

PISA 2015 Integrated Design

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NOTE: The design for Financial Literacy has been updated since the NPM Meeting in March 2013. The revised approach for the Main Study is to administer Financial Literacy to a subsample of the PISA sample that will take combinations of Mathematical, Reading and Scientific Literacy items.

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PISA 2015 INTEGRATED DESIGN

The purpose of this document is to illustrate the proposed integrated design for PISA 2015, emphasizing the design for the Field Trial. This design is necessarily complex because as PISA moves towards a computer-based survey that emphasizes innovation, the 2015 cycle must collect reliable, valid and comparable information about a widening range of knowledge, skills and context factors across two modes of administration – paper-and-pencil and computer – while ensuring that results are linked to previous cycles (i.e., 2000 through 2012).

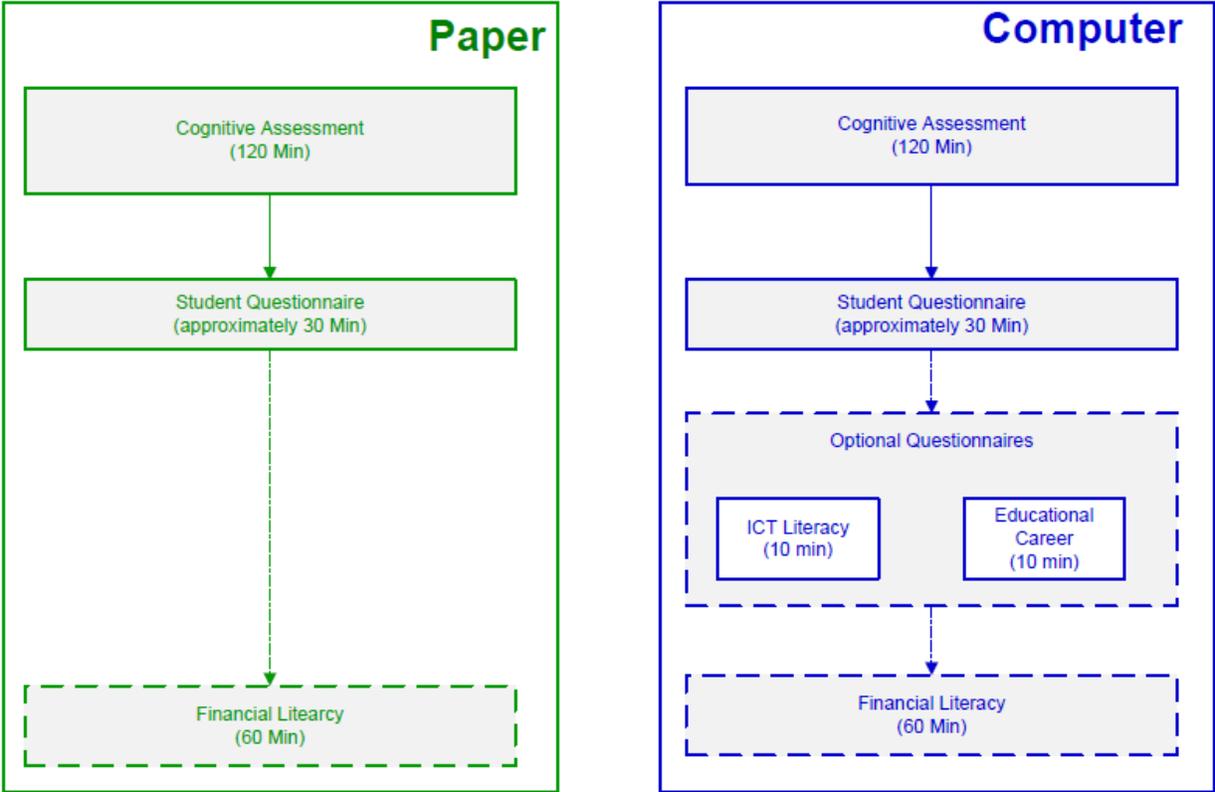
This document will present the proposed designs for the cognitive assessment and for the questionnaires for both the Main Survey and the Field Trial. However, detailed information will only be presented for the Field Trial. The designs are based on the following assumptions:

- The design includes the assessment of Reading, Mathematical and Scientific Literacy as well as Collaborative Problem Solving for every participating country¹. Those choosing the paper-and-pencil option will be limited to assessing Reading, Mathematical and Scientific Literacy trend items. No new cognitive items will be developed for paper-and-pencil. Regardless of which mode of delivery a country chooses, this portion of the survey will take approximately 120 minutes to complete.
- All countries planning to implement PISA as a computer-based survey in the Main Study will need to implement both paper- and computer-based assessment instruments during the Field Trial to meet the requirements of the mode effect study as part of the transition process to a full computer-based survey.
- Paper-based instruments linking to previous surveys will be provided for countries unable or unwilling to test their students by computer and will be limited to trend items. New materials for the cognitive assessment will be developed for computer delivery only.
- The workflow for the cognitive assessment and student context questionnaires will consist of separate components to accommodate various national options: *i*) an assessment testing session of 120 minutes, *ii*) a student questionnaire session of approximately 30 minutes; *iii*) optional questionnaires that include the Educational Career Questionnaire (ECQ) (10 minutes) and the Information and Computer Technology Familiarity Questionnaire (ICTQ) (10 minutes) in computer mode, and *iv*) an optional assessment of Financial Literacy of 60 minutes in both paper and computer modes. In addition, *v*) a school questionnaire (45 minutes), *vi*) an optional Parent Questionnaire (PQ) (30 minutes), and *vii*) and optional Teacher Questionnaire (TQ) (30 minutes) will be administered.

An overview of the integrated design as described above is provided, in a simplified form, in Figure 1.

¹ Per request of the PGB, an alternative design is included in Annex A that excludes the assessment of CPS for countries that choose to opt out of this core domain.

Figure 1. PISA 2015 Integrated Design (Simplified)



PISA 2015 Cognitive Assessment Design

The cognitive assessment design for PISA 2015 is planned so that the total testing time for measuring the four domains of Reading, Mathematical and Scientific Literacy and Collaborative Problem Solving (CPS) will remain at two hours for each student. While computer-based delivery will be the primary mode for 2015, paper-and-pencil instruments linking to earlier PISA cycles will be provided for countries deciding they are not able or willing to test their students by computer. These paper-based assessments will be limited to existing Reading, Mathematical and Scientific Literacy items.

The assessment designs that will be described in detail in the next sections cover the four skill domains for 2015. The designs extend the range of information that PISA will provide to policy makers concerning the distribution of skills in their student populations. In addition, these assessment designs will use advanced measurement and computer technologies to deliver PISA in an efficient manner.² In summary, the PISA 2015 assessment design will provide participating countries with the following information:

- population distributions in Scientific Literacy, which reflect the new 2015 framework as well as links to the framework and scale developed in 2006;
- population distributions in Mathematical Literacy linked to the 2012 framework and Mathematical Literacy scale;
- population distributions in Reading Literacy linked to the 2009 framework and Reading Literacy scale;
- population distributions in Collaborative Problem Solving;
- pairwise covariance estimates among each of the four domains;
- three-way covariance information among the four cognitive domains including the three core PISA domains (Reading, Mathematics, and Science); and
- data to link the two modes of delivery – paper and pencil and computer based.

These designs are based on the approach that was presented to and approved by the PGB in May 2012 [*Doc. Ref. [EDU/PISA/PGB\(2012\)5](#)]. In order to meet the goals and domain coverage assumed in this approach, Table 1 shows the number of clusters that will be included in PISA 2015 FT and MS.*

² We expect to introduce multistage adaptive testing for the Main Study in PISA 2015. The extent to which this type of adaptive testing will be introduced will depend on decisions that need to be made regarding the use of intact clusters and proportion of machine scorable items. We expect to discuss these issues with the OECD, the Technical Advisory Group and the PISA Governing Board at an upcoming meeting.

Table 1. Domain coverage for PISA 2015

Domain Coverage	NEW (CBA only)		TREND (CBA and PBA)	
	FT	MS	FT	MS
Reading Literacy	NO	NO	6 30-min clusters	6 30-min clusters
Mathematical Literacy	NO	NO	6 30-min clusters	6 30-min clusters
Scientific Literacy	12 30-min clusters	9 30-min clusters	6 30-min clusters	6 30-min clusters
Collaborative Problem Solving	4 30-min clusters	3 30-min clusters	NO	NO

It is important for countries to note that the Contractors will assume full responsibility for assembling all paper forms and all computer forms of the cognitive instruments. While there are many more forms in PISA 2015 than in previous cycles, there will be no additional work on the part of the country in assembling these forms.

Main Study Assessment Design

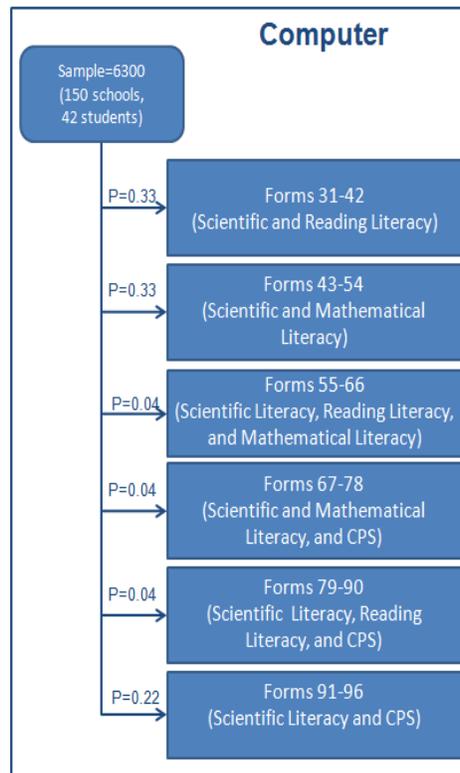
The Main Study assessment design for PISA 2015 covers the domains of reading, mathematical and scientific literacy as computer-based and paper-based designs with the computer-based design adding the fourth domain of collaborative problem solving. A computer-based design for countries opting out of the assessment of Collaborative Problem Solving is described in Annex A. These designs require participating countries to sample a minimum of 150 schools representing their national population of 15-year-old students. Countries taking the computer-based assessment will need to sample 42 students from each of 150 schools for a total sample of 6,300 students while countries taking the paper-based assessment will need to sample 35 students from each of 150 schools for a total sample of 5,250. It is important to understand that 88% to 92% of students will receive a form that consists of four 30-minute clusters (or sets of tasks) assembled from two domains, resulting in one hour of assessment time per domain, with a total of two hours of testing time per student. An additional 8% to 12% of students will receive forms that consist of four 30-minute clusters covering three of the four core domains. Scientific Literacy is included in each of these forms.

Main Study CBA Assessment Design

This design includes six intact clusters from Scientific, Reading and Mathematical Literacy based to the extent possible on the assessment cycle when each was the major domain – 2006 for Scientific Literacy, 2009 for Reading Literacy and 2012 for Mathematical Literacy – as shown in Table 1. The six intact clusters will provide trend information for Mathematical and Reading Literacy. The six intact clusters of Scientific Literacy tasks will carry not only the trend information but also link to

the new items developed to reflect the 2015 framework³. In addition, three clusters of CPS items will be assembled for the Main Study. These clusters across the four domains will be organized into 66 different test forms as shown in Figure 2 (Forms 31-96).

Figure 2. Main Study Computer-Based Assessment Design



As reflected in Figure 2, there are 30 different kinds of test forms that combine two of the four domains – 88 percent of students receive one of these forms. These combinations include: *i*) Scientific and Reading Literacy (Forms 31-42), *ii*) Scientific and Mathematical Literacy (Forms 43-54), and *iii*) Scientific Literacy and Collaborative Problem Solving (Forms 91-96). In these test forms, students take one hour of Scientific Literacy (one cluster each of trend and new science) plus one hour of a minor domain – Reading, Mathematical Literacy or Collaborative Problem Solving. These 30 test forms provide strong pairwise covariance information between Scientific Literacy and each of the three minor domains.

In addition, there are 36 additional forms providing covariance information about three of the four domains, 12 percent of students receive one of these forms. In these forms, students receive one hour of Scientific Literacy (one cluster each of trend and new science) plus two 30-minute clusters of items from each of the other three domains. These combinations are: *iv*) Scientific, Reading and Mathematical Literacy (Forms 55-66); *v*) Scientific and Mathematical Literacy and Collaborative Problem Solving (Forms 67-78), *vi*) Scientific and Reading Literacy and Collaborative Problem Solving (Forms 79-90). It

³ The intact clusters from the three domains will be tested for mode effects in the PISA 2015 Field Trial design since they will be implemented and used in both paper and computer versions in the Main Study.

is important to note that these three-domain test forms will ensure that all covariance estimates among the four domains are indeed based on the joint assessment of the domains.

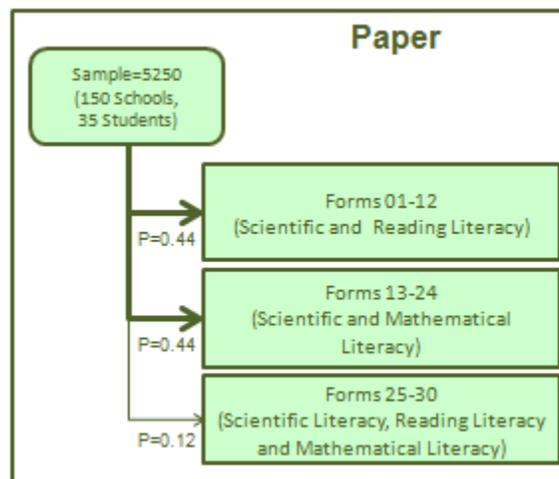
As Scientific Literacy is the major domain for 2015, it is paired with one or two of the other three domains, and each of the different combinations of domains is balanced in terms of position to provide important covariance information. The design also reflects the fact that the random assignment of a form within a school follows a specific probability. According to this design, 33% of students within each school will be assigned to one of 12 Scientific and Reading Literacy test forms. Another 33% will be assigned to one of 12 Scientific and Mathematical Literacy test forms. In addition, some 22% of the sampled students within each school will be assigned to one of the 12 Scientific Literacy and CPS test forms. To provide additional covariance information, 4% percent of students will be assigned to one of 12 Scientific Literacy, Mathematical Literacy and CPS test forms; 4% to one of 12 Scientific Literacy, Reading Literacy and CPS test forms; and 4% to one of 12 Reading, Mathematical, and Scientific Literacy test forms⁴.

Information about the detailed rotation of clusters that will make up these various forms will be determined once the results of the Field Trial are known.

Main Study PBA Assessment Design

As decided at the PISA Governing Board meeting in Tallinn, Estonia, countries that are not able or willing to use computer-based delivery for PISA 2015 can choose to test their students using a paper-based assessment. This assessment consists of paper-based trend items for Scientific, Reading and Mathematical Literacy that rely heavily on the frameworks and assessments that were developed when each was a major domain – 2006 for Scientific Literacy, 2009 for Reading Literacy and 2012 for Mathematical Literacy. This PBA design is shown in Figure 3.

Figure 3. Main Study Paper-Based Assessment Design



⁴ These percentages are based on random assignment of test forms to students across schools. Each student in each classroom has a real probability of receiving any of the forms.

As with the CBA design shown in Figure 2, the PBA Design includes six intact clusters from each of the three domains – as shown in Table 1. These intact clusters will provide trend information for Mathematical, Reading and Scientific Literacy. It is important to note that in the paper-based survey, the assessment of Scientific Literacy will be limited to trend items. It will not include any new items based on the new 2015 framework as those new items will be developed for the computer-based platform. As with the previous designs, there are several different sets of forms that combine two or three of the domains to provide covariance information. These combinations include: *i*) Scientific and Reading Literacy; *ii*) Scientific and Mathematical Literacy; and *iii*) Scientific, Reading and Mathematical Literacy. The position of items within each domain will be balanced and the assignment of a form within a school follows a probability design like the one used for assigning test forms in the CBA Design. In this PBA Design, 44% of students will be assigned to one of 12 Scientific and Reading Literacy forms and another 44% will be assigned to one of 12 Scientific and Mathematical Literacy forms. The remaining 12% of students will be assigned to one of six Scientific, Reading and Mathematical Literacy forms.

Field Trial Assessment Design

This section illustrates the detailed Field Trial design for PISA 2015, which is necessarily complex because it must provide evidence to support various goals and inferences. These include:

- needing to evaluate the invariance of item parameters across previous PISA cycles and across two modes for the 2015 cycle (CBA and PBA);
- obtaining initial item parameters for the new Scientific Literacy and Collaborative Problem Solving items;
- evaluating sampling and survey operations; and,
- assessing how well the new computer platform functions within and across participating countries.

Because the primary goal of the Field Trial is to support the goals noted above and not to estimate the proficiency distribution of national populations, the sampling requirements differ from those for the Main Study.

Like the Main Study design, the Field Trial design for PISA 2015 considers one CBA design including Reading, Mathematical and Scientific Literacy and Collaborative Problem Solving and one PBA design that involves the core domains of Reading, Mathematical and Scientific Literacy.

It is critical to note that countries planning to use computer-based delivery in 2015 will also need to Field Trial paper-and-pencil forms to test for mode effects; that is, the invariance of the item parameters across the two modes of delivery. Without testing for mode effects, it will be impossible for countries that wish to deliver PISA 2015 on computer to measure trends relative to performance in previous paper-based cycles.

The recommended design for countries choosing computer delivery is to sample a minimum of 25 schools for the Field Trial. Within each of these schools, 78 students will need to be selected and tested for a total sample of 1,950 students. Because the preferred number of students to be sampled from each school participating in the Field Trial is much larger than in previous cycles, selecting schools having a large

eligible student body and with sufficient computer facilities should be considered. It is important to note, however, that the Contractors will work with countries and schools that cannot meet these requirements. For example, the Contractors recognize that for some countries, schools with large numbers of students are less common, so sampling more than 25 schools may be necessary. As such, the Contractors have provided two alternative sampling designs that are presented in Annex B.

All students will be randomly assigned to respond to either a paper-and-pencil or a computer-based test form according to the design shown below. It is important to understand that each test form will consist of four 30-minute clusters assembled from two domains, resulting in one hour of assessment time per domain, with a total of two hours of testing time per student.

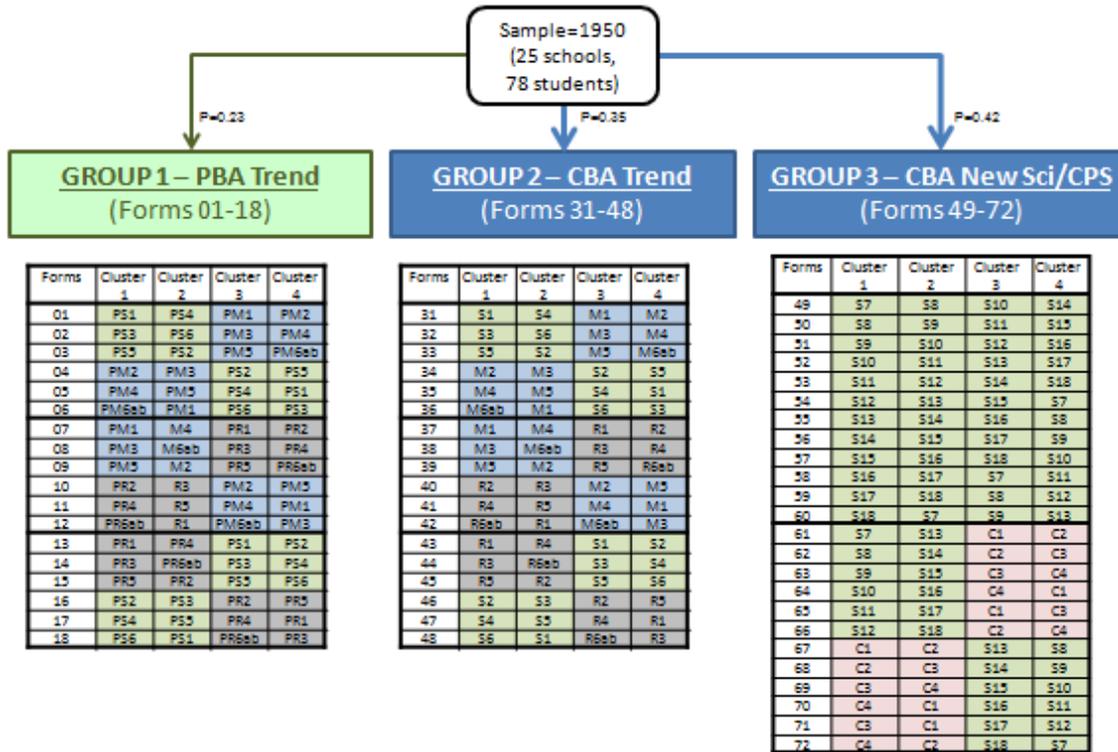
Countries that choose to measure student performance with only paper-and-pencil forms will have a much reduced sample size because they will be using items from previous cycles. These countries will also need to sample 25 schools but only have to select 36 students from each school for a total Field Trial sample of 900.

Field Trial CBA Assessment Design

The Field Trial CBA design includes six intact clusters from Scientific, Reading and Mathematical Literacy based on the assessment cycle when each was the major domain: 2006 for Scientific Literacy, 2009 for Reading Literacy and 2012 for Mathematical Literacy. In order to test for mode effects, this design includes a set of 18 paper-and-pencil forms covering the domains of Reading, Mathematical and Scientific Literacy⁵. The “identical” set of tasks from the 18 paper-and-pencil forms will be adapted and re-authored for computer administration yielding 18 equivalent computer-based test forms. In addition, there will be 12 test forms consisting of the new 2015 Science tasks (Forms 49-60) and 12 new test forms combining those 2015 Scientific Literacy items with the new Collaborative Problem Solving tasks (Forms 61-72) – as shown in Table 1. The schematic design consisting of the set of paper-and-pencil forms along with the set of CBA forms – including the CBA trend, CBA new Science, and CBA new Science plus Collaborative Problem Solving – is shown in Figure 4.

⁵ Consistent with previous cycles, easier and harder forms will be available. Clusters M6a and R6a will be used to assemble forms for countries selecting the standard forms while clusters M6b and R6b will be used to assemble forms for countries selecting the standard forms.

Figure 4. Field Trial Computer-Based Assessment Design, with CPS



Where:

- *PR1-PR6* represent Reading clusters in paper (Trend)
- *PM1-PM6* represent Math clusters in paper (Trend)
- *PS1-PS6* represent Science clusters in paper (Trend)
- *R1-R6* represent Reading clusters in computer (Trend)
- *M1-M6* represent Math clusters in computer (Trend)
- *S1-S6* represent Science clusters in computer (Trend)
- *S7-S18* represent Science clusters in computer (New)
- *C1-C4* represent Collaborative Problem Solving clusters in computer (New)
- *a* represents standard clusters and *b* represents easier clusters

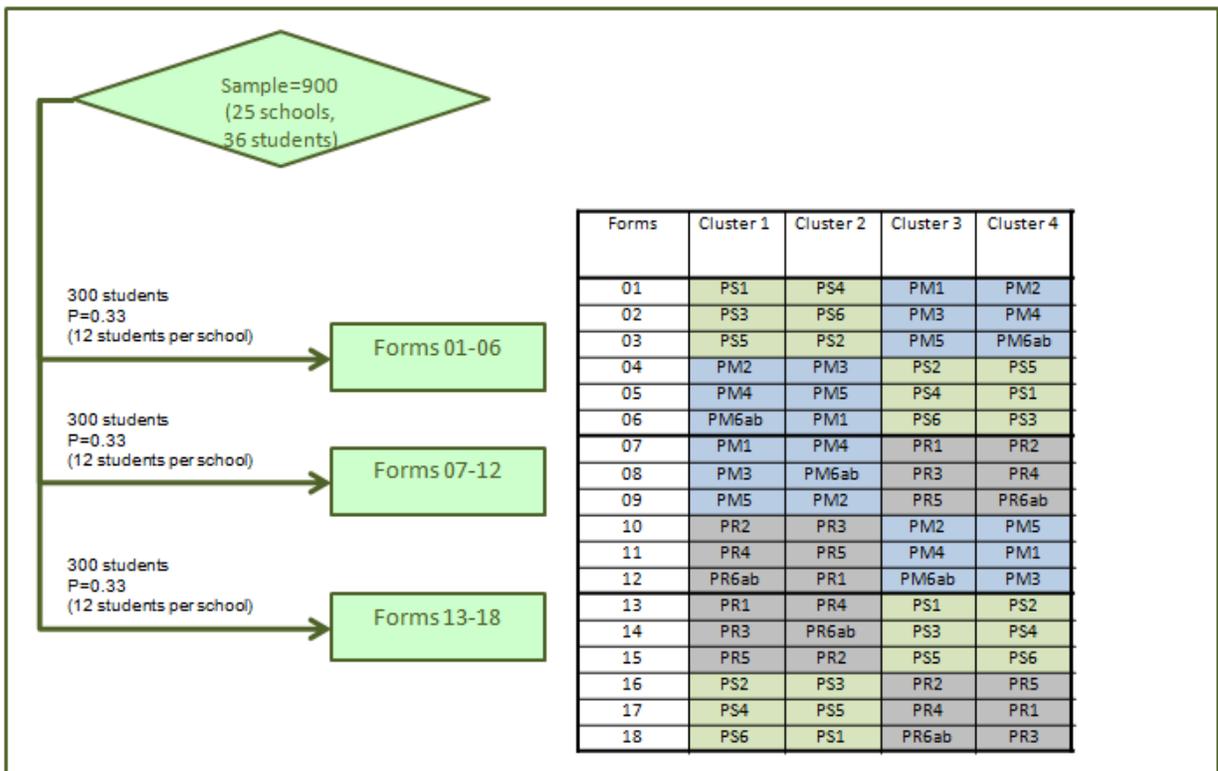
As shown in Figure 4 above, the Field Trial CBA Design with CPS is based on sampling 78 students per school. Students will be randomly assigned to one of three groups: *i*) paper-based trend items for Reading, Mathematical and Scientific Literacy, referred to as Group 1-PBA Trend, *ii*) the same trend items for Reading, Mathematical and Scientific Literacy adapted for computer-based delivery, referred to as Group 2-CBA Trend, and *iii*) the computer-based test forms of new Scientific Literacy and Collaborative Problem Solving, referred to as Group 3-CBA New Science/CPS. According to this design, 18 of the 78 students (or 23%) will be assigned to one of the forms in Group 1-PBA Trend; 27 of the 78 students (or 35%) will be assigned to one of the test forms in Group 2-CBA Trend; and, 33 of the 78 students (or 42%) will be assigned to one of the test forms in Group 3-CBA New Science/CPS. It is important to remember that each test form will contain four 30-minute clusters for a total testing time of two hours per student.

The successful implementation of the design above rests on strict random assignment of students to one of the three groups identified in Figure 4. Ideally this would mean randomly distributing the 78 sampled students from each school across the three groups. For some countries, large schools are very uncommon and sampling 25 schools having 78 or more eligible students may not be feasible. Therefore, two alternative sampling designs are provided in Annex B.

Field Trial PBA Assessment Design

Countries that choose the PBA Design for the Main Study will be measuring student performance with only paper-and-pencil forms in the Field Trial. This paper-based Field Trial will have a much reduced sample size because countries will be using secure item clusters from previous cycles. While these countries will also need to sample 25 schools, they will only need to select 36 students from each school for a total Field Trial sample of 900. Again, these students will be randomly assigned one of the 18 paper-and pencil forms containing the trend items from two of the three core domains for PISA – Reading, Mathematical and Scientific Literacy. This design is shown in Figure 5.

Figure 5. Field Trial Paper-Based Assessment Design



Where:

- *PR1-PR6* represent Reading clusters in paper (Trend)
- *PM1-PM6* represent Math clusters in paper (Trend)
- *PS1-PS6* represent Science clusters in paper (Trend)
- *a* represents standard clusters and *b* represents easier clusters

PISA 2015 Questionnaire Design

Starting with the first cycle in 2000, PISA has emphasized the importance of collecting background information from students and schools along with the assessment of student achievement. This has been done through a Student Questionnaire (StQ) of approximately 30 minutes and a School Questionnaire (ScQ) of approximately 45 minutes that covered a broad range of contextual variables. The content of these questionnaires – especially the content of the StQ – changed considerably, but the design remained stable: every student (approximately 5,000 per country) completed the StQ, and every school principal (approximately 150 per country) completed the ScQ.

PISA has also included several international options, i.e., additional instruments that countries would administer on a voluntary basis, which included a Parental Questionnaire (PQ) as well as optional questionnaires for the students including the Educational Career Questionnaire (ECQ) and Information and Computer Technology Familiarity Questionnaire (ICTQ). These instruments are proposed to continue in 2015.

The background questionnaires contribute to integral aspects of the analytical power of PISA as well as to its capacity for innovation. Therefore, the Questionnaire Design must meet high methodological standards, such as allowing for reliable, precise and unbiased estimation of population parameters for each participating country. In addition, the design also has to ensure that important policy issues and research questions can be addressed in later analysis and reporting based on PISA data. Both the psychometric quality of the variables and indicators and the analytical power of the study have to be taken into account when proposing and evaluating a questionnaire design.

The Field Trial and Main Study questionnaire designs greatly differ in many respects. The main purpose of the Field Trial is to test more material than will be implemented in the Main Study. The proposed designs described below reflect these differences.

Main Study Questionnaire Design

As part of the integrated design, each student is required to complete a Student Questionnaire of approximately 30 minutes and each school is required to complete a School Questionnaire of approximately 45 minutes. The design may also include optional components that countries can choose to implement as described below.

Main Study Computer-Based Questionnaire Design

During the Main Study, it is proposed that PISA 2015 implement a student questionnaire of approximately 30 minutes. The questions will cover most of the policy modules that Core 6 has proposed and the PGB considers relevant. The two optional questionnaires – Educational Career and ICT

Familiarity – will be 10 minutes in length each and will cover some of the modules in more detail (see progress report from Core 6 for a draft listing of content). This design is shown in more detail in Annex C.

Each of the 150 participating schools will also take a 45-minute School Questionnaire. Additionally, countries may also choose to implement one or both of the following optional questionnaires: *i*) a computer-based teacher questionnaire that consists of two 30-minute questionnaires: one for Science Teachers and one for teachers of other subjects; and *ii*) a 30-minute paper-based Parent Questionnaire.

Main Study Paper-Based Questionnaire Design

This proposed design, if approved, will be administered for countries that have decided to implement PISA 2015 as a paper-based survey. The paper-based Student Questionnaire will include mostly trend items and thus may take less than 30 minutes of testing time. The School Questionnaire will be administered on paper as well in these countries; some innovative parts, however, may not be available on paper. Among the International Options, only the Parent Questionnaire will be available for these countries. This design is shown in more detail in Annex D.

Field Trial Questionnaire Design

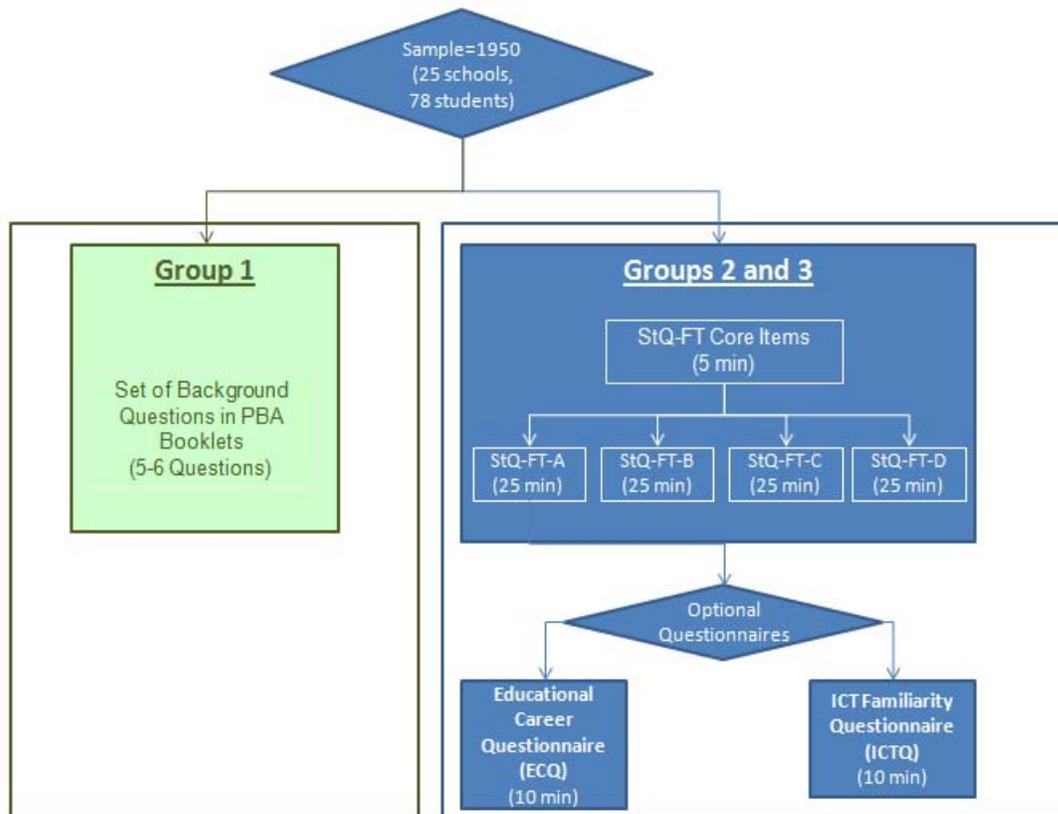
As previously mentioned, the goals of the Field Trial differ from those of the Main Study, as one Field Trial goal is to evaluate the quality of the context questionnaires used in previous cycles as well as the quality of new items developed for PISA 2015.

Field Trial Computer-Based Student Questionnaire Design

It is important to note that countries which are considering implementing PISA as a computer-based survey in 2015 must implement the Field Trial computer-based Student Questionnaire. This questionnaire will include a set of core items (i.e., StQ-FT Core Items) and one of four rotated blocks (i.e., StQ-FT-A, StQ-FT-B, StQ-FT-C or StQ-FT-D). Just a minimal set of student background variables – around five minutes in length – will be administered to all students. In contrast, the four rotated blocks will consist of 25-minutes of non-overlapping content. As shown in Figure 6, these four blocks will be randomly assigned to students in Group 2 (CBA Trend) and Group 3 (CBA New Science/CPS) that were described in Figure 4. The optional questionnaires for students – ECQ and ICTQ – will be administered following the Student Questionnaire and are available only as computer-based instruments – thus, administered only to Groups 2 and 3.

For Group 1, that is the group of students assigned to the PBA-Trend test material as shown in Figure 4, this design recommends that a key set of 5-6 questions be administered immediately after the cognitive test items. These variables will be selected as to allow Contractors to evaluate the extent to which the random assignment was successful, and to use important background variables (*e.g.*, gender and ICT familiarity) when studying the measurement quality of cognitive test items.

Figure 6. Field Trial Computer-Based Questionnaire Design



Field Trial Paper-Based Questionnaire Design

A paper-based Student Questionnaire will be administered in countries that choose the paper-based assessment (PBA). Students in these countries will receive both the cognitive instruments and the questionnaires in paper-based forms. The paper-based Student Questionnaire will take up to 30 minutes and will include mostly trend items from previous cycles, as well as some additional newly developed items.

Field Trial Design for School Questionnaire, Parent (optional) and Teacher Questionnaire (optional)

The School Questionnaire in the Field Trial will be available in two forms: a computer version for countries choosing the computer administration (60 minutes) and a paper version for countries that choose the paper administration (less than 60 minutes) with mostly trend items. Additionally, this design offers the following optional questionnaires:

- A 30-minute paper-based Parent Questionnaire that will include new items and trend items. A 45-minute computer-based Teacher Questionnaire that will include a core set of questions (10 minutes) followed by two non-overlapping rotated modules of 35 minutes each (TQ-FS-S and TQ-FS-G). This option will be available only for countries choosing the computer-based mode of

delivery for PISA 2015 and will be administered to at most 10 science teachers and 15 teachers of other subjects in each school⁶.

Details about the Field Trial questionnaire designs are included in Annex E.

PISA 2015 Financial Literacy

The assessment of Financial Literacy will be offered as an optional component in PISA 2015. It will be based on the same framework as the one developed for PISA 2012 [*Doc. Ref.: FinLit_Frmwrk_PISA2012.doc*] and will include the majority of items from 2012 with a few new items developed to replace those that will be released for illustrative purposes. In 2015, this assessment will be offered in parallel versions across paper- and computer-based modes of delivery for the field trial to evaluate any mode effects. In both modes, the Financial Literacy assessment will include some specific questionnaire items in addition to the cognitive items. The proposed approach for the Main Study is to administer Financial Literacy to a subsample of the PISA sample that will take combinations of Mathematical, Reading and Scientific Literacy items.

Main Study Design for Financial Literacy

For the Main Study computer-based design, students selected to take Financial Literacy will be a subgroup of the students sampled from the following forms:

- C31-C42 (Science and Reading): 500 students. Within each school, out of 14 students taking these forms, 3-4 students will be sampled to take Financial Literacy.
- C43-C54 (Science and Mathematics): 500 students. Within each school, out of 14 students taking these forms, 3-4 students will be sampled to take Financial Literacy.
- C55-C66 (Science, Mathematics and Reading): all of 250 students. Within each school, all students taking these forms will also take Financial Literacy.

This design will result in a total sample size of 1,250 students. There is no paper-based design for the Main Study because no PBA country has signed up to take Financial Literacy.

Field Trial Design for Financial Literacy

Countries opting for the computer-based assessment in the Main Study are required to participate in the mode effect study and administer paper and computer versions of instruments (see

⁶ The intention was to select Science teachers first (which may give a sample of less than 10 in many schools), and afterwards adjust the number of teachers of other subjects, to guarantee that all in all 20 teachers would be sampled from every school. However, the sampling software (KeyQuest) requires sample sizes for Science and “General” Teacher Questionnaires to be fixed a priori. We expect that the rule of up to 10 science teachers and 15 other teachers will provide sample sizes of around 20 in many schools. These procedures will be tested in the Field Trial.

). For the Field Test design the following two groups will also take the assessment of Financial Literacy:

- Group 1 (PBA Trend) includes students taking Booklets P07-P12. Within each school there should be approximately six students taking these booklets, all of whom will proceed to the assessment of Financial Literacy. This group will take Financial Literacy as a paper instrument.
- Group 2 (CBA Trend) includes Forms C37-C42. Within each school there should be approximately nine students taking these forms, with all students proceeding to the assessment of Financial Literacy. This group will take Financial Literacy as a computer instrument.

This design will provide a Field Trial sample size of approximately 375 students (150 students taking the paper version and 225 students taking the computer version).

PISA 2015 UH Booklet

Consistent with previous cycles, a special one-hour assessment instrument, referred in PISA 2015 as the UH (Une Heure) instrument, will be prepared for use in schools catering for students with special needs. The UH instrument will contain about half as many items as the other instruments, with about 50% of the items being scientific literacy, 25% mathematical literacy and 25% reading literacy. These items were selected taking into account their suitability for students with special educational needs.

The UH instrument will be offered in both paper-and-pencil and computer delivery modes. In the Field Trial, countries that are planning to administer the UH instrument in the Main Study will be asked to administer it in 3 additional schools.

The UH instrument will be accompanied by a UH student questionnaire, that will be designed and authored by Core 6, and will include a subset of items from the regular questionnaire (mostly trend items) in a single form design that will be administered in the same mode as the UH instrument.

Annexes

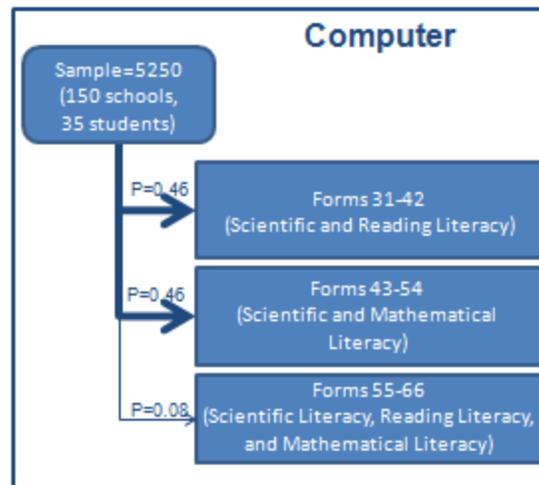
Annex A: CBA Assessment Design without Collaborative Problem Solving (CPS)

Main Study CBA Assessment Design without CPS

In response to the PGB requirement to accommodate countries that chose to opt out of the assessment of Collaborative Problem Solving, this Annex provides an alternative design that meets that requirement. Countries that choose not to include Collaborative Problem Solving will need to sample 35 students from each school for a total sample of 5,250 students.

This design is very similar to CBA Design presented previously that included the assessment of Collaborative Problem Solving (CPS). The major difference is that it reduces the number and combinations of test forms because CPS is not assessed. As with CBA Design 1, this design includes six intact clusters from Scientific, Reading and Mathematical Literacy based on the assessment cycle when each was the major domain: 2006 for Scientific Literacy, 2009 for Reading Literacy and 2012 for Mathematical Literacy. Each of these six intact clusters will provide trend information for Mathematics and Reading. The six intact clusters of Science tasks will carry not only the trend information but also link to the new scientific literacy items developed to reflect the 2015 framework. These sets of tasks across the four domains will be organized into different test forms as shown in Figure 7.

Figure 7. Main Study Computer-Based Assessment Design without CPS



As shown in Figure 7, there are several 36 test forms that combine the three domains to provide important covariance information. These combinations include: *i*) Scientific and Reading Literacy (Forms 31-42); *ii*) Scientific and Mathematical Literacy (Forms 43-54); and, *iii*) Scientific, Mathematical and Reading Literacy (Forms 55-66). As Scientific Literacy is the major domain for 2015, each student receives one hour of Scientific Literacy (one cluster each of trend and new science), which is paired with one or both of the two minor domains to provide important covariance information, as was the case in Design 1. CBA Design 2 also reflects the fact that the random assignment of a form within a school follows a specific probability. According to this design, 46% of the students will be randomly assigned to one of the 12 Scientific and Reading Literacy test forms and another 46% of students will be assigned to one of

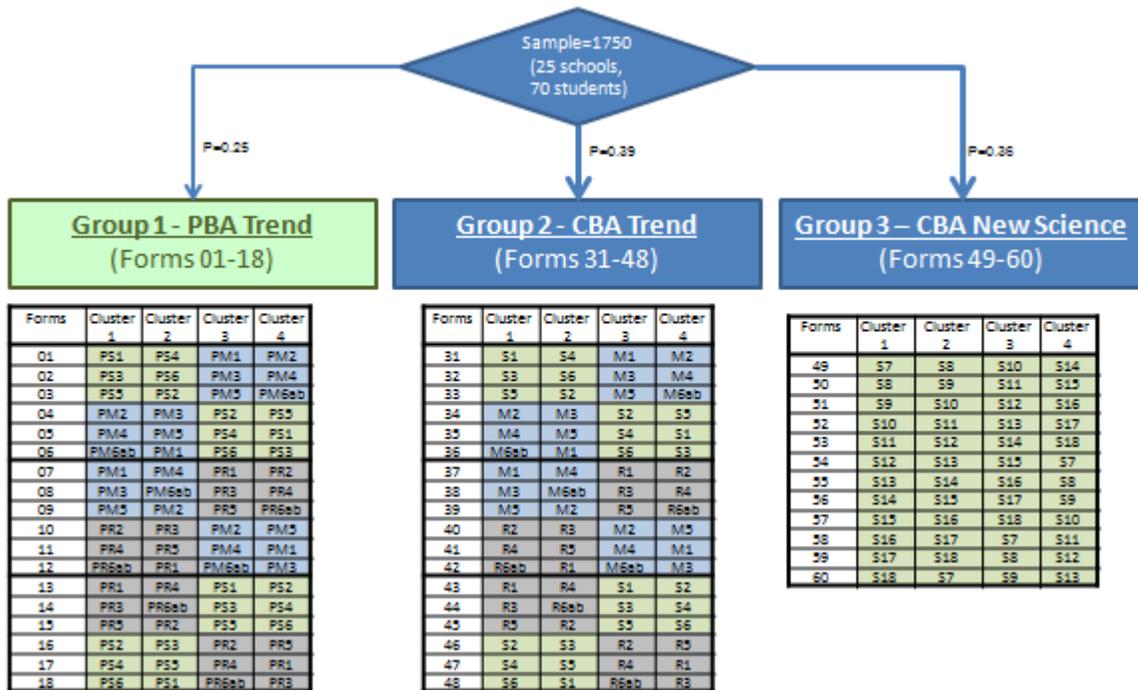
the 12 Scientific and Mathematical Literacy test forms. The remaining 8% of students within each school will be assigned to one of 12 Reading, Mathematical and Scientific Literacy test forms.

Field Trial CBA Assessment Design without CPS

The Field Trial CBA Design without CPS is very similar to Field Trial CBA with CPS shown in Figure 4. The major difference is that the number and combinations of test forms are reduced because Collaborative Problem Solving (CPS) is not assessed. As with Field Trial CBA design with CPS, we expect to include six intact clusters of tasks from Scientific, Reading and Mathematical Literacy based on the assessment cycle when they were the major domain – 2006 for Scientific Literacy, 2009 for Reading Literacy and 2012 for Mathematical Literacy. To test for any mode effects, this design includes a set of 18 paper-and-pencil forms covering the domains of Reading, Mathematical and Scientific Literacy (shown in Figure 8 as Group 1-PBA Trend). These same tasks will be adapted and authored into 18 equivalent computer-based test forms (shown in Figure 5 as Group 2-CBA Trend). However, without CPS, this design only includes 12 test forms consisting of the new 2015 Science tasks (shown in Figure 8 as Group 3-CBA New Science). The schematic design of the set of paper-and-pencil forms along with the set of CBA trend and CBA new Science test forms are shown in Figure 8.

For countries choosing computer delivery without CPS the recommended design includes a minimum of 25 schools for the Field Trial. Within each of these schools, 70 students will need to be selected and tested for a total sample of 1,750 students.

Figure 8. Field Trial Computer-Based Assessment Design without CPS



Where:

- PR1-PR6 represent Reading clusters in paper (Trend)
- PM1-PM6 represent Math clusters in paper (Trend)

- PS1-PS6 represent Science clusters in paper (Trend)
- R1-R6 represent Reading clusters in computer (Trend)
- M1-M6 represent Math clusters in computer (Trend)
- S1-S6 represent Science clusters in computer (Trend)
- S7-S18 represent Science clusters in computer (New)
- *a* represents standard clusters and *b* represents easier clusters

As shown in Figure 8, Field Trial (FT) CBA Design without CPS, 70 students (as compared with 78 students for FT CBA shown in Figure 4) will be randomly selected from each of the 25 schools and randomly assigned to one of three groups based on pre-specified probabilities: *i*) 18 of the 70 students (or 25%) will be assigned to Group 1-PBA Trend; *ii*) 27 of the 70 students (or 39%) will be assigned to Group 2-CBA Trend; and *iii*) 25 of the 70 students (or 36%) will be assigned to Group 3-CBA New Science. It is important to remember that each form will contain four 30-minute clusters for a total testing time of two hours per student. It is again important to note that the Contractors will work with countries and schools to accommodate their specific situation and needs. For example, the Contractors recognize that for some countries, schools with large numbers of students are less common, so sampling more than 25 schools and adjusting the spiraling of forms to ensure random assignment within schools may be necessary.

Annex B. Alternative approaches to sampling schools and student in the Field Trial

As stated previously, the preferred approach to conducting a mode effect study is based on each country sampling 25 schools and 78 students per school. This annex provides two alternative designs for countries that feel they cannot meet these requirements.

Field Trial Alternative Sampling Design 1

This first alternative sampling design is the second best option. Countries choosing this approach will need to sample a minimum of **39 schools** for the Field Trial. Within each of these schools, **52 students** will need to be selected and tested for a total sample of 2,028 students. Please note that this section is related to the Field Trial Design with CPS that is shown in Figure 4 with slightly modified proportions of respondents for Group 1-PBA Trend, Group 2-CBA Trend and Group 3-CBA New.

The 39 schools should be randomly divided into three groups of 13 schools each. Then 52 students should be sampled and randomly divided into three groups of 12, 16 and 24 students, respectively.

- Schools Group 1: From the group of 12 students, each will receive one of the forms numbered 01-06 and 13-18. From the group of 16 students, 12 students will receive one of the forms numbered 31-36 and 43-48 and the remaining 4 students will receive one of the forms numbered 31-36 and 43-48 with no forms between 31-36 and 43-48 administered more than twice. Each of the 24 students in the third group will receive one of the 24 forms numbered 49-72
- Schools Group 2: From the group of 12 students, each will receive one of forms numbered 01-12. From the group of 16 students, 12 students will receive one of the forms numbered 31-42 forms and the remaining 4 students will receive one of the forms numbered 31-42, with no forms between 31-42 administered more than twice. Each of the 24 students in the third group will receive one of the 24 forms numbered 49-72.
- Schools Group 3: From the group of 12 students, each will receive one of the forms numbered 07-18. From the group of 16 students, 12 students will receive one of the forms numbered 37-48 and the remaining 4 students will receive one of the forms numbered 37-48, with no forms between 37-48 administered more than twice. Each of the 24 students in the third group will receive one of the 24 forms numbered 49-72.

Field Trial Alternative Sampling Design 2

This second alternative sampling design is the third best option. Countries using computer delivery will need to sample a minimum of **54 schools** for the Field Trial. Within each of these schools, **36 students** will need to be selected and tested for a total sample of 1,944 students.

The 54 schools need to be randomly divided into 6 groups: *i*) 3 groups of 13 schools, and *ii*) 3 groups of 5 schools each.

- Schools Group 1 (13 schools): From the 36 students, 12 students will receive one of the forms numbered 01-06 and 13-18. The next 12 students will receive one of the forms numbered 31-36 and 43-48. Lastly, the remaining 12 students will receive one form randomly selected from the 24 forms numbered 49-72.
- Schools Group 2 (13 schools): From the 36 students, 12 students will receive one of the forms numbered 01-12. The next 12 students will receive one of the forms numbered 31-42 forms. The

remaining 12 students will receive one form randomly selected from the 24 forms numbered 49-72.

- Schools Group 3 (13 schools): From the 36 students, 12 students will receive one of the forms numbered 07-18. The next 12 students will receive one of the forms numbered 37-48. The remaining 12 students will receive one of 12 forms randomly selected from the 24 forms numbered 49-72.
- Schools Group 4 (5 schools): From the 36 students, 12 students will receive one of the forms numbered 31-36 and 43-48. The remaining 24 students will receive one of the 24 forms numbered 49-72.
- Schools Group 5 (5 schools): From the 36 students, 12 students will receive one of the forms numbered 31-42. The remaining 24 students will receive one of 24 Forms 49-72.
- Schools Group 6 (5 schools): From the 36 students, 12 students will receive one of the forms numbered 37-48. The remaining 24 students will receive one of the 24 forms numbered 49-72.

Annex C. Main Study Computer-Based Questionnaire Design

Student Questionnaire (n= 6300 in CBA Design per country) To be combined with Main Study Computer-Based Assessment Design (Figure 2)	
StQ-MS Items (approximately 30 minutes)	
<ul style="list-style-type: none"> • Student background (modules 7, 8) • Science-related non-cognitive outcomes (self efficacy, self concept, motivation, value of science) (module 4) • General non-cognitive outcomes (self efficacy, behavioral preferences, well-being) (module 10) • Reflexive constructs (module 2: science teaching, modules 3/13: school environment, module 19: assessment) 	
Optional: Educational Career Questionnaire (ECQ) (10 min)	
Optional: ICT Familiarity Questionnaire (ICTQ) (10 min)	
School Questionnaire (ScQ) (n=150 per country) Computer-based administration 45 min	
Optional: Teacher Questionnaire (TQ) (up to 10 science teachers and 15 non-science teachers per school, i.e. n=3000 per country) Computer-based administration 30 min	
TQ-MS-Core: Teacher background and education (5 min.)	
TQ-MS-S (25 Min)	TQ-MS-G (25 Min)
To be administered to the sample of Science Teachers No overlap with TQ-MS-G	To be administered to the sample of non-Science Teachers No overlap with TQ-MS-S

Optional: Parent Questionnaire (PQ)

(n= 6300)

Paper-based administration

30 min

Annex D. Main Study Paper-Based Questionnaire Design

Student Questionnaire (StQ)

(n= 5250 per Country)

Based on the Main Study Paper-Based Assessment Design (as shown in Figure 3)

30 min or less, mostly trend items

School Questionnaire (ScQ)

(n=150 per Country)

45 min or less, mostly trend items

Optional: Parent Questionnaire (PQ)

(n= 5250 per Country)

30 min, identical to the PQ administered in CBA-countries

Annex E. Field Trial Questionnaire Design

Student Questionnaire			
Based on Field Trial Assessment Design (as shown in Figure 4)			
Students administered “CBA Trend” or “CBA New Science/CPS” achievement test items n= 1500 per country Computer-Based Questionnaires			
StQ-FT Core Items (5 min): gender, age, grade, educational program, parental occupation, parental education, immigration background			
Within-school random assignment to one out of four non-overlapping blocks (25 min each) ⁷			
StQ-FT-A	StQ-FT-B	StQ-FT-C	StQ-FT-D
If country chooses this Option: Educational Career Questionnaire (10 min)			
If country chooses this Option: ICT Familiarity Questionnaire (10 min)			
Within-school random assignment to one out of two non-overlapping blocks			
ICT-FT-A		ICT-FT-B	

⁷ Net available assessment time may be lower than 4*25=100 minutes, because the Field Trial will be used for systematic comparison between variations of the same scale, such as Likert-type scales with and without preceding vignettes, interactive vs. non-interactive answering formats, different ways of branching, or different ordering of questions.

School Questionnaire One questionnaire per school	
Countries doing PBA	Countries doing CBA
ScQ Trend Items + Selected new content (less than 60 minutes) administered on paper	Full ScQ-FT computer-based Questionnaire (about 60 min, to be reduced to 45 min in the Main Study)

Optional: Parent Questionnaire Sample size equal to student sample Paper-based administration 30 min
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Optional: Teacher Questionnaire up to 10 science teachers and 15 non-science teachers per school Computer-based only (→ only in countries choosing CBA) Overall duration: 45 min, to be reduced to 30 min in the Main Study	
TQ-FT-Core: Teacher background, school climate... (10 min)	
TQ-FT-S (35 min)	TQ-FT-G (35 min)
To be administered to the sample of Science Teachers	To be administered to the sample of non-Science Teachers