



## Considerations for Analysis of International Activities Program Data

### Module Objectives

- Demonstrate the use of the IEA IDB Analyzer Merge and Analysis Module
  - PIRLS, TIMSS, and PISA use a complex sample design and IRT scaling of assessment data
  - Complex sample data should not be analyzed using procedures that assume simple random sampling
  - The IEA IDB Analyzer accounts for the study design and correctly calculates estimates and their standard errors
- Describe the analysis considerations for IAP data

### What is the IEA IDB Analyzer?

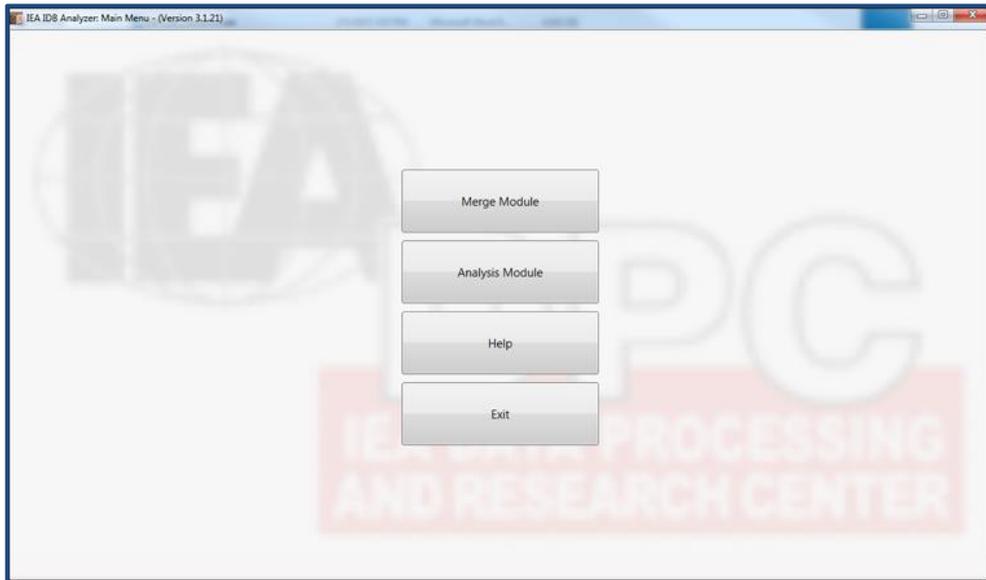
Special statistical software that produces weighted estimates, correct standard errors, and correct achievement scores using plausible values

- Designed for use with large-scale international data files, including PIRLS, TIMSS, and PISA
- Available for free download
- SPSS for Windows needed to execute SPSS code created by the IEA IDB Analyzer

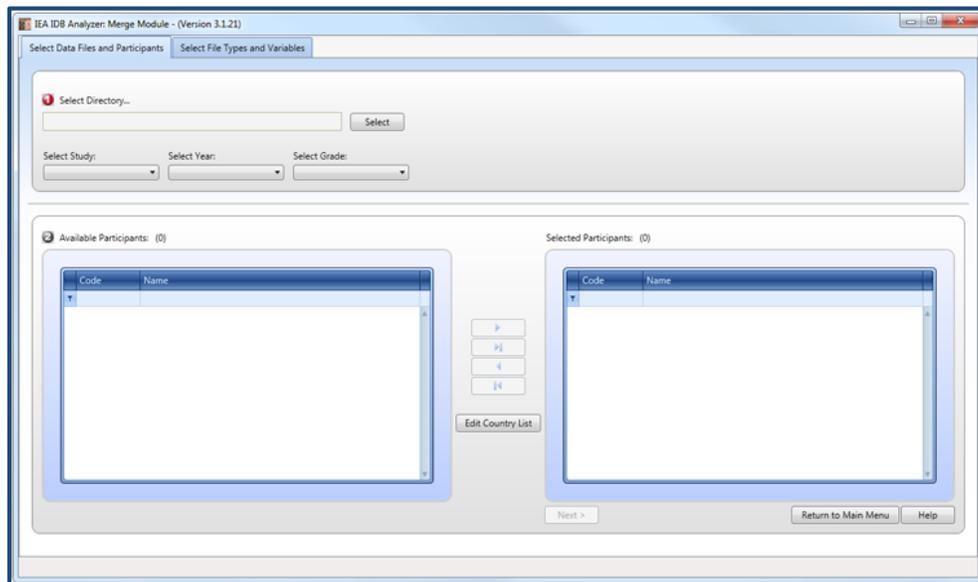
### Installing and Using the [IEA IDB Analyzer](#)

- Windows XP or higher, SPSS 15 or higher, .Net 4 and Microsoft Excel needs to be installed
- Administrator rights are required for installation process but not for use
  - Locate the IBM SPSS Statistics program and right click on it to choose 'Properties'
  - See where your SPSS program starts and ensure that it is not write-protected
    - In this case, you will need to gain administrator rights or have an administrator change the 'start' folder to one for which you have write access
- IEA IDB Analyzer has one common graphical user interface with two modules
  - **Merge**
  - **Analysis**

### Using the IDB Analyzer to Merge Data Files



### Merging Data Files



### Choosing Variables

Select...

- Country Data
- File Types
- Variables
- Output Files

Start SPSS

The screenshot shows the 'Select Data Files and Participants' dialog box. On the left, under 'Select File Types...', 'School Background', 'Student Achievement', and 'Student Background' are checked. A red box highlights these three items, with a callout pointing to them that says 'School Background Student Background'. Below this, a red box says 'Select all variables'. On the right, under 'Selected Variables', a list of variables is shown, with a red box indicating that 'Scores are selected automatically'. At the bottom, a red box shows the output file path: 'C:\Workshop\Output\SchoolStudent\_Merged.\*'.

C:\Workshop\Output\SchoolStudent\_Merged.\*

### Selecting the Teacher Data Files

The screenshot shows the 'Select Data Files and Participants' dialog box. Under 'Select File Types...', 'School Background', 'Student Achievement', 'Student Background', 'Math Teacher Background', and 'Science Teacher Background' are checked. The 'Available Variables' list on the left shows 182 variables, including 'GEN\YEARS BEEN TEACHING', 'GEN\SEX OF TEACHER', 'GEN\AGE OF TEACHER', and 'GEN\LEVEL OF FORMAL EDUCATION COMP...'. The 'Selected Variables' list on the right shows 10 variables, including 'GEN\CHARACTERIZE\JOB SATISFACTION', 'GEN\CHARACTERIZE\TCHS UNDERSTAND...', 'GEN\CHARACTERIZE\TCHS DEGREE OF SUC...', 'GEN\CHARACTERIZE\TCHS EXPECTATIONS', 'GEN\CHARACTERIZE\PARENTAL SUPPORT', 'GEN\CHARACTERIZE\PARENTAL INVOLVEM...', 'GEN\CHARACTERIZE\STUDENTS REGARDS...', 'GEN\CHARACTERIZE\STUDENTS DESIRE', 'GEN\THINKING ABT CURR SCH\SAFE NEIGH...', and 'GEN\THINKING ABT CURR SCH\SAFE NEIGH...'. The 'Background Variables and Scores' count is 12, and 'ID and Sampling Variables' count is 10.



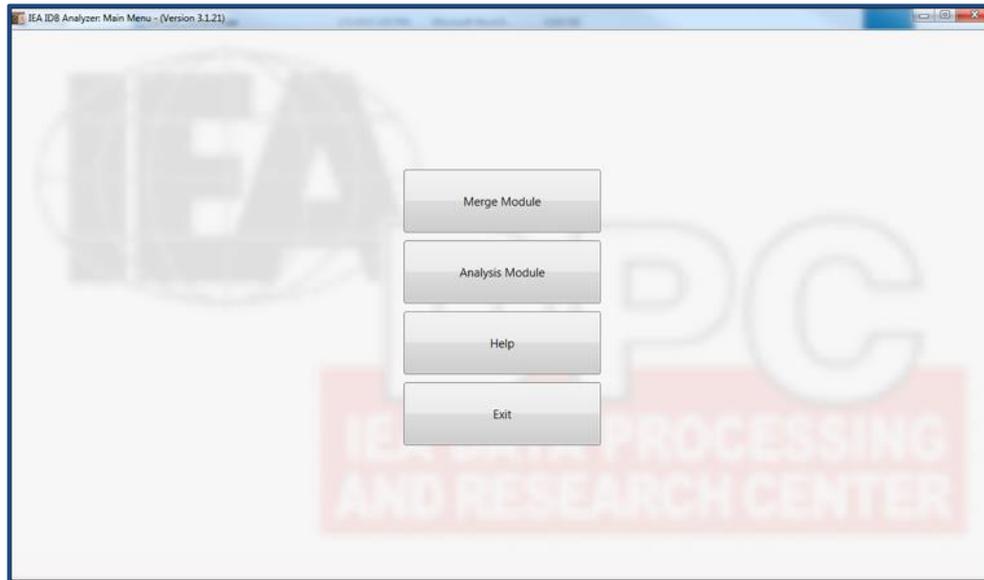
### Merging PISA Data

- To do analyses with school-level PISA variables, manually merge the student data file and the school data file
- The merged data file in SPSS can then be used in the Analysis Module of the IDB Analyzer

### Steps for Merging PISA data in SPSS

1. Open each data file and select Data → Sort Cases. Move the COUNTRY and SCHOOLID variables, in that order, to the 'Sort by' box, and select 'Ascending' for both variables
2. Open the sorted school data file (which will now be your active dataset)
  - Select Data → Merge Files → Add Variables
3. Select the student data file as the "open dataset" or "external SPSS data file" that will be merged with the active dataset
  - Click 'Continue'
4. Check 'Match cases on key variables in sorted files' and 'Active dataset is keyed table'
  - Enter the COUNTRY and SCHOOLID variables in the 'Key Variables' box
5. Save the merged data file under a file name
  - Run some analyses and check these against corresponding data tables in the [PISA international report](#)

### Using the IDB Analyzer to Merge Data Files



### Overview of Analysis Steps

- Step 1: Select the analysis file and analysis type
- Step 2: Select the statistic type
- Step 3: Select variables or parameters
- Step 4: Specify output files

### Step 1: Selecting the Analysis File and Analysis Type

Select...

Analysis File

Analysis Type

The screenshot shows the 'IEA IDB Analyzer: Analysis Module - (Version 3.1.21)' window. The 'Analysis File' field is set to 'C:\Workshop\Output\SchoolStudent\_Merged.\*'. The 'Analysis Type' dropdown is set to 'TIMSS (Using Student Weights)'. A list of variables is visible on the left, and a 'Select Variables' panel is on the right.

Name	Description
*COUNTRY	*COUNTRY ID*
*DBOOK	*ACHIEVEMENT TEST BOOKLET*
*DSCHOOL	*SCHOOL ID*
*DCLASS	*CLASS ID*
*DSTUD	*STUDENT ID*
*DGRADE	*GRADE ID*
*DBIRTHD	*DATE OF STUDENTS BIRTHDAY*
*DBIRTHM	*DATE OF STUDENTS BIRTHMONTH*
*DBIRTHY	*DATE OF STUDENTS BIRTHYEAR*
*DSEX	*SEX OF STUDENTS*
*DADMIN	*TEST ADMINISTRATORS POSITION*
*DATE	*DATE OF TESTING*
*DLANG	*LANGUAGE OF TESTING*
*DSEX01	GENSEX OF STUDENT
*DSEX02A	GENDATE OF BIRTHMONTH
*DSEX02B	GENDATE OF BIRTHYEAR
*DSEX03	GENOFTEN SPEAK +LANG OF TEST+ AT HOME
*DSEX04	GENAMOUNT OF BOOKS IN YOUR HOME
*DSEX05A	GENHOME POSSESS/COMPUTER
*DSEX05B	GENHOME POSSESS/STUDY DESK
*DSEX05C	GENHOME POSSESS/BOOKS
*DSEX05D	GENHOME POSSESS/OWN ROOM
*DSEX05E	GENHOME POSSESS/INTERNET CONNECTION
*DSEX05F	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05G	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05H	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05I	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05J	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05K	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX06A	GENHIGHEST LVL OF EDU.+STMO OR FE GUAD+
*DSEX06B	GENHIGHEST LVL OF EDU.+STFA OR MA GUAD+
*DSEX07	GENHOW FAR IN EDU DO YOU EXPECT TO GO

### Step 2: Selecting the Statistic Type

Select...

Analysis File

Analysis Type

Statistic Type

The screenshot shows the 'IEA IDB Analyzer: Analysis Module - (Version 3.1.21)' window. The 'Analysis File' field is set to 'C:\Users\sterguson\Desktop\SchoolStudent\_Merged.sav'. The 'Analysis Type' dropdown is set to 'TIMSS (Using Student Weights)'. The 'Statistic Type' dropdown is set to 'Percentages and Means'. A list of variables is visible on the left, and a 'Select Variables' panel is on the right.

Name	Description
*DSEX01	GENSEX OF STUDENT
*DSEX02A	GENDATE OF BIRTHMONTH
*DSEX02B	GENDATE OF BIRTHYEAR
*DSEX03	GENOFTEN SPEAK +LANG OF TEST+ AT HOME
*DSEX04	GENAMOUNT OF BOOKS IN YOUR HOME
*DSEX05A	GENHOME POSSESS/COMPUTER
*DSEX05B	GENHOME POSSESS/STUDY DESK
*DSEX05C	GENHOME POSSESS/BOOKS
*DSEX05D	GENHOME POSSESS/OWN ROOM
*DSEX05E	GENHOME POSSESS/INTERNET CONNECTION
*DSEX05F	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05G	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05H	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05I	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05J	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX05K	GENHOME POSSESS+ COUNTRY SPECIFIC+
*DSEX06A	GENHIGHEST LVL OF EDU.+STMO OR FE GUAD+
*DSEX06B	GENHIGHEST LVL OF EDU.+STFA OR MA GUAD+
*DSEX07	GENHOW FAR IN EDU DO YOU EXPECT TO GO

**Statistic Types**

- Percentages and Means
- Percentages Only
- Regression
- Correlations
- Benchmarks (Discrete or Cumulative options)
- Percentiles

Correct standard errors calculated for all analytic procedures, and together with the statistics these are presented in output files to evaluate statistical significance.

**Percentages and Means**

**Without Plausible Values of Achievement**

- Computes percentages, means, and standard deviations for selected variable(s), by subgroups defined by grouping variable(s)

**With Plausible Values of Achievement**

- Computes percentages, mean achievement scores, and standard deviations based on plausible values, by subgroups defined by grouping variable(s)

**Percentages Only**

- Computes percentages by subgroups defined by grouping variable(s)
- Achievement scores cannot be used with this option

**Regression**

**Without Plausible Values of Achievement**

- Computes standardized regression coefficients for selected independent variables to predict a dependent variable, by subgroups defined by grouping variable(s)

**With Plausible Values of Achievement**

- Computes standardized regression coefficients for selected independent variables to predict a dependent variable whereby plausible values can be used as dependent or independent variable, by subgroups defined by grouping variable(s)

### **Correlations**

#### **Without Plausible Values of Achievement**

- Computes correlation coefficients for selected variables by subgroups defined by grouping variable(s)

#### **With Plausible Values of Achievement**

- Computes correlation coefficients for selected variables that include the plausible values, by subgroups defined by grouping variable(s)

### **Benchmarks**

Computes percentages of students meeting a set of user-specified achievement benchmarks, by subgroups defined by grouping variable(s)

- Discrete
- Discrete with Analysis Variable(s)
- Cumulative

### Percentiles

#### Without Plausible Values of Achievement

- Calculates percentiles of any continuous variable by subgroups defined by grouping variable(s)

#### With Plausible Values of Achievement

- Computes percentiles of a student achievement distribution for a specified set of plausible values by subgroups defined by grouping variable(s)

### Step 3: Selecting the Variables or Parameters

Select...

- Analysis File
- Analysis Type
- Statistic Type
- Parameters

The screenshot shows the SAEB Analyst software interface. On the left, a 'Select...' menu lists 'Analysis File', 'Analysis Type', 'Statistic Type', and 'Parameters'. The main window displays variable selection options. Red boxes highlight the following categories: 'Grouping Variables' (pointing to the 'Country' variable), 'Background analysis variables' (pointing to the 'Non-Plausible Values' section), 'Achievement scores as analysis variables' (pointing to the 'Plausible Values' section), 'Dependent Variable (background or PVs)' (pointing to the 'Dependent Variable' section), and 'Weight Variable' (pointing to the 'Weight Variable' section).

### Selecting the Variables or Parameters (Continued)

Select...

Analysis File

Analysis Type

Statistic Type

Parameters

The screenshot shows the 'Select...' dialog box in the IEA IDB Analyzer. On the left, there are four buttons: 'Analysis File', 'Analysis Type', 'Statistic Type', and 'Parameters'. The main window displays a list of variables with columns for 'Name' and 'Description'. A red callout box highlights the 'Achievement Benchmarks/Percentiles' section, which includes options for 'Grouping Variables', 'Exclude Missing from Analysis', 'Possible Values', 'Weight Variable', and 'Achievement Benchmarks'.

### Parameters within the IEA IDB Analyzer

#### Grouping Variables

- This is the list of variables that are to be used to define the subgroups. The list can consist of one or more variables. The IDB Analyzer always includes IDCNTRY as the first grouping variable and there should always be at least one grouping variable.
- If the option “Exclude Missing from Analysis” is checked, only cases that have non-missing values in the grouping variables will be used in the analysis

#### Analysis Variables

- Depending on the analysis chosen, these could be variables
  - For which means will be computed
  - That will be correlated
  - For which percentiles will be calculated
  - Used as predictors in a regression model, either categorical or continuous independent variables

### Parameters within the IEA IDB Analyzer (Continued)

- Achievement Scores
  - The achievement scores in the form of plausible values can be used as a dependent or independent variable in a regression analysis
- Dependent Variable
  - The dependent variable to be predicted by the list of analysis variables. Only one dependent variable can be listed
- International benchmark values for PIRLS and TIMSS and PISA proficiency level cutpoint scores can be found in the [PIRLS](#), [TIMSS](#), or [PISA](#) international reports.
  - These are the values that will be used as cut points of the achievement and other selected continuous variables' distributions

### Step 4: Specifying Output Files

Select...

**Analysis File**

**Analysis Type**

**Statistic Type**

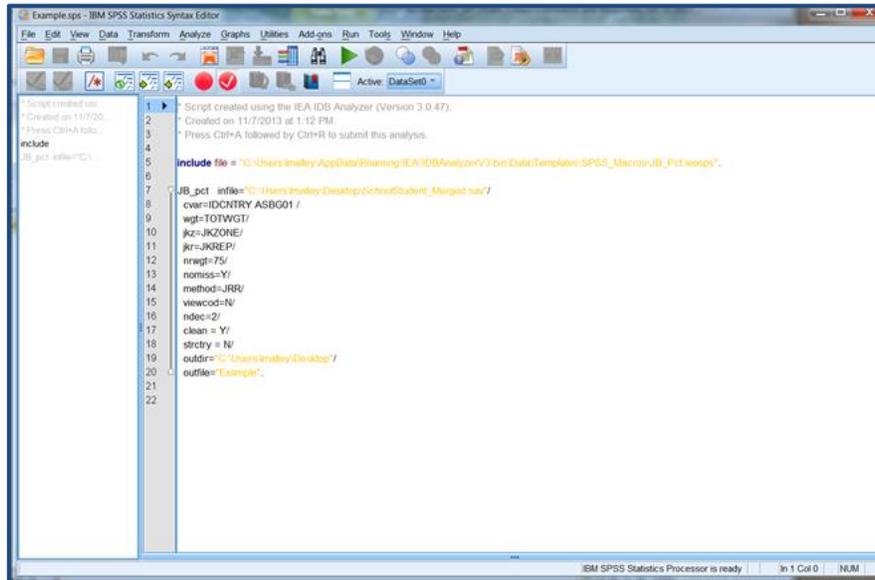
**Parameters**

**Output Files**

**Start SPSS**

The screenshot shows the 'IEA IDB Analyzer Analysis Module - Version 3.2.20' window. The 'Select Variables' dialog is open, displaying a list of variables on the left and configuration options on the right. The 'Output Files' field at the bottom is highlighted with a red box and contains the text 'C:\Workshop\Output\File\_Name'. Other visible options include 'Analysis Type' (TIMSS Young Student Weights), 'Statistic Type' (Benchmarks), 'Plausible Value Option' (Use PVL), 'Benchmark Options' (Country), and 'Number of Decimals' (2). The 'Grouping Variables' section includes 'COUNTRY' and 'COUNTRY ID'. The 'Weight Variable' section includes 'TOTAL STUDENT WEIGHT'. The 'Achievement Benchmarks' section is currently empty.

## SPSS Output Syntax



```
Example.sps - IBM SPSS Statistics Syntax Editor
File Edit View Data Transform Analyze Graphs Utilities Add-ons Run Tools Window Help
Active DataSet0

1 * Script created using the IEA IDB Analyzer (Version 3.0.47).
2 * Created on 11/7/2013.
3 * Press Ctrl+A followed by Ctrl+R to submit this analysis.
4
5 include file = "C:\Users\malloy\AppData\Roaming\IEA IDB Analyzer\3.0.47\bin\Data\Templates\SPSS_Macros\B_Pct macros".
6
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8 JB_pct infile="C:\Users\malloy\Desktop\SchoolStudent_Merged.sav"/
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10 cvar=IDCNTRY ASBG01 /
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12 wgt=TOTWGT/
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14 jcz=JKZONE/
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16 jkr=JKREP/
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18 nrawt=75/
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20 normss=Y/
21
22 method=JRR/
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24 viewcod=IV/
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26 ndec=2/
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28 clean = Y/
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30 strctry = N/
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32 outfile="C:\Users\malloy\Desktop\7
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### **IAP Studies are Not Experiments**

- We do not control assignment of students to ‘treatment’ groups
- We cannot establish causality, or direct effect
- Events have already happened and we record what has happened

### **Correctly Wording Research Questions**

- Important to know how to word statements about contextual variables correctly
- For example
  - About how many books are there in your home?
    - None or very few (0–10 books)
    - Enough to fill one shelf (11–25 books)
    - Enough to fill one bookcase (26–100 books)
    - Enough to fill two bookcases (101–200 books)
    - Enough to fill three or more bookcases (more than 200)

### Correctly Wording Research Questions (Continued)

We could ask...

- Is there a statistical relationship between the number of books in the home and mathematics achievement at grade 8?
- Do students who report having more books in the home tend to do better in mathematics than those who have fewer books?

We should not ask...

- Does having more books in the home affect (increase/decrease) mathematics achievement?

### Does the Significance Matter?

- Any difference can be “statistically significant” if the sample is large enough
- But a statistically significant difference is not necessarily “substantively significant”

### PIRLS and TIMSS in 2011

- Combined study
  - PIRLS
  - TIMSS Grade 4
- Same schools participated
- Same schools tested with PIRLS (reading literacy) and TIMSS Grade 4 (mathematics and science) instruments
- New set of scores using data from both studies
- New set of background scales and indices
- Combined dataset released in August 2013

### **Module Summary and Resources**

- Demonstrated the use of the IEA IDB Analyzer Merge and Analysis Module
  - PIRLS, TIMSS, and PISA use a complex sample design and IRT scaling of assessment data
  - Complex sample data should not be analyzed using procedures that assume simple random sampling
  - The IEA IDB Analyzer accounts for the study design and correctly calculates estimates and their standard errors
- Described the analysis considerations for IAP data

#### Resources

- [IEA IDB Analyzer](#)
- [PIRLS and TIMSS International Reports](#)
- [PIRLS and TIMSS in 2011](#)
- [PISA International Report](#)