INTERNATIONAL COMPUTER AND INFORMATION LITERACY STUDY (ICILS 2018) FIELD TEST AND RECRUITMENT FOR MAIN STUDY

REQUEST FOR OMB CLEARANCE
OMB# 1850-0929 v.3

SUPPORTING STATEMENT PART B

Submitted by:

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Washington, DC

Revised January 2017

B. COLLECTION OF INFORMATION EMPLOYING STATISTICAL INFORMATION

B.1 Respondent Universe

The respondent universe for the ICILS field test is all students enrolled in grade 8, provided that the mean age at the time of testing is at least 13.5 years of age. The teacher target population in ICILS consists of all teachers that are teaching regular school subjects to 8th grade students (regardless of the subject or the number of hours taught) during the ICILS testing period and since the beginning of the school year. The universe for the selection of schools is all types of schools in approximately six populous states. A sample of 38 schools will be selected for the field test, with the goal of obtaining participation from a minimum of 32 schools. A sample of 353 schools will be selected for the main study, with the goal of obtaining participation from a minimum of 300 schools.

For the field test, in each sampled school, a minimum of 20 students will be selected across classes. If fewer than 20 students can be found in a school, they will all be included in the survey. Also, if the number of eligible students is greater than 20, but less or equal to 25, all students will be selected in order to prevent the situation that a small number of students are the only ones not being surveyed. For the main study, a minimum of 30 students will be selected across classes. If fewer than 30 students can be found in a school, they will all be included in the survey. Also, if the number of eligible students is greater than 30, but less or equal to 32, all students will be selected in order to prevent the situation that a small number of students are the only ones not being surveyed.

Within schools, the minimum sample size requirements for teachers are identical in the field test and main study. In each sampled school, a minimum of 20 teachers will be selected. If fewer than 20 eligible teachers can be found in a school, they will all be included in the survey. Also, if the number of eligible teachers is greater than 20, but less or equal to 22, all teachers will be selected in order to prevent the situation that a small number of teachers are the only ones not being surveyed.

School administrators of each school will also be asked to complete a school questionnaire.

B.2 Statistical Methodology

Field Test Sampling Plan and Sample

The purpose of the ICILS field test is to test out new assessment items and background questions, and to ensure that student sampling procedures proposed for the main study are successful. In selecting a school sample for this purpose, it is important to minimize the burden on schools, districts, and states, to minimize impact on these entities while also ensuring that the field test data are collected effectively.

As required by the ICILS international study center and IEA, the field test sample is to consist of a minimum of 32 schools with 570 students assessed. The student samples will be obtained by selecting a systematic random sample of at least 20 grade 8 students in each school. As well, the teacher samples will be obtained by selecting a systematic random sample of at least 15 grade 8 teachers in the same school. As the field test is designed only to test items, questions, and procedures, a probability sample of schools is not required. However, the sample must include a broad range of schools covering such features as public (including charter schools), private, large, small, urban, and rural schools, and schools from a variety of different states.

The field test sample will be drawn from 6 states (Arkansas, Connecticut, Florida, Indiana, Kentucky, and Oklahoma), which will allow for achieving the desired distribution of schools by region, poverty level, and ethnicity, and will inform the recruitment and data collection process for the nation as a whole.

A purposive sample of 38 schools will be selected for the field test which allocates equally to the separate states, although purposive selection of schools within the states will be conducted to ensure that to the extent possible, the proportion of schools in the field test closely aligns with the proportion of schools in the main study school sampling frame on the margins of the stratification and sort characteristics

described previously. In addition, we will coordinate sampling with NAEP, eTIMSS (pilot), PISA (field test), and other National Center for Education Statistics' (NCES) studies taking place in schools around the same time as the ICILS field test and will select the ICILS field test sample so as to minimize overlap with these other samples. Two replacement schools will be selected for each of the sampled schools from the same strata, and will have the same sort characteristics as the corresponding sampled schools. Once the field test sample has been selected, a summary of the distribution of the characteristics of the selected schools will be prepared, showing the comparison with the national population of schools.

The student sampling procedures for the field test will correspond as closely as feasible to what is planned for the main study, so as to try out the operational procedures for student sample selection. The sample will be selected by systematic random sampling of a minimum of 20 grade 8 students per school. Each participating school will be asked to submit an exhaustive list of students (that is, a list that accounts for each student in the grade exactly once). We will use a sampling algorithm to select the students with equal probability.

Frequently, small groups of schools or students will have to be removed from the national desired target population for practical reasons, such as increased survey cost or difficult test conditions. This will not be regarded as reduced coverage, but as 'exclusion'. If the overall rate of excluded students is higher than 5% of the national desired target population, this will be annotated in the tables of the international report.

We plan to gather student lists from participating schools electronically using a secure electronic filing process (as explained in Part A). Electronic filing provides advantageous features such as efficiency and data quality checks. Schools will access the electronic filing system through a web site.

Main Study Sampling Plan and Sample

The school sample design for the main study must be more rigorous than that for the field test. It must be a probability sample of schools that fully represents the entire United States. At the same time, to ensure maximum participation it must be designed so as to minimize overlap with other NCES studies involving student assessment that will be conducted around the same time.

The main study will take place in the spring of 2018, at the same time as the Trends in International Mathematics and Science Study (TIMSS) 2019 field test, at grades 4 and 8. As well, some NAEP testing will be taking place, but 2018 is not a Main NAEP year. The number of overlapping schools between ICILS and other studies can be kept to a minimum. The Program for International Student Assessment (PISA) 2018 main data collection, for 15-year-olds, will take place in the fall of the subsequent school year to ICILS, thus it will overlap with school recruiting. PISA will include a small number of grade 8 schools in the sample, but very few grade 8 students will be assessed in PISA, given that very few grade 8 students meet the PISA 15 years of age requirements. Thus overlap control between the ICILS and PISA samples will be desirable, and should not be difficult to accomplish successfully. Overlap control procedures in studies such as this, where stratified probability proportional to size samples of schools are selected, can be implemented via a procedure that applies Bayes Theorem to modify the conditional probability of selection of a given school for one study, depending upon its selection probability for a second study, and whether or not it was selected for that study. This approach was first documented in a survey sampling application by Keyfitz (1951)[1]. The principles involved can be extended to more than two studies simultaneously, and a procedure for doing this is described by Chowdhury et al. (2000)[2].

The minimum sample size for the ICILS main study will be 300 schools. For each original sample school, two replacement schools will also be identified. The sampling frame will be obtained from the most

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

[2] Chowdhury, S., Chu, A., & Kaufman, S. (2000). Minimizing overlap in NCES surveys. Proceedings of the Survey Methods Research Section, American Statistical Association, 174-179. Retrieved from http://www.amstat.org/sections/srms/proceedings/papers/2000_025.pdf.

current versions of NCES's Common Core of Data (CCD) and Private School Survey (PSS) files, restricted to schools having grade 8, and eliminating schools in Puerto Rico, U.S. territories, and Department of Defense overseas schools.

The sample will be stratified according to school characteristics such as public/private, Census region, poverty status (as measured by the percentage of students in the school receiving free or reduced-price lunch in the National School Lunch Program (NSLP)). This will ensure an appropriate representation of each type of school in the selected sample of schools.

Determining school eligibility, student eligibility, and student sampling will be accomplished as described below.

Schools will be selected with probability proportional to the school's estimated grade enrollment of eighth graders. A minimum of 30 students will be selected within each school with equal probability (unless there are 30 or fewer grade 8 students, in which case all grade 8 students will be taken with certainty). The use of a probability proportional to sample design ensures that all students have an approximately equal chance of selection.

Student sampling and teacher sampling will be accomplished by selecting a minimum of 20 grade 8 students and a minimum of 15 grade 8 teachers per school. Each school selected will be asked to prepare a list of grade 8 students and a list of grade 8 teachers in the school. As described above, schools will submit these student lists and teacher lists via secure E-filing. Students will be selected from the comprehensive list of all target grade students using a systematic random sample, and teachers will be randomly selected from the teacher list.

Nonresponse Bias Analysis, Weighting, and Sampling Errors

It is inevitable that nonresponse will occur at both levels: school and student. We will analyze the nonrespondents and provide information about whether and how they differ from the respondents along dimensions for which we have data for the nonresponding units, as required by NCES standards. After the calculation of weights, sampling errors will be calculated for a selection of key indicators incorporating the full complexity of the design, that is, clustering and stratification (detailed plans will be included in the OMB submission for the main study).

B.3   Maximizing Response Rates

The most significant challenge in recruitment for international assessments has been engaging the schools and gaining their cooperation. Historically, other assessments such as TIMSS which select classrooms for student sampling have student participation rates that never go below 90 percent (see Table 1). However, student participation may be more of a challenge for ICILS than other international assessments because ICILS requires a random student sample within schools rather than a selection of classrooms. In addition, it is important to U.S. ICILS that students are engaged and try to do well on the assessment.

Table 1. Historical TIMSS school and student participation rates

Year	Grade	School Participation Rate		Overall Student Participation Rate
		Before Replacement	**After Replacement**	
2011	8	87	87	94
2007	8	68	83	93
2003	8	71	78	94
1999	8	83	90	94

Our approach to school recruitment is to:
- Obtain endorsements about the value of schools' participation in ICILS from relevant organizations;
- Work with NAEP state coordinators;

- Inform Chief State School Officers and test directors about the sample of schools in their state. Enclose a sample letter of endorsement they can send to schools;
- Send letters and informational materials to schools and districts. These letters will be customized by the type of school;
- Train experienced school recruiters about ICILS;
- Implement strategies from NAEP's Private School Recruiting Toolkit, which was developed for NAEP and includes well-honed techniques used to recruit a very challenging type of schools;
- Follow-up mailings with telephone calls to explain the study and schools involvement, including placing the ICILS assessment date on school calendars;
- Offer schools $200 for participation;
- Maintain continued contact until schools have built a relationship with the recruiter and fully understand ICILS;
- Offer a $100 incentive to the individual at the school identified to serve as the school coordinator; and
- Make in-person visits to some schools, as necessary.

B.4   Purpose of Field Test and Data Uses

The main focus of a field test for ICILS is to collect enough assessment data to perform reliable tests of the items. In addition, the field test will allow us to evaluate procedures for conducting the main study, including recruitment methods for obtaining school and student participation, and identifying and sampling eligible schools and students. An additional purpose of the field test is to learn more about the electronic delivery of assessments in preparation for the ICILS main data collection, as well as the electronic data collections of other assessments such as eTIMSS.

B.5   Individuals Consulted on Study Design

Overall direction for ICILS in the United States is provided by Lydia Malley, ICILS National Research Coordinator at NCES, within the U.S. Department of Education, with support from Stephen Provasnik, the TIMSS National Research Coordinator at NCES.

The IEA studies are developed as a cooperative enterprise involving all participating countries. An international panel of computer and information literacy and measurement experts provide substantive and technical guidance for the study and National Research Coordinators participate in extensive discussions concerning the projects, usually with advice from national subject matter and testing experts.

The majority of the consultations (outside NCES) involve the Australian Council for Educational Research (ACER), the international study center for ICILS. ACER staff are responsible for designing and implementing the study in close cooperation with the IEA Secretariat, the IEA Data Processing and Research Center, and the national centers of participating countries. Key staff from ACER include: Dr. John Ainley (project coordinator), Mr. Julian Fraillon (research director); and Dr. Wolfram Schulz (assessment coordinator), all of whom have extensive experience in developing and operating international education surveys (especially related to ICILS). Key staff from the IEA include Sabine Tieck (sampling statistician) and Michael Jung (IEA DPC).