is administered after the assessment, and after a long break, typically in the afternoon.

How did my school get selected to take PISA?

The schools that participate in PISA in the United States are randomly selected from a list of all schools in the country that enroll age-eligible students. This is done to ensure that U.S. participants accurately represent the entire population of students nearing the end of compulsory education and not just particular types of schools or groups of students.



How did I get selected to take PISA?

The only criteria for being eligible to be selected for PISA are a birth date on or between July 1, 2002 and June 30, 2003, and being enrolled in grade 7 or higher. From a list of all eligible students provided by your school, up to 52 students were randomly selected to participate. Every eligible student enrolled in a PISA selected school has an equal chance of being selected. Students in other countries are selected in the same way to make sure each country is fairly represented and no country is advantaged or disadvantaged because of the types of schools or groups of students selected.

What types of questions will I see on PISA?

PISA questions assess the knowledge and skills students have learned, both in and out of school, based on situations you may encounter in real life. Some PISA questions require that you select from a set of provided answers; other PISA questions require that you write out your response. PISA is administered on computer and many of the items are interactive, where you manipulate different pieces of information. To try PISA items on your own, please visit <http://www.oecd.org/pisa/test/>.

What is done with the information you collect from me?

PISA is not designed to produce individual test scores and your individual performance is not shared with your teachers, school, or district in any way. Student responses are combined with other student responses and are only used for statistical purposes. The data collected for PISA will be used to report on students' knowledge and skills as group descriptions at the national level. All of the information you provide 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 (20 U.S.C. §9573 and 6 U.S.C. §151). The U.S. Office of Management and Budget has approved this data collection under OMB# 1850-0755.

Where can I find more information?

Visit the PISA website at <https://nces.ed.gov/surveys/pisa/>. For additional questions about PISA, contact the PISA U.S. home office at 1-888-638-2597 or email PISAHelp@westat.com.



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Exhibit B-8. PISA 2018 Student certificate of volunteer service



Appendix C. PISA 2018 School, Teacher, and Student Questionnaires

The PISA 2018 school and teacher questionnaires were administered online via a secure server at Westat. The student questionnaire was administered as part of the PISA Student Delivery System following the cognitive portion of the assessment. These instruments have been adapted for presentation online and may be found on the NCES PISA study website at <https://nces.ed.gov/surveys/pisa/questionnaire.asp>.

Appendix D. PISA 2018 Study Forms

Exhibit D-1. PISA 2018 Student Tracking Form

Codes to enter into SEN column: 1 – Functional disability 2 – Cognitive, behavioural or emotional disability 3 – Limited assessment language experience 4 – Home schooled				Codes to enter into N/P columns: 2 – Parent refusal 3 – Excluded on SEN basis 4 – Now enrolled at another school 5 – Not enrolled in this school, enrollment unknown n – Does not meet PISA criteria for eligibility				Codes to enter into ACCOMM column: SMG – Small Group AUD* – Auditory Amplification ONE – One-on-One OTR – other accommodation EQP* – Special Equipment NAP – accommodation(s) not allowed on PISA SLD* – Directions in Sign Language *School staff provided accommodation			
--	--	--	--	--	--	--	--	--	--	--	--

P18 - STUDENT TRACKING FORM

School Name	School ID	School Coordinator	Test Administrator	Assessment Date(s)
«School»		«SC»	«TA»	«AssessDate1» / «AssessDate2»

Line #	Student Name	Line #	SUBID	Region	Stratum ID	School ID	Student ID	Grade	Gender (F=1; M=2)	Birth Date (MM-YYYY)	SEN ¹	N/P ² PISA	ACCOM	UH	COMMENTS
01		01													
02		02													
03		03													
04		04													
05		05													
06		06													
07		07													
08		08													
09		09													
10		10													
11		11													
12		12													
13		13													
14		14													
15		15													
16		16													
17		17													
18		18													
19		19													
20		20													
21		21													
22		22													

¹ SEN = Special Education Needs

² N/P = Non-Participant

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

School Name	School ID	Session ID	Test Administrator	Date:	TEST:
				Time:	A. Total # absent (all students with a 0 in the Test column): _____
				Location:	B. Total # N/P Absent (students with "0" in Attendance and "N/P Absent" in the Comments column): _____
					C. Total # students listed : _____

absent (all students with a 0 in the Test column): _____
 N/P Absent (students with "0" in Attendance and "N/P Absent"
 comments column): _____
 students listed: _____

0 – Student is absent
1 – Student is present
2 – Student is partially present (absent for more than 10 minutes without technical problem)
3 – Student is partially present (completed some of assessment, could not complete entire assessment due to technical problems with laptop or assessment)
4 – Student is absent (never began assessment due to technical problem with computer or lack of computer)
5 – N/P Absent (absent due to N/P code on the STF)

Exhibit D-3. PISA 2018 Student Payment Receipt Form

Exhibit D-4. PISA 2018 Student Login Form

P18 – STUDENT LOGIN FORM

Student Name:	«Student_Name»
School Name:	«school»
User ID:	«Full_ID»
Password:	«Password»

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

[illegible]

Appendix E. Training Agendas

Exhibit E-1. Test administrator training agenda



Program for International Student Assessment (PISA) 2018 Main Study

Test Administrator Training Agenda
Westat, 1600 Research Blvd., Rockville, MD
August 21-23, 2018

Day 1 – Tuesday August 21, 2018, 9:00 – 5:30

SESSION	TOPICS
SESSION 1: Welcome and Overview	<ul style="list-style-type: none"> ▪ Introductions ▪ Overview of PISA 2018 ▪ Roles and Responsibilities ▪ Overview of MyPISA.us
SESSION 2: Key PISA Materials	<ul style="list-style-type: none"> ▪ Receiving PISA materials and supplies ▪ Adhering to security and confidentiality guidelines ▪ Understanding sampling and tracking forms
SESSION 3: Understanding SEN Students and PISA Accommodations	<ul style="list-style-type: none"> ▪ Understanding students with Special Education Needs (SEN) ▪ PISA accommodations
Morning Break	
	<i>Exercise: Coding SEN and Exclusions</i>
SESSION 4: Preassessment Activities	<ul style="list-style-type: none"> ▪ Conducting preassessment calls <p><i>Role Plays: Conducting Preassessment Scheduling Calls</i></p> <p><i>Exercise: Preassessment Call Scenarios</i></p>
Lunch (ID Pictures)	
SESSION 4: Preassessment Activities	<ul style="list-style-type: none"> ▪ Conducting preassessment visits (PAVs) ▪ Student Presentation <p><i>Role Plays: Conducting Preassessment Visits</i></p>
Afternoon Break	
SESSION 5: Introduction to the SCS	<ul style="list-style-type: none"> ▪ Overview of the SCS ▪ Entering PAV information <p><i>Exercise: Entering Preassessment Information into the SCS</i></p>
Day 1 Wrap-up	<ul style="list-style-type: none"> ▪ Remaining questions from Day 1 ▪ Meet with Field Manager

Exhibit E-1. Test administrator training agenda—Continued

**PISA 2018 Main Study
Test Administrator Training Agenda
August 21-23, 2018**

Day 2 – Wednesday, August 22, 2018, 9:00 – 5:30


SESSION	TOPICS
Welcome to Day 2	<ul style="list-style-type: none"> ▪ Remaining Questions from Day 1
SESSION 6: Activities to Complete Before Assessment Day	<ul style="list-style-type: none"> ▪ Preparing materials <p><i>Exercise: Preparing Materials</i></p> <ul style="list-style-type: none"> • Gathering materials to bring to the assessment
SESSION 7: Assessment Day Activities	<ul style="list-style-type: none"> ▪ Arriving at the school ▪ Meeting with school coordinator ▪ Setting up the laptops ▪ Beginning the session ▪ Monitoring the session ▪ Ending the session and dismissing students ▪ Repacking the Pelican Cases <p><i>Group Work: Session Script</i></p> <p><i>Exercise: Assessment Day Scenarios</i></p> <p><i>Exercise: Completing the Session Report Form</i></p>
Morning Break	
SESSION 8: Conducting the Computer-Based Assessment	<ul style="list-style-type: none"> • Equipment overview • Mock assessment demonstration by trainers
Lunch	
	<p><i>Group Work: Setting up the Laptops, Logging Students into the Assessment, Repacking the Pelican Cases</i></p>
Day 2 Wrap-up	<ul style="list-style-type: none"> ▪ Remaining questions from Day 2

Exhibit E-1. Test administrator training agenda—Continued

PISA 2018 Main Study Test Administrator Training Agenda August 21-23, 2018	
Day 3 – Thursday, August 23, 2018, 9:00 – 4:00	
SESSION	TOPICS
Welcome to Day 3	<ul style="list-style-type: none"> Remaining Questions from Day 2
SESSION 9: Activities to Complete After the Session	<ul style="list-style-type: none"> Determining a Makeup <p><i>Exercise: Determining a Makeup</i></p> <ul style="list-style-type: none"> Finalizing assessment materials Finalizing the School Storage Envelope <p><i>Exercise: How to Organize Materials and Forms</i></p> <ul style="list-style-type: none"> Conducting the School Coordinator Debriefing Interview
Morning Break	
SESSION 10: Activities to Complete at Home	<ul style="list-style-type: none"> Updating the SCS with post-assessment information Finalizing the School Folder
Lunch	
	<ul style="list-style-type: none"> Uploading and transmitting student data to Westat <p><i>Exercise: Uploading and Transmitting Student Data</i></p>
SESSION 11: Training Your AAs	<ul style="list-style-type: none"> Conducting the AA Training
Afternoon Break	
SESSION 12: TA Training Wrap-up	<ul style="list-style-type: none"> Administrative activities DCIUFs Meet with Field Manager

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018

Exhibit E-2. Assistant administrator training agenda

 PISA USA	Program for International Student Assessment (PISA) 2018 Main Study Assistant Administrator Training Agenda August 2018
SESSION	TOPICS
SESSION 1: Welcome and Overview	<ul style="list-style-type: none"> Overview of the PISA 2018
SESSION 2: Key PISA Materials	<ul style="list-style-type: none"> Adhering to Security and Confidentiality Guidelines Understanding sampling and tracking forms PISA accommodations
SESSION 3: Activities to Complete Before Assessment Day	<ul style="list-style-type: none"> Preparing the assessment materials <i>Exercise: Preparing Materials</i> <ul style="list-style-type: none"> Gathering Materials to Bring to the Assessment
SESSION 4: Activities to Complete Upon Arriving at the School	<ul style="list-style-type: none"> Arriving at the school Setting up the room
Lunch	
SESSION 5: Conducting the Assessment Sessions	<ul style="list-style-type: none"> Beginning the session and logging students into the assessment Monitoring the session Ending the session and dismissing students Repacking the Pelican Cases <i>Group Work: Reviewing Session Scripts</i> <i>Exercise: Setting Up for CBA Sessions (Setting up and Breaking Down Computers)</i>
SESSION 6: Activities to Complete After the Session	<ul style="list-style-type: none"> Finalizing Sampling and Tracking Forms
SESSION 7: Training Wrap-up	<ul style="list-style-type: none"> Any remaining questions from training? Share assessment schedule (if not already done) Discuss outstanding travel details (if necessary)

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018

Appendix F. Variables Deleted from the U.S. PISA 2018 Questionnaires

Table F-1 presents the international items that were not administered in the U.S. questionnaires. These items are not adapted for American English.

Table F-1. Variables not used in the United States: 2018

Variable name	Questionnaire item wording
Student questionnaire	
ST002Q01TA	Which one of the following programs are you in?
ST177Q01HA	How many languages [...] do you and your parents speak well enough to converse with others? You
ST177Q02HA	How many languages [...] do you and your parents speak well enough to converse with others? Your mother
ST177Q03HA	How many languages [...] do you and your parents speak well enough to converse with others? Your father
ST189Q01HA	How many foreign languages do you learn at your school this school year?
ST196Q01HA	How easy do you think it would be for you to perform the following tasks on your own? Predict how changes to an environment will affect the survival of certain species.
ST196Q02HA	How easy do you think it would be for you to perform the following tasks on your own? Explain how carbon-dioxide emissions affect global climate change.
ST196Q03HA	How easy do you think it would be for you to perform the following tasks on your own? Establish a connection between prices of textiles and working conditions in the countries of production.
ST196Q04HA	How easy do you think it would be for you to perform the following tasks on your own? Discuss the different reasons why people become refugees.
ST196Q05HA	How easy do you think it would be for you to perform the following tasks on your own? Explain why some countries suffer more from global climate change than others.
ST196Q06HA	How easy do you think it would be for you to perform the following tasks on your own? Explain how economic crises in single countries affect the global economy.
ST196Q07HA	How easy do you think it would be for you to perform the following tasks on your own? Discuss the consequences of economic development on the environment.
ST197Q01HA	How informed are you about the following topics? Climate change and global warming
ST197Q02HA	How informed are you about the following topics? Global health (e.g. epidemics)
ST197Q03HA	How informed are you about the following topics? Population growth
ST197Q04HA	How informed are you about the following topics? Migration (movement of people)

See note at end of table.

Table F-1. Variables not used in the United States: 2018—Continued

Variable name	Questionnaire item wording
Student questionnaire—Continued	
ST197Q05HA	How informed are you about the following topics? Impacts of developments in the global economy
ST197Q06HA	How informed are you about the following topics? Air pollution
ST197Q07HA	How informed are you about the following topics? International conflicts
ST197Q08HA	How informed are you about the following topics? Hunger or malnutrition in different parts of the world
ST197Q09HA	How informed are you about the following topics? Causes of poverty
ST197Q10HA	How informed are you about the following topics? The pace of technological change in the world
ST197Q11A	How informed are you about the following topics? The impact of ageing populations
ST197Q12A	How informed are you about the following topics? Equality between men and women in different parts of the world
ST197Q13A	How informed are you about the following topics? The consequences of clearing forests for other land use
ST204Q02HA	People are increasingly moving from one country to another. How much do you agree with the following statements about immigrants? Immigrant children should have the same opportunities for education that other children in the country have.
ST204Q03HA	People are increasingly moving from one country to another. How much do you agree with the following statements about immigrants? Immigrants who live in a country for several years should have the opportunity to vote in elections.
ST204Q04HA	People are increasingly moving from one country to another. How much do you agree with the following statements about immigrants? Immigrants should have the opportunity to continue their own customs and lifestyle.
ST204Q05HA	People are increasingly moving from one country to another. How much do you agree with the following statements about immigrants? Immigrants should have all the same rights that everyone else in the country has.
ST204Q06HA	People are increasingly moving from one country to another. How much do you agree with the following statements about immigrants? When there are not many jobs available, immigration should be restricted.
ST214Q01HA	How well does each of the following statements below describe you? I want to learn how people live in different countries.
ST214Q02HA	How well does each of the following statements below describe you? I want to learn more about the religions of the world.
ST214Q03HA	How well does each of the following statements below describe you? I am interested in how people from various cultures see the world.
ST214Q06HA	How well does each of the following statements below describe you? I am interested in finding out about the traditions of other cultures.
ST215Q01HA	How well does each of the following statements below describe you? I try to look at everybody's side of a disagreement before I make a decision.
ST215Q02HA	How well does each of the following statements below describe you? I believe that there are two sides to every question and try to look at them both.

See note at end of table.

Table F-1. Variables not used in the United States: 2018—Continued

Variable name	Questionnaire item wording
Student questionnaire—Continued	
ST215Q03HA	How well does each of the following statements below describe you? I sometimes try to understand my friends better by imagining how things look from their perspective.
ST215Q04HA	How well does each of the following statements below describe you? Before criticizing somebody, I try to imagine how I would feel if I were in their place.
ST215Q05HA	How well does each of the following statements below describe you? When I'm upset at someone, I try to take the perspective of that person for a while.
ST216Q01HA	How well does each of the following statements below describe you? I can deal with unusual situations.
ST216Q02HA	How well does each of the following statements below describe you? I can change my behavior to meet the needs of new situations.
ST216Q03HA	How well does each of the following statements below describe you? I can adapt to different situations even when under stress or pressure.
ST216Q04HA	How well does each of the following statements below describe you? I can adapt easily to a new culture.
ST216Q05HA	How well does each of the following statements below describe you? When encountering difficult situations with other people, I can think of a way to resolve the situation.
ST216Q06HA	How well does each of the following statements below describe you? I am capable of overcoming my difficulties in interacting with people from other cultures.
ST217Q01HA	How well does each of the following statements below describe you? I respect people from other cultures as equal human beings.
ST217Q02HA	How well does each of the following statements below describe you? I treat all people with respect regardless of their cultural background.
ST217Q03HA	How well does each of the following statements below describe you? I give space to people from other cultures to express themselves.
ST217Q04HA	How well does each of the following statements below describe you? I respect the values of people from different cultures.
ST217Q05HA	How well does each of the following statements below describe you? I value the opinions of people from different cultures.
ST218Q01HA	To what extent do you agree with the following statements? I carefully observe their reactions.
ST218Q02HA	To what extent do you agree with the following statements? I frequently check that we are understanding each other correctly.
ST218Q03HA	To what extent do you agree with the following statements? I listen carefully to what they say.
ST218Q04HA	To what extent do you agree with the following statements? I choose my words carefully.
ST218Q05HA	To what extent do you agree with the following statements? I give concrete examples to explain my ideas.
ST218Q06HA	To what extent do you agree with the following statements? I explain things very carefully.

See note at end of table.

Table F-1. Variables not used in the United States: 2018—Continued

Variable name	Questionnaire item wording
Student questionnaire—Continued	
ST218Q07HA	To what extent do you agree with the following statements? If there is a problem with communication, I find ways around it (e.g. by using gestures, re-explaining, writing etc.).
ST219Q01HA	To what extent do you agree with the following statements? I think of myself as a citizen of the world.
ST219Q02HA	To what extent do you agree with the following statements? When I see the poor conditions that some people in the world live under, I feel a responsibility to do something about it.
ST219Q03HA	To what extent do you agree with the following statements? I think my behavior can impact people in other countries.
ST219Q04HA	To what extent do you agree with the following statements? It is right to boycott companies that are known to provide poor workplace conditions for their employees.
ST219Q05HA	To what extent do you agree with the following statements? I can do something about the problems of the world.
ST219Q06HA	To what extent do you agree with the following statements? Looking after the global environment is important to me.
ST220Q01HA	Do you have contact with people from other countries? In your family
ST220Q02HA	Do you have contact with people from other countries? At school
ST220Q03HA	Do you have contact with people from other countries? In your neighborhood
ST220Q04HA	Do you have contact with people from other countries? In your circle of friends
ST221Q01HA	Do you learn the following at school? I learn about the interconnectedness of countries' economies.
ST221Q02HA	Do you learn the following at school? I learn how to solve conflicts with other people in our classrooms.
ST221Q03HA	Do you learn the following at school? I learn about different cultures.
ST221Q04HA	Do you learn the following at school? We read newspapers, look for news on the Internet or watch the news together during classes.
ST221Q05HA	Do you learn the following at school? I am often invited by my teachers to give my personal opinion about international news.
ST221Q06HA	Do you learn the following at school? I participate in events celebrating cultural diversity throughout the school year.
ST221Q07HA	Do you learn the following at school? I participate in classroom discussions about world events as part of the regular instruction.
ST221Q08HA	Do you learn the following at school? I analyze global issues together with my classmates in small groups during class.
ST221Q09HA	Do you learn the following at school? I learn how people from different cultures can have different perspectives on some issues.
ST221Q11HA	Do you learn the following at school? I learn how to communicate with people from different backgrounds.
ST222Q01HA	Are you involved in the following activities? I reduce the energy I use at home (e.g. by turning the heating or air conditioning down or by turning off the lights when leaving a room) to protect the environment.

See note at end of table.

Table F-1. Variables not used in the United States: 2018—Continued

Variable name	Questionnaire item wording
Student questionnaire—Continued	
ST222Q03HA	Are you involved in the following activities? I choose certain products for ethical or environmental reasons, even if they are a bit more expensive.
ST222Q04HA	Are you involved in the following activities? I sign environmental or social petitions online.
ST222Q05HA	Are you involved in the following activities? I keep myself informed about world events via <Twitter> or <Facebook>.
ST222Q06HA	Are you involved in the following activities? I boycott products or companies for political, ethical, or environmental reasons.
ST222Q08HA	Are you involved in the following activities? I participate in activities promoting equality between men and women.
ST222Q09HA	Are you involved in the following activities? I participate in activities in favor of environmental protection.
ST222Q10HA	Are you involved in the following activities? I regularly read websites on international social issues (e.g. poverty, human rights).
ST223Q02HA	Thinking about teachers in your school: to how many of them do the following statements apply? They have misconceptions about the history of some cultural groups.
ST223Q04HA	Thinking about teachers in your school: to how many of them do the following statements apply? They say negative things about people of some cultural groups.
ST223Q05HA	Thinking about teachers in your school: to how many of them do the following statements apply? They blame people of some cultural groups for problems faced by <country of test>.
ST223Q08HA	Thinking about teachers in your school: to how many of them do the following statements apply? They have lower academic expectations for students of some cultural groups.
School questionnaire	
SC158010HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? The pace of technological change in the world
SC158011HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? The impact of ageing populations
SC158012HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Equality between men and women in different parts of the world
SC158013HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? The consequences of clearing forests for other land use
SC15801HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Climate change and global warming
SC15802HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Global health (e.g. epidemics)
SC15803HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Population growth
SC15804HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Migration (movement of people)

See note at end of table.

Table F-1. Variables not used in the United States: 2018—Continued

Variable name	Questionnaire item wording
School questionnaire—Continued	
SC15805HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Impacts of developments in the global economy
SC15806HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Air pollution
SC15807HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? International conflicts
SC15808HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Hunger or malnutrition in different parts of the world
SC15809HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Causes of poverty
SC16701HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Communicating with people from different cultures or countries
SC16702HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Knowledge of different cultures
SC16703HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Openness to intercultural experiences
SC16704HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Respect for cultural diversity
SC16705HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Foreign languages
SC16706HA	Is there any formal curriculum for the following in <national modal grade for 15-year-olds>? Critical thinking skills

SOURCE: U.S. Department of Education, National Center for Education Statistics, Program for International Student Assessment (PISA), 2018.

Appendix G. PISA 2018 Inter-rater Item Reliability

Table G-1. PISA 2018 inter-rater item reliabilities

Item	Item description	2018 IRR percent
Reading		
CR432Q01	About a book	100
CR432Q05	About a book	96
CR067Q05	Aesop	87
CR067Q04	Aesop	89
CR543Q15	Alfred Nobel	97
CR456Q02	Biscuits	96
CR456Q06	Biscuits	95
CR547Q09	Book survey	100
CR540Q04	Building a legend	99
CR542Q02	Bulletin board	92
CR420Q10	Children's futures	95
CR420Q09	Children's futures	99
CR420Q02	Children's futures	99
CR420Q06	Children's futures	93
CR455Q03	Chocolate and health	99
CR455Q02	Chocolate and health	89
CR550Q10	Cliff Palace	96
CR550Q09	Cliff Palace	98
CR550Q07	Cliff Palace	99
CR055Q02	Drugged spiders	92
CR055Q03	Drugged spiders	97
CR055Q05	Drugged spiders	97
CR219Q01C	Employment	100
CR219Q01D	Employment	99
CR219Q01E	Employment	97
CR219Q02	Employment	94
CR219Q01B	Employment	100
CR219Q01A	Employment	100
CR111Q06	Exchange	90
CR111Q02B	Exchange	93
CR552Q11	FestiRock	95
CR552Q08	FestiRock	92
CR552Q03	FestiRock	100
CR552Q04	FestiRock	94
CR460Q01	Gulf of Mexico	98
CR446Q06	Job vacancy	99
CR406Q05	Kokeshi dolls	96
CR406Q01	Kokeshi dolls	96
CR406Q02	Kokeshi dolls	93
CR554Q07	Literary magazine	88
CR545Q04	Machu Picchu	100
CR546Q03	Making news travel	90

See note at end of table.

Table G-1. PISA 2018 inter-rater item reliabilities—Continued

Item	Item description	2018 IRR percent
Reading—Continued		
CR549Q05	Message in a bottle	92
CR556Q09	Microlending	96
CR558Q12	Microwave ovens	93
CR558Q04	Microwave ovens	91
CR559Q08	Nalini Nadkarni	90
CR437Q07	Narcissus	92
CR544Q13	Nikola Tesla	98
CR544Q07	Nikola Tesla	95
CR561Q07	Olympic flag	97
CR562Q06	Opening night	90
CR562Q03	Opening night	95
CR227Q06	Optician	99
CR227Q03	Optician	96
CR541Q11	Plastic	93
CR541Q09	Plastic	94
CR541Q04	Plastic	96
CR563Q09	Question of the week	100
CR563Q12	Question of the week	98
CR563Q14	Question of the week	100
CR563Q13	Question of the week	99
CR551Q05	Rapa Nui	95
CR551Q11	Rapa Nui	92
CR564Q05	Sebastiao Salgado	97
CR102Q04	Shirts	99
CR102Q05	Shirts	99
CR565Q05	Sitting disease	91
CR565Q02	Sitting disease	87
CR404Q10B	Sleep	89
CR404Q10A	Sleep	96
CR567Q03	Smoke jumpers	97
CR568Q13	Space debris	92
CR568Q06	Space debris	95
CR453Q04	Summer job	87
CR453Q06	Summer job	97
CR553Q06	Teen health forum	96
CR553Q04	Teen health forum	90
CR569Q06	The cleanup	99
CR570Q10	The favor	98
CR573Q06	The portrait	89
CR566Q12	The Skellig rocks	93
CR566Q03	The Skellig rocks	92
CR466Q02	Work right	96
CR412Q08	World languages	92
CM998Q02	Bike rental	100
CM828Q02	Carbon dioxide	97

See note at end of table.

Table G-1. PISA 2018 inter-rater item reliabilities—Continued

Item	Item description	2018 IRR percent
Mathematics		
CM906Q02	Crazy ants	95
CM953Q04	Flu test	99
CM953Q02	Flu test	95
CM954Q02	Medicine doses	96
CM955Q02	Migration	93
CM9SSQ01	Migration	100
CM155Q02	Population pyramids	92
CM155Q03	Population pyramids	97
CM949Q03	Roof truss design	98
CM406Q02	Running tracks	99
CM406Q01	Running tracks	100
CM992Q03	Spacers	99
CM90SQ02	Tennis balls	98
CM446Q02	Thermometer cricket	99
CM462Q01	Third Side	93
CM00KQ02	Wheelchair basketball	100
Science		
CS608Q04	Ammonoids	90
CS428Q05	Bacteria in milk	94
CS607Q03	Birds and caterpillars	94
CS610Q01	Brain-controlled robotics	95
CS645Q04	Carbon dioxide in earth's atmosphere	92
CS643Q03	Comparing light bulbs	98
CS643Q05	Comparing light bulbs	89
CS514Q02	Development and disaster	98
CS414Q03	Development and disaster	93
CS514Q04	Development and disaster	99
CS603Q02	Elephants and Acacia trees	91
CS498Q04	Experimental digestion	88
CS605Q04	Geothermal energy	96
CS438Q03	Green parks	87
CS648Q01	Habitable zone	94
CS657Q04	Invasive species	88
CS326Q02	Milk	87
CS326Q01	Milk	92
CS646Q04	Nanoparticles	89
CS646Q05	Nanoparticles	91
CS425Q04	Penguin Island	96
CS425Q03	Penguin Island	92
CS635Q05	Save the Fish	94
CS635Q03	Save the Fish	96
CS629Q03	Solar cooker	90
CS629Q01	Solar cooker	90
CS602Q03	Urban heat island effect	90

See note at end of table.

Table G-1. PISA 2018 inter-rater item reliabilities—Continued

Item	Item description	2018 IRR percent
Science—Continued		
CS634Q03	Vaccination and spreading of disease	94
CS634Q05	Vaccination and spreading of disease	96
CS604Q04	Water from fog	91
CS408Q03	Wild oat grass	89
CS625Q01	Wildfires and the fire triangle	95
Financial literacy		
CF051Q01	Bicycle shop	94
CF054Q01	E-mail	97
CF201Q01	Emergency funds	98
CF106Q01	Family holiday	93
CF102Q02	Gantica	94
CF004Q03	Income tax	100
CF103Q01	Investing	93
CF024Q02	Jacket sale	99
CF068Q01	Job change	94
CF082Q01	New bike	97
CF203Q01	No credit	96
CF058Q01	PIN	93
CF303Q04	Purchasing a tablet	92

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

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 2018. This section of the appendix describes two simple indices that are included in the U.S. PISA dataset. For a detailed description of other PISA indices used in the international report and details on the methods used to create indices, see *PISA 2018 Technical Report* (OECD 2019b).

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).” Race/ethnicity and school poverty are provided in the U.S. national data.

Student-Level Simple Indices

Race/Ethnicity

Race/ethnicity data is indicated through a composite variable (RACETHC) and is obtained by asking two questions in the student questionnaire. Students were asked whether or not they were Hispanic or Latino (ST800C01HA). They were also asked about their race (ST801C01HA–ST801C05HA). In the case that students indicated they were more than one race, they were coded as Two or more races. 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.

School-Level Simple Indices

School Poverty

The index for school poverty (FRPL) was derived from a question (SC801) 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.

Appendix I. PISA 2018 Nonresponse Bias Analysis Report

1. 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, and in the 2018 cycle, additional optional assessments in global competence and financial literacy. The United States administered the core PISA assessments as well as the optional financial literacy assessment and teacher questionnaire in 2018. The 2018 cycle of the study was carried out in 79 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 2018, 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 used a two-stage stratified sampling design. The first stage used a systematic probability-proportionate-to-size technique to select schools where size is the estimated age-eligible enrollment of the school. Although 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 sorted sampling frame (immediately preceding and following the selected school) were designated as substitute schools. The sampling frame was sorted first by explicit and secondarily by implicit stratification variables so the replacement schools were within the same strata as the original school. 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 52 students was selected in an equal probability sample, unless fewer than 52 students aged 15 were available (in which case all students were selected). PISA International standards require that the age of sampled students be 15 years and 3 months to 16 years and 2 months at the beginning of the testing period. The sample of teachers was selected in a similar manner as the student sample. Eligible teachers were those eligible to teach grade 10 (the modal grade) and were selected with equal probability. Within each school, a total of up to 25 teachers were selected (10 English/Language Arts (ELA) teachers and 15 non-ELA teachers).

There are two sets of two sets PISA participation rates. One is for reporting response rates which is described in chapter 6. The second is based on data that is included in the PISA database that are used in this nonresponse bias analysis and are described next. There were 257 schools in the original national sample. Of these 257 sampled schools, 215 were determined to be eligible¹ (the eligible original school sample), having at least one age-eligible student. For the purposes of calculating response rates, international PISA standards stipulated that schools with a student participation rate between 25 percent and 50 percent were not considered as a participating school for the purposes of calculating and documenting response rates, which results in 136 participating schools as shown in chapter 6. However, data from such schools were included in the database and contributed to the estimates included in the initial PISA international report. Data from schools with a student participation rate of less than 25 percent were not included in the database, and such schools were regarded as nonrespondents. Two original sample schools with less than 50 percent of students participating had a student response rate of at least 25 percent, so these schools and students were included in the PISA 2018 database and the schools treated as participants in this nonresponse bias analysis report. The analysis of school nonresponse in this report was thus based on the following participating schools: 138 (the participating original sample) for an initial unweighted response rate of 64 percent before replacement (66 percent weighted). An additional 26 substitute schools participated for a total of 164 participating schools after replacement (the participating final sample). The unweighted school response rate increased to 76 percent (77 percent weighted). The school participation rates for this report are summarized in table I-1. The student and teacher participation rates after replacement are summarized in table I-2.

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.

¹ Of the 257 original schools selected for the sample, 42 schools were ineligible or closed.

Table I-1. Selected characteristics for the nonresponse bias analysis of the U.S. PISA final school sample: 2018

Sample	Schools in original sample	Eligible schools in sample	Number of participating schools		Percent			
			Before replacement	After replacement	School participation rate before replacement		School participation rate after replacement	
					Un-weighted	Weighted	Un-weighted	Weighted
United States	257	215	138	164	64.2	65.9	76.3	77.4

NOTE: Two original sample schools with less than 50 percent of students participating had a student response rate of at least 25 percent, so these schools and students were included in the PISA 2018 database and the schools treated as participants in this nonresponse bias analysis, so participation rates in this table differs from chapter 6.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

Table I-2. Student and teacher participation rates after replacement of the U.S. PISA final school sample: 2018

Sample	Percent			
	Student participation rate		English/Language Arts teacher participation rate	Non-English/Language Arts teacher participation rate
	Unweighted	Weighted	Unweighted	Unweighted
United States	84.5	84.7	81.8	79.5

NOTE: The student participation rates include the financial literacy sample of studies who did not take the PISA assessment.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

2. 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 general approach taken involves an analysis in three parts as described below.

1. Analysis of the participating original sample: The distribution of the participating original school sample ($N = 138$) was compared with that of the total eligible original school sample ($N = 215$). The participating original sample is the sample before substitution. In each sample, schools were weighted by their school base weights and enrollment of age-eligible students, referred to as a size-adjusted weight,² 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 school sample with substitutes: The distribution of the participating final school sample ($N = 164$), which includes 26 participating substitutes that were used as replacements for nonresponding schools from the eligible original sample, was compared to the total eligible final school sample ($N = 215$). The total eligible final sample includes the participating final sample plus those original nonrespondents that were not replaced by substitutes. Again, schools were weighted by their size-adjusted school base weights for both the eligible sample and the participating schools. The base weight for each substitute school is the reciprocal of its selection probability.
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 size-adjusted school base weights. The international weighting procedures form nonresponse adjustment classes by cross-classifying the explicit and implicit stratification variables. The eligible sample was again weighted by their size-adjusted school base weights.

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

² The size-adjusted weight modifies the PPS weight so that schools with relatively small number of students (and large school base weights) will not influence the results more than schools with relatively large number of students (and small school base weights).

characteristics examined here. However, 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 school 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 2015–16 Common Core of Data (CCD) and, for private schools, from the 2015–16 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 control³ (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., central city, suburb, town, rural);
- Census region—Northeast, Midwest, South, and West;⁴
- Poverty level⁵—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 or reduced-price lunch (FRPL) program, and a low-poverty school is defined as one in which less than 50 percent are eligible; and
- School size—age-eligible enrollment of school (as shown on school samples frame) divided into three equally sized categories (small, medium, and large).⁶

³ Includes charter schools.

⁴ For the definition of Census region as of the year on the school frame, 2016, see <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>.

⁵ 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.

⁶ Small schools had less than or equal to 105 age-eligible students. Medium schools had less than or equal to 365 age-eligible students. Large schools had more than 365 age-eligible students.

The following continuous variables were available in the sampling frame for all schools:

- Estimated number of age-eligible students enrolled;
- Total number of students; and
- 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).⁷

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.⁸

For categorical variables, the distribution of frame characteristics for participating schools 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 that follow. 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 the results below. The bias is calculated as 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 and is a measure of the size of the bias compared to the eligible sample (i.e., the unbiased) estimate.

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. The logistic regression compared frame characteristics for participating schools with nonparticipating schools, which is effectively the same as comparing the participating schools to the eligible sample as in the bivariate analysis.

Multivariate analysis can provide additional insights, over and above those gained through the bivariate analysis. It may be the case 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

⁷ Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin.

⁸ 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.

variables, which are not related to participation status, will appear as significant in simple bivariate tables. Multivariate analysis, in contrast, examines the conditional relationships with participation after controlling for the other predictor variables—thereby, testing the robustness of the relationships between school characteristics and participation.

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), referred to as the summed race/ethnicity percentage, 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.

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 third 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 between the two characteristics was also included in the model.

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 a regression analysis that compares respondents with nonrespondents using nonresponse-adjusted weights.

The bivariate analysis and the logistic regression were both performed using 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).

3. Participating Original Sample

This section presents the nonresponse bias analysis based on the original sample of 215 eligible schools for PISA. The distribution of the participating original sample was compared to the schools in the total eligible original sample. Size-adjusted school base weights were used for both the eligible sample and the participating schools. The unweighted school response rate for PISA was 64.2 percent, with 138 out of 215 schools participating. The weighted response rate was 65.9 percent.

3.1 Categorical Variables

The distribution of participating and eligible schools by the five characteristics is shown in table I-3. The Chi-square statistic for school control, census region, and poverty level are significant and suggests that there is evidence of relationships with participation in the assessment. In particular, public schools were overrepresented among participating schools relative to eligible schools (95.7 percent versus 92.9 percent, respectively; table I-3), while private schools were underrepresented among participating schools relative to eligible schools (4.3 percent versus 7.1 percent, respectively; table I-3). Schools in the Northeast were underrepresented among participating schools relative to eligible schools (11.3 percent versus 17.7 percent, respectively; table I-3), while schools in the South were overrepresented among participating schools relative to eligible schools (47.4 percent versus 37.5 percent, respectively; table I-3). Schools in low poverty were underrepresented among participating schools relative to eligible schools (51.1 percent versus 61.0 percent, respectively; table I-3), while schools in high poverty were overrepresented among participating schools relative to eligible schools (48.9 percent versus 39.0 percent, respectively; table I-3). There are no statistically significant relationships between participation status and any of the other characteristics shown in table I-3. However, the absolute value of the relative bias for small and large schools is greater than 10 percent, which indicates potential bias even though no statistically significant relationship was detected.

Table I-3. Percentage distribution of eligible and participating schools in the U.S. PISA original sample, by selected school characteristics: 2018

School characteristic	Sample schools		Bias	Relative bias	Chi-square <i>p</i> value
	Eligible (percent) (N = 215)	Participating (percent) (N = 138)			
School control					< .001
Public	92.9	95.7	2.75	0.030	
Private	7.1	4.3	-2.75	-0.388	
Locale					0.961
Central city	30.7	31.2	0.49	0.016	
Suburb	40.7	41.1	0.37	0.009	
Town	10.2	10.3	0.10	0.009	
Rural	18.4	17.4	-0.96	-0.052	
Census region					< .001
Northeast	17.7	11.3	-6.41	-0.363	
Midwest	20.8	16.4	-4.38	-0.211	
South	37.5	47.4	9.96	0.266	
West	24.1	24.9	0.83	0.034	
Poverty level					< .001
High	39.0	48.9	9.90	0.254	
Low	61.0	51.1	-9.90	-0.162	
School size					0.096
Small	17.0	13.9	-3.09	-0.182	
Medium	40.7	39.0	-1.75	-0.043	
Large	42.2	47.1	4.84	0.115	

NOTE: Detail may not sum to totals because of rounding. Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL); all private schools are treated as low-poverty schools. Eligible schools have at least one age-eligible 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 size-adjusted 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), 2018.

3.2 Continuous Variables

Summary means for each continuous variable for participating and eligible schools are shown in tables I-4 and I-5. No data on FRPL eligibility were available for private schools, so private schools are not included in the analysis shown in table I-5.

The *t* test statistic for total school and age-eligible enrollments are significant and suggests that there is evidence of relationships with participation in the assessment. In particular, participating schools had a higher mean total school enrollment than the eligible sample (1,518.5 versus 1,432.3, respectively; table I-4) and a higher mean age-eligible enrollment than the eligible sample (373.6 versus 348.9,

respectively; table I-4). The t test statistic for White, non-Hispanic, Black, non-Hispanic, and Hispanic are significant and suggests that there is evidence of relationships with participation in the assessment. In particular, participating schools had a lower mean percentage of White, non-Hispanic students than the eligible sample (46.8 percent versus 50.9 percent, respectively; table I-4), a higher mean percentage of Black, non-Hispanic students than the eligible sample (19.0 percent versus 16.9 percent, respectively; table I-4), and a higher mean percentage of Hispanic students than the eligible sample (24.6 percent versus 21.9 percent, respectively; table I-4). However, the absolute value of the relative bias for American Indian or Alaska Native and Hawaiian/Pacific Islander is greater than 10 percent, although this is due mostly to the eligible percentage being less than 5.0 percent, as the bias is relatively small. The t test statistic for free or reduced-price lunch is significant and suggests that there is evidence of relationships with participation in the assessment. In particular, participating schools had a higher mean percentage than the eligible sample (49.3 percent versus 46.3 percent, respectively; table I-5).

Table I-4. Mean values of various characteristics for eligible and participating schools in the U.S. PISA original sample: 2018

	Sample schools		Bias	Relative bias	t test p value
	Eligible (mean) (N = 215)	Participating (mean) (N = 138)			
Enrollment					
Total school	1,432.3	1,518.5	86.23	0.060	0.039
Age-eligible	348.9	373.6	24.67	0.071	0.022
Race/ethnicity percentage					
White, non-Hispanic	50.9	46.8	-4.14	-0.081	0.009
Black, non-Hispanic	16.9	19.0	2.18	0.129	0.026
Hispanic	21.9	24.6	2.69	0.123	0.021
Asian	5.9	5.8	-0.04	-0.006	0.936
American Indian or Alaska Native	0.9	0.8	-0.18	-0.191	0.473
Hawaiian/Pacific Islander	0.5	0.3	-0.23	-0.470	0.263
Two or more races	3.0	2.7	-0.29	-0.097	0.130

NOTE: Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Eligible schools have at least one age-eligible 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 size-adjusted 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), 2018.

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: 2018

Students	Sample schools		Bias	Relative bias	<i>t</i> test <i>p</i> value
	Eligible (percent) (N = 181)	Participating (percent) (N = 124)			
Percentage of students eligible for free or reduced-price lunch	46.3	49.3	2.98	0.064	0.007

NOTE: Eligible schools have at least one age-eligible 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 size-adjusted 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), 2018.

3.3 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.

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). Private schools are treated as low poverty for the categorical variable poverty level. The Northeast region, high poverty, and Two or more races were significant predictors of school participation in table I-6a. The negative parameter estimate for Northeast region indicates that relative to schools in the West region, schools in the Northeast region were somewhat underrepresented among the participating schools. The positive parameter estimate for high poverty indicates that relative to schools in low poverty, schools in high poverty were somewhat overrepresented among the participating schools. The negative parameter estimate for Two or more races indicates that relative to White, non-Hispanic students, students with Two or more races were somewhat underrepresented among the participating schools. The *F* test statistic to determine whether the race/ethnicity characteristics are simultaneously equal to 0 was 0.9695 with a *p* value of 0.4518, which indicates that no significant relationship with participation was detected. Only high poverty was a significant predictor of school participation in table I-6b. The positive parameter estimate indicates that relative to schools in low poverty, schools in high poverty were somewhat overrepresented among the participating schools.

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 term⁹ was also included in the model. Standard errors and tests of hypotheses for the full model parameter estimates are presented in table I-6c. None of the coefficients on the parameter estimates are significant. However, since poverty is not significant in this model, while it is in the previous two models, this suggests that there is confounding with poverty and private schools in the previous two models, since all private schools are classified as low poverty.

⁹ The interaction term can be interpreted as indicating whether the marginal effect of a one percentage-point increase in FRPL is diminished or amplified for schools above the 50 percent cut point, relative to those below the cut point.

Table I-6a. Logistic regression model parameters (with six race/ethnicity variables) using the U.S. PISA original school sample: 2018

Parameter	Parameter estimate	Standard error	<i>t</i> test for H ₀ : parameter = 0	<i>p</i> value
Intercept	0.591	1.0697	0.5527	0.5820
Private school	-0.028	0.6314	-0.0451	0.9642
Central city	0.603	0.6563	0.9194	0.3606
Suburb	0.660	0.5662	1.1653	0.2474
Town	0.522	0.7127	0.7319	0.4664
Northeast	-1.233	0.5953	-2.0719	0.0415
Midwest	-0.808	0.7156	-1.1298	0.2619
South	0.870	0.7310	1.1900	0.2376
High poverty	1.487	0.4824	3.0818	0.0028
Small	-0.336	0.9337	-0.3600	0.7198
Medium	-0.157	0.6227	-0.2521	0.8016
Total school enrollment	#	0.0012	0.1911	0.8489
Age-eligible enrollment	-0.001	0.0048	-0.1332	0.8944
Black, non-Hispanic	-0.005	0.0087	-0.5488	0.5847
Hispanic	-0.007	0.0115	-0.6249	0.5338
Asian	0.017	0.0271	0.6188	0.5378
American Indian or Alaska Native	-0.046	0.0473	-0.9712	0.3344
Hawaiian/Pacific Islander	-0.470	0.3977	-1.1828	0.2404
Two or more races	-0.132	0.0633	-2.0857	0.0402

NOTE: # Rounds to zero. Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (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 size-adjusted 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), 2018.

Table I-6b. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA original school sample: 2018

Parameter	Parameter estimate	Standard error	<i>t</i> test for H ₀ : parameter = 0	<i>p</i> value
Intercept	0.097	0.9605	0.1012	0.9196
Private school	-0.293	0.561	-0.5219	0.6032
Central city	0.310	0.5819	0.5331	0.5954
Suburb	0.423	0.5303	0.7972	0.4277
Town	0.407	0.6187	0.6572	0.5130
Northeast	-0.814	0.5513	-1.4768	0.1437
Midwest	-0.584	0.5676	-1.0297	0.3063
South	0.978	0.4925	1.9852	0.0506
High poverty	1.398	0.4139	3.3774	0.0011
Small	-0.204	0.8573	-0.2377	0.8127
Medium	-0.208	0.6266	-0.3322	0.7406
Total school enrollment	#	0.0011	-0.3176	0.7516
Age-eligible enrollment	0.002	0.0044	0.4506	0.6535
Summed race/ethnicity percentage	-0.006	0.0065	-0.9296	0.3554

Rounds to zero.

NOTE: Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL); all private schools are treated as low-poverty schools. Schools were weighted by their size-adjusted 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), 2018.

Table I-6c. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA original public school sample: 2018

Parameter	Parameter estimate	Standard error	t test for H_0 : parameter = 0	p value
Intercept	0.262	1.0671	0.2454	0.8067
Central city	0.297	0.7099	0.4190	0.6763
Suburb	0.393	0.6551	0.6002	0.5501
Town	0.699	0.7370	0.9483	0.3459
Northeast	-0.832	0.6359	-1.3088	0.1943
Midwest	-0.665	0.6545	-1.0154	0.3130
South	1.030	0.6040	1.7060	0.0919
High poverty	2.281	1.6303	1.3992	0.1656
Small	0.134	1.0217	0.1310	0.8961
Medium	-0.268	0.7232	-0.3699	0.7124
Free or reduced-price lunch eligibility	-0.017	0.0220	-0.7580	0.4507
High poverty*free or reduced-price lunch eligibility	-0.005	0.0271	-0.1751	0.8614
Total school enrollment	0.003	0.0021	1.2959	0.1987
Age-eligible enrollment	-0.010	0.0082	-1.2053	0.2316
Summed race/ethnicity percentage	-0.002	0.0088	-0.1959	0.8452

NOTE: Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL). Schools were weighted by their size-adjusted 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), 2018.

4. Participating Final Sample with Substitutes

This section presents the nonresponse bias analysis based on the final sample of 215 eligible schools for the U.S. PISA sample, including participating substitute schools. The distribution of the participating final sample of schools was compared to the schools in the total eligible final sample. The total eligible final sample includes the participating final sample plus those original nonrespondents who were not replaced by substitutes. Size-adjusted 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 76.3 percent, with 164 out of 215 schools participating. The weighted response rate was 77.4 percent.

4.1 Categorical Variables

The distribution of participating and eligible schools by the five characteristics is shown in table I-7. The Chi-square statistic for school control, census region, and poverty level are significant and suggests that there is evidence of relationships with participation in the assessment. In particular, public schools were overrepresented among participating schools relative to eligible schools (95.0 percent versus 92.9 percent, respectively; table I-7), while private schools were underrepresented among participating schools relative to eligible schools (5.0 percent versus 7.1 percent, respectively; table I-7). Schools in the Northeast and Midwest were underrepresented among participating schools relative to eligible schools (12.9 percent versus 17.6 percent and 18.7 percent versus 20.8 percent, respectively; table I-7), while schools in the South were overrepresented among participating schools (43.1 percent versus 37.5 percent, respectively; table I-7). Schools in low poverty were underrepresented among participating schools relative to eligible schools (55.2 percent versus 60.0 percent, respectively; table I-7), while schools in high poverty were overrepresented among participating schools (44.8 percent versus 40.0 percent, respectively; table I-7). There are no statistically significant relationships between participation status and any of the other characteristics shown in table I-7. However, the absolute value of the relative bias for small schools is greater than 10 percent, which indicates potential bias even though no statistically significant relationship was detected.

Table I-7. Percentage distribution of eligible and participating schools in the U.S. PISA final sample, by selected school characteristics: 2018

School characteristic	Sample schools		Bias	Relative bias	Chi-square <i>p</i> value
	Eligible (percent) (N = 215)	Participating (percent) (N = 164)			
School control					0.002
Public	92.9	95.0	2.15	0.023	
Private	7.1	5.0	-2.15	-0.303	
Locale					0.988
Central city	30.7	30.4	-0.35	-0.011	
Suburb	40.7	41.2	0.55	0.014	
Town	10.2	10.1	-0.17	-0.017	
Rural	18.4	18.4	-0.03	-0.002	
Census region					0.001
Northeast	17.6	12.9	-4.78	-0.271	
Midwest	20.8	18.7	-2.14	-0.103	
South	37.5	43.1	5.61	0.150	
West	24.0	25.3	1.31	0.054	
Poverty level					0.003
High	40.0	44.8	4.83	0.121	
Low	60.0	55.2	-4.83	-0.080	
School size					0.062
Small	17.0	14.8	-2.22	-0.130	
Medium	40.7	38.8	-1.95	-0.048	
Large	42.2	46.4	4.17	0.099	

NOTE: Detail may not sum to totals because of rounding. Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL); all private schools are treated as low-poverty schools. Eligible schools have at least one age-eligible 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 size-adjusted 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), 2018.

4.2 Continuous Variables

Summary means for each continuous variable for participating and eligible schools are shown in tables I-8 and I-9. No data on FRPL eligibility were available for private schools, so private schools are not included in the analysis shown in table I-9.

The *t* test statistic for age-eligible enrollment is significant and suggests that there is evidence of relationships with participation in the assessment. In particular, participating schools had higher mean age-eligible enrollment than the eligible sample (365.3 versus 349.1, respectively; table I-8). There were no statistically significant differences between participating and eligible schools with respect to

race/ethnicity percentage (table I-8). However, the absolute value of the relative bias for Hawaiian/Pacific Islander is greater than 10 percent, although this is due mostly to the eligible percentage being less than 5.0 percent, as the bias is relatively small. There was also no statistically significant difference between participating and eligible schools with respect to free or reduced-price lunch (table I-9).

Table I-8. Mean values of various characteristics for eligible and participating schools in the U.S. PISA final sample: 2018

Characteristic	Sample schools		Bias	Relative bias	<i>t</i> test <i>p</i> value
	Eligible (mean) (N = 215)	Participating (mean) (N = 164)			
Enrollment					
Total school	1,432.0	1,483.2	51.27	0.036	0.112
Age-eligible	349.1	365.3	16.28	0.047	0.049
Race/ethnicity percentage					
White, non-Hispanic	50.6	49.9	-0.76	-0.015	0.466
Black, non-Hispanic	17.4	17.8	0.38	0.022	0.594
Hispanic	21.7	22.6	0.86	0.040	0.282
Asian	6.1	6.1	-0.07	-0.011	0.811
American Indian or Alaska Native	0.8	0.8	0.07	0.089	0.330
Hawaiian/Pacific Islander	0.5	0.3	-0.23	-0.469	0.275
Two or more races	2.9	2.6	-0.26	-0.088	0.134

NOTE: Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Eligible schools have at least one age-eligible 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 size-adjusted 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), 2018.

Table I-9. Mean percentage of students eligible for free or reduced-price lunch, in eligible and participating public schools in the U.S. PISA final sample: 2018

Students	Sample schools		Bias	Relative bias	<i>t</i> test <i>p</i> value
	Eligible (percent) (N = 181)	Participating (percent) (N = 144)			
Percentage of students eligible for free or reduced-price lunch	46.9	47.6	0.78	0.017	0.362

NOTE: Eligible schools have at least one age-eligible 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 size-adjusted 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), 2018.

4.3 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.

Standard errors and tests of hypotheses for the full model parameter estimates are presented in table I-10a (with six race/ethnicity variables) and table I-10b (with summed race/ethnicity percentage). The Northeast region, high poverty, and Two or more races were a significant predictor of school participation in table I-10a. The negative parameter estimate for Northeast region indicates that relative to schools in the West region, schools in the Northeast region were somewhat underrepresented among the participating schools. The positive parameter estimate for high poverty indicates that relative to schools in low poverty, schools in high poverty were somewhat overrepresented among the participating schools. The negative parameter estimate for Two or more races indicates that relative to White, non-Hispanic students, students with Two or more races were somewhat underrepresented among the participating schools. The *F* test statistic to determine whether the race/ethnicity characteristics are simultaneously equal to 0 was 1.5092 with a *p* value of 0.1868, which indicates no significant relationship was detected with participation. High poverty and the summed race/ethnicity percentage were a significant predictor of school participation in table I-10b. The positive parameter estimate for high poverty indicates that relative to schools in low poverty, schools in high poverty were somewhat overrepresented among the participating schools. The negative parameter estimate for the summed race/ethnicity indicates that relative to White, non-Hispanic students, all other students were somewhat underrepresented among the participating schools.

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-10c (with public schools only). High poverty was a significant predictor of school participation among public schools only. The positive parameter estimates indicate that relative to low-poverty public schools, high-poverty public schools were overrepresented among the participating public schools.

Table I-10a. Logistic regression model parameters (with six race/ethnicity variables) using the U.S. PISA final school sample: 2018

Parameter	Parameter estimate	Standard error	<i>t</i> test for H ₀ : parameter = 0	<i>p</i> value
Intercept	2.822	1.4422	1.9569	0.0538
Private school	-0.170	0.7387	-0.2301	0.8186
Central city	0.748	0.6370	1.1738	0.2440
Suburb	0.692	0.5971	1.1593	0.2498
Town	0.083	0.7021	0.1187	0.9058
Northeast	-1.500	0.6667	-2.2499	0.0272
Midwest	-0.972	0.7237	-1.3424	0.1833
South	0.822	0.8466	0.9712	0.3344
High poverty	1.664	0.5820	2.8600	0.0054
Small	-1.105	1.2553	-0.8807	0.3811
Medium	-0.790	0.9200	-0.8584	0.3932
Total school enrollment	#	0.0014	-0.3152	0.7534
Age-eligible enrollment	0.001	0.0055	0.1565	0.8760
Black, non-Hispanic	-0.020	0.0110	-1.7743	0.0798
Hispanic	-0.024	0.0124	-1.8943	0.0618
Asian	0.006	0.0256	0.2174	0.8284
American Indian or Alaska Native	0.059	0.0833	0.7043	0.4833
Hawaiian/Pacific Islander	-0.433	0.4907	-0.8828	0.3800
Two or more races	-0.181	0.0711	-2.5486	0.0127

Rounds to zero.

NOTE: Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (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, and by their estimated number of age-eligible students.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

Table I-10b. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA final school sample: 2018

Parameter	Parameter estimate	Standard error	<i>t</i> test for H ₀ : parameter = 0	<i>p</i> value
Intercept	2.542	1.3952	1.8223	0.0722
Private school	-0.284	0.6657	-0.4264	0.6709
Central city	0.376	0.5791	0.6495	0.5179
Suburb	0.340	0.5930	0.5742	0.5675
Town	-0.007	0.6750	-0.0099	0.9921
Northeast	-1.282	0.6565	-1.9522	0.0544
Midwest	-0.925	0.6239	-1.4820	0.1423
South	0.730	0.6171	1.1836	0.2401
High poverty	1.402	0.5025	2.7895	0.0066
Small	-0.916	1.2327	-0.7434	0.4594
Medium	-0.799	0.9461	-0.8449	0.4007
Total school enrollment	-0.001	0.0012	-0.9364	0.3519
Age-eligible enrollment	0.004	0.0050	0.7677	0.4449
Summed race/ethnicity percentage	-0.019	0.0074	-2.6267	0.0103

NOTE: Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL); all private schools are treated as low-poverty schools. Schools were weighted by their school base weights that did not include a nonresponse adjustment factor, and by their estimated number of age-eligible students.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

Table I-10c. Logistic regression model parameters (with summed race/ethnicity percentage) using the U.S. PISA final public school sample: 2018

Parameter	Parameter estimate	Standard error	<i>t</i> test for H ₀ : parameter = 0	<i>p</i> value
Intercept	2.524	1.5119	1.6692	0.0990
Central city	0.058	0.7521	0.0766	0.9392
Suburb	-0.004	0.7711	-0.0049	0.9961
Town	0.242	0.8030	0.3014	0.7639
Northeast	-1.136	0.7781	-1.4596	0.1483
Midwest	-1.030	0.6810	-1.5118	0.1345
South	0.847	0.7681	1.1032	0.2733
High poverty	3.654	1.8175	2.0107	0.0477
Small	-0.165	1.4275	-0.1154	0.9084
Medium	-0.740	1.0083	-0.7336	0.4653
Free or reduced-price lunch eligibility	-0.014	0.0247	-0.5675	0.5720
High poverty*free or reduced-price lunch eligibility	-0.025	0.0286	-0.8872	0.3776
Total school enrollment	#	0.0018	-0.0430	0.9658
Age-eligible enrollment	#	0.0075	0.0589	0.9532
Summed race/ethnicity percentage	-0.015	0.0111	-1.3221	0.1899

Rounds to zero.

NOTE: Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL). Schools were weighted by their school base weights that did not include a nonresponse adjustment factor, and by their estimated number of age-eligible students.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

5. Nonresponse-adjusted Final Sample with Substitutes

This section presents the nonresponse bias analysis based on the final sample of 215 eligible schools for the U.S. PISA sample. 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. However, in the analysis that follows, size-adjusted school base weights were used for the eligible sample of schools, whereas nonresponse adjustments were applied to the size-adjusted school base weights for the participating schools.

5.1 Categorical Variables

The distribution of participating and eligible schools by the five characteristics is shown in table I-11. There are no statistically significant relationships between participation status and any of the characteristics shown in table I-11. However, the absolute value of the relative bias for small sized schools is greater than 10 percent, which indicates potential bias even though no statistically significant relationships were detected.

Table I-11. Percentage distribution of eligible and participating schools in the U.S. PISA nonresponse-adjusted sample, by selected school characteristics: 2018

School characteristic	Sample schools		Bias	Relative bias	Chi-square <i>p</i> value
	Eligible (percent) (N = 215)	Participating (percent) (N = 164)			
School control					1.000
Public	92.9	92.9	0.00	0.000	
Private	7.1	7.1	0.00	0.000	
Locale					0.827
Central city	30.7	30.4	-0.33	-0.011	
Suburb	40.7	42.5	1.79	0.044	
Town	10.2	10.3	0.05	0.005	
Rural	18.4	16.9	-1.52	-0.083	
Census region					0.567
Northeast	17.6	16.2	-1.48	-0.084	
Midwest	20.8	21.7	0.94	0.045	
South	37.5	38.1	0.57	0.015	
West	24.0	24.0	-0.03	-0.001	
Poverty level					0.453
High	40.0	43.8	3.80	0.095	
Low	60.0	56.2	-3.80	-0.063	
School size					0.791
Small	17.0	15.2	-1.84	-0.108	
Medium	40.7	40.2	-0.57	-0.014	
Large	42.2	44.6	2.41	0.057	

NOTE: Detail may not sum to totals because of rounding. Census region is the state-based region of the country, <https://www.census.gov/geographies/reference-files/2016/demo/popest/2016-fips.html>. For public schools, a high-poverty school is defined as one in which 50 percent or more of the students are eligible for free or reduced-price lunch program (FRPL); all private schools are treated as low-poverty schools. Eligible schools have at least one age-eligible 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. Participating schools were weighted by their size-adjusted school nonresponse adjusted weights. The eligible sample were weighted by their size-adjusted school base weights.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

5.2 Continuous Variables

Summary means for each continuous variable for participating and eligible schools are shown in tables H-12 and H-13. No data on FRPL eligibility were available for private schools, so private schools are not included in the analysis shown in table I-13.

There were no statistically significant differences between participating and eligible schools with respect to enrollment or race/ethnicity percentage (table I-12). However, the absolute value of the relative bias for Hawaiian/Pacific Islander is greater than 10 percent, although this is due mostly to the eligible percentage

being less than 5.0 percent, as the bias is relatively small. There was also no statistically significant difference between participating and eligible schools with respect to free or reduced-price lunch (table I-13).

Table I-12. Mean values of various characteristics for eligible and participating schools in the U.S. PISA nonresponse-adjusted sample: 2018

Characteristic	Sample schools		Bias	Relative bias	<i>t</i> test <i>p</i> value
	Eligible (mean) (N = 215)	Participating (mean) (N = 164)			
Enrollment					
Total school	1,432.0	1,462.9	30.98	0.022	0.698
Age-eligible	349.1	359.2	10.10	0.029	0.617
Race/ethnicity percentage					
White, non-Hispanic	50.6	50.5	-0.09	-0.002	0.969
Black, non-Hispanic	17.4	17.1	-0.32	-0.018	0.873
Hispanic	21.7	22.1	0.42	0.019	0.796
Asian	6.1	6.5	0.40	0.065	0.726
American Indian or Alaska Native	0.8	0.8	0.05	0.064	0.894
Hawaiian/Pacific Islander	0.5	0.3	-0.22	-0.454	0.300
Two or more races	2.9	2.7	-0.24	-0.081	0.351

NOTE: Black includes African American, and Hispanic includes Latino. Racial categories exclude Hispanic origin. Eligible schools have at least one age-eligible 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. Participating schools were weighted by their size-adjusted school nonresponse adjusted weights. The eligible samples were weighted by their size-adjusted school base weights.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

Table I-13. 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: 2018

Students	Sample schools		Bias	Relative bias	<i>t</i> test <i>p</i> value
	Eligible (percent) (N = 181)	Participating (percent) (N = 144)			
Percentage of students eligible for free or reduced-price lunch	46.9	47.3	0.47	0.010	0.851

NOTE: Eligible schools have at least one age-eligible 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. Participating schools were weighted by their size-adjusted school nonresponse adjusted weights. The eligible sample were weighted by their size-adjusted school base weights.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

6. Summary

Since the U.S. PISA weighted school response rates are below 85 percent, NCES requires an investigation into the potential magnitude of nonresponse bias at the school level in the U.S. sample. The investigation into nonresponse bias at the school level for the U.S. PISA effort shows statistically significant relationships between response status and some of the available school characteristics that were examined in the analyses.

For original sample schools, nine variables were found to be statistically significantly related to participation in the bivariate analysis: school control (table I-3), census region (table I-3), poverty level (table I-3), total school and age-eligible enrollments (table I-4), White, non-Hispanic (table I-4), Black, non-Hispanic (table I-4), Hispanic (table I-4), and free or reduced-price lunch (table I-5). Additionally, the absolute value of the relative bias for small and large schools (table I-3), American Indian or Alaska Native (table I-4), and Hawaiian/Pacific Islander (table I-4) is greater than 10 percent, which indicates potential bias even though no statistically significant relationship was detected. Although each of these findings indicates some potential for nonresponse bias, when all of these factors were considered simultaneously in a regression analysis, the Northeast region, high poverty, and Two or more races were significant predictors of school participation (table I-6a). The second model showed that high poverty was a significant predictor of participation (table I-6b, with summed race/ethnicity percentage). None of the parameter estimates in the third model were significant predictors of school participation among public schools only (table I-6c).

For the final sample of schools (with substitutes), four variables were found to be statistically, significantly related to participation in the bivariate analysis: school control (table I-7), census region (table I-7), poverty level (table I-7), and age-eligible enrollment (table I-8). Additionally, the absolute value of the relative bias for small sized schools (table I-7) and Hawaiian/Pacific Islander (table I-8) are again greater than 10 percent. When all of these factors were considered simultaneously in a regression analysis, the Northeast region, high poverty, and Two or more races were significant predictors of participation (table I-10a). The second model showed that high poverty and the summed race/ethnicity percentage were significant predictors of participation (table I-10b, with summed race/ethnicity percentage). The third model showed that high poverty was a significant predictor of school participation among public schools only (table I-10c).

For the final sample of schools (with substitutes) with school nonresponse adjustments applied to the weights, no variables were found to be statistically significantly related to participation in the bivariate analysis. However, the absolute value of the relative bias for small sized schools (table I-11) and

Hawaiian/Pacific Islander (table I-12) is again greater than 10 percent. 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 analysis are summarized in table I-14.

Table I-14. Characteristics with p values less than 0.05 and absolute relative bias greater than 10 percent, U.S. PISA schools: 2018

Analysis	Characteristics with p values less than 0.05	Additional characteristics with absolute relative bias greater than 10 percent
Original sample	School control, Census region, poverty level, total school and age-eligible enrollments, White, non-Hispanic, Black, non-Hispanic, and Hispanic, free or reduced-price lunch	Small sized and large sized schools, American Indian or Alaska Native, Hawaiian/Pacific Islander
Regression model a	Northeast, high poverty, Two or more races	†
Regression model b	High poverty	†
Regression model c	None	†
Sample with substitutes	School control, Census region, poverty level, age-eligible enrollments	Small sized schools Hawaiian/Pacific Islander
Regression model a	Northeast, high poverty, Two or more races	†
Regression model b	High poverty, summed race/ethnicity percentage	†
Regression model c	High poverty	†
Nonresponse adjusted	None	Small sized schools Hawaiian/Pacific Islander

† Not applicable.

SOURCE: Organization for Economic Cooperation and Development (OECD), Program for International Student Assessment (PISA), 2018.

In summary, the investigation into nonresponse bias at the school level in the U.S. PISA 2018 provides evidence that there is some potential for nonresponse bias in the PISA participating original sample based on the characteristics studied. It also suggests that, while there is some evidence that the use of substitute schools reduced the potential for bias, it has not reduced it substantially. Moreover, after the application of school nonresponse adjustments, there is little evidence of resulting potential bias in the available frame variables and correlated variables in the final sample.

7. References

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