IEA Data Visualizer

User Guide

Manual Version 1.0

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1 About the IEA Data Visualizer

The IEA Data Visualizer has been developed in order to provide new ways to view and compare data from the various cycles of the IEA TIMSS and PIRLS studies. For clarity the results are shown without indication of standard errors. Not all differences that can be seen are statistically significant. Other tools such as the IEA IDB Analyzer may be used to estimate the correct standard errors and to apply tests of significance.

The aim of this software is to promote analysis by improving and facilitating the communication and interpretation of information, by providing: (i) interactive visualizations which facilitate the interpretation of information, (ii) a user friendly interface that is accessible also to non-technical users, (iii) automated data visualization.

In particular, trend analysis is facilitated by use of a "Time Slider" allowing data from different cycles to be compared. Comparisons between different participating countries is intuitively made by clicking directly onto a world map or selecting the country names from an alphabetic list, and it is possible to quickly switch between different styles of data plot in order to find the best style in which to display the data.

Finally, it is possible to export all plots, data maps, and the current data selection as a .CSV file.

2 System Requirements

The IEA Data Visualizer is designed to operate in as many places as possible regardless of the available computers and infrastructure. It can be used online, through an intranet, as well as offline – making it usable in places where there is no Internet connectivity. It is easy to disseminate due to its very small size – small enough to fit on any USB flash drive (USB stick) or to be sent as an e-mail attachment. The software does not require installation, so even those without administrator rights on their PC can run both the offline and online versions.

The software runs with Adobe Flash Player[1], which has the following minimum system requirements. The system requirements are very low, and any computer purchased within the past 8 years should be able to run the software.

Windows®	Macintosh	Linux®
Intel® Pentium® II 450MHz, AMD Athlon™ 600MHz or faster processor (or equivalent)	PowerPC® G3 500MHz or faster processor Intel Core™ Duo 1.33GHz or faster processor	Modern processor (800MHz or faster)
128MB of RAM	128MB of RAM	512MB of RAM, 128MB of graphics memory
128MB of VRAM*		

*Recommended for GPU hardware acceleration–dependent features. Flash Player will use software mode for systems that do not meet the system requirements.

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[1] See also http://www.adobe.com/products/flashplayer.html

3 Thematic Map
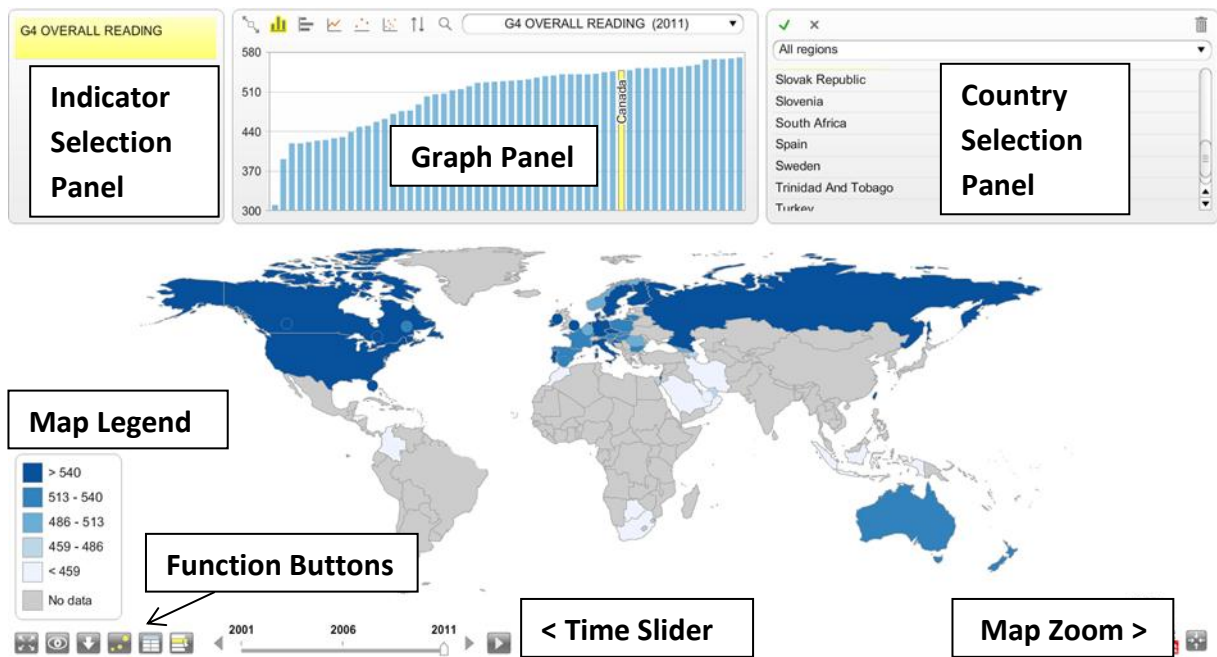
3.1 Start Page

On starting the program, the map displays an overview of 'IEA Participation' – this is simply an indicator of which countries have taken part in TIMSS, PIRLS or both studies. For general use, you will want to select variables from the drop-down menu above the graph:
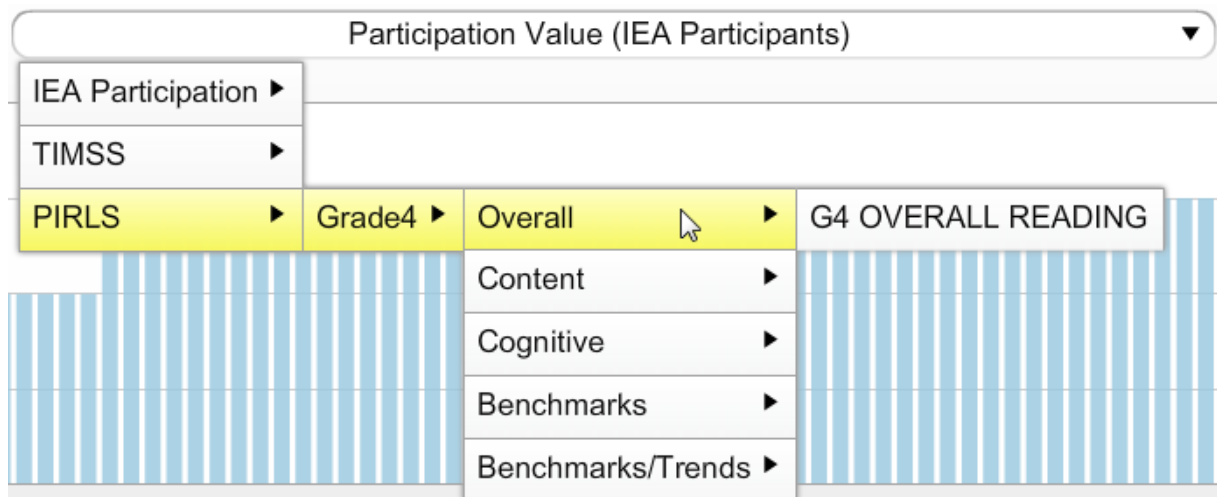
3.2 Choropleth Map

This is the main thematic map type in the program. The map legend shows which map colors are associated with each data range (for example, higher values may be shaded in increasingly darker colors). Both the map colors and the data range can be customized (see 'Map Legend' below). The following features are enabled:

Map information per country

Moving the mouse over a country brings up a popup containing information about that particular country for the selected indicator (as well as the bookmarked indicator, if there is one).

Selecting a country

You can select a country by clicking on it (once) in the map. Each time you do this for a new country with data in the relevant dataset, this country will be added to the selection. Clicking on a selected country will remove it from the selection. See also the Selection panel for additional selection options.
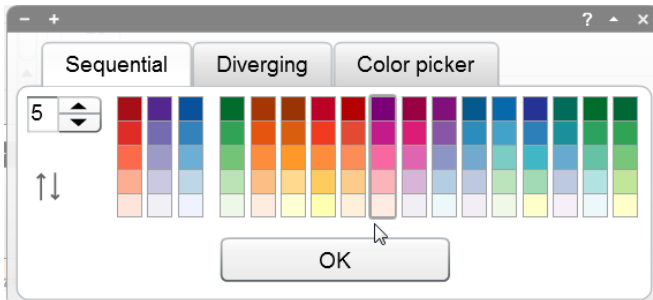
Map Legend

Clicking on any of the colors in the legend will bring up a color selection panel. In this panel you can change the colors (either Sequential or Diverging color schemes), as well as the number of color classes (between 3 and 9).

Data range

To adjust the data range of the map legend, click on the top or bottom value. Use the popup to increase or decrease the value, or enter a whole new value. The intermediate values will be adjusted automatically.

Map zoom

The map zoom controls are normally hidden from view. Move the mouse towards the bottom-right corner of the screen to make them appear.

Zoom: You can zoom in and out of the map using the 'zoom in' and 'zoom out' buttons, or by dragging the zoom slider up or down. If your mouse has a scroll wheel, you can also use this to zoom in and out.
Moving the map: click and drag the map with the mouse to move it to a new position.
Restore map position: the button shown on the left restores the map to the original coordinates for the selected region.

3.3 Proportional Symbol Map

A proportional symbol map scales symbols (usually circles) according to the indicator being mapped. Each symbol can represent a country or other map area. In this program, the symbol map overlays the choropleth map (see above). This means that two data sets can be shown on the same map – one for the choropleth map and one for the symbol map.

These proportional symbols may also be used as a third indicator in the Scatter Plot style of chart.

4 Indicator Selection Panel
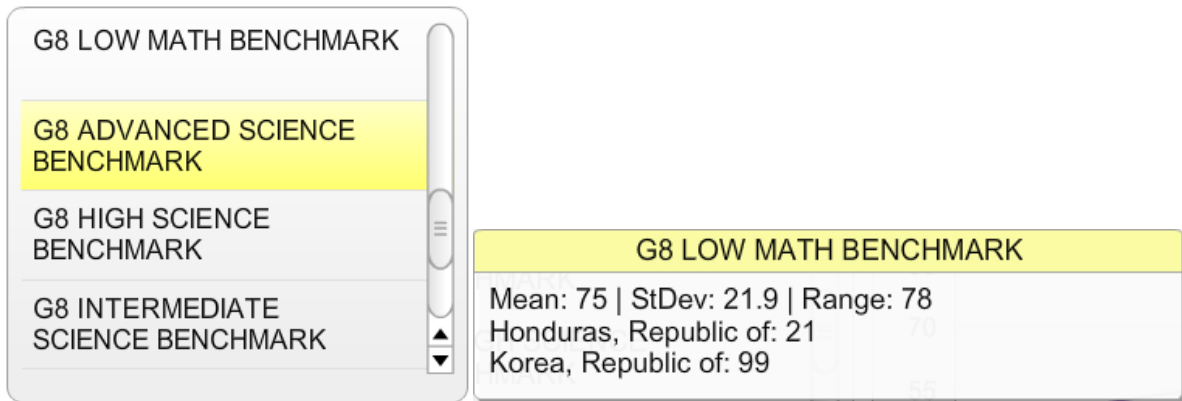
This area is automatically populated with the options from the last group selected, allowing for easy switching between related indicators.

In addition, leaving the cursor over the selected indicator brings up a popup showing details of the mean, standard deviation, range, and countries with the highest and lowest values.
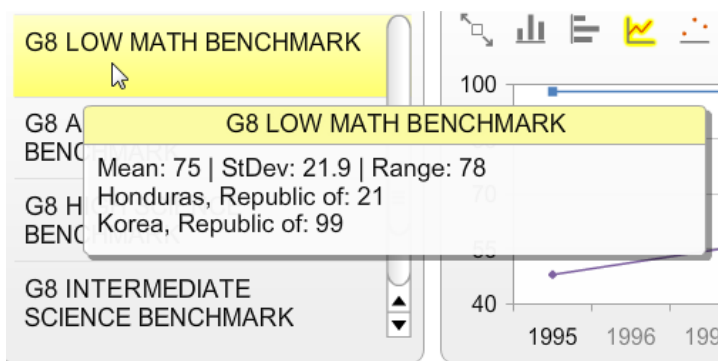
5   Graph Panel

The Graph panel is the panel above the map used for the display of selected data as graphs according to the chart style chosen.

Full Screen / Restore

Use the Full Screen button to expand the graph to fill the available screen. When the graph is full screen, the map and Indicator Selection panel will not be shown, however, the Country Selector panel remains as an integrated area – if you want to you can remove this by clicking on the Selection. The Restore button returns the display to its original state.

Column Chart / Bar Chart

The bar chart and column chart buttons are located in the top-left corner of the Graph panel.

Use the "sort" button to sort the graph from lowest to highest, from highest to lowest, from highest to lowest starting in the middle, or alphabetically.

Time series

The time series button is located in the top-left corner of the Graph panel. Use the Selection panel to add countries or other variables (depending on your data set) to the time series graph. Click on the country/variable again if you wish to remove it. Countries can also be selected directly from the map (sSee also: Selection anel).

Use the "sort" button to sort the time series labels.

Vertical Bubble Chart

This button enables the display of country data as with the column chart, but with the values on the y-axis marked as bubbles rather than the top of a column. This display type has the advantage that it allows a second indicator to be visualized in the form of the bubble size. This indicator can be selected through the drop-down menu above the scatter plot. The bubble size follows the formula: value / maximum value.

Scatter Plot

The scatter plot button is located in the top-left corner of the Graph panel. Clicking on the button will automatically use the selected indicator as the x-axis variable. You need to select a second indicator as the y-axis variable. The x-axis and y-axis variables can be selected in the Graph panel (see below), or in the Indicators panel.

Press the 'play' button to see an animation of changes over time, with each bubble (point) moving to the corresponding x and y positions (depending on whether data is available for each time interval).

If 'Show trails' is selected (next to the play button), each bubble will leave a trail to mark previous positions over time.

Clicking on a scatter plot bubble will display the associated label. They can also be repositioned through 'drag and drop', by right-clicking and selecting 'move text labels or map points'.

A third indicator can be visualized through the bubble size parameter. This indicator can be selected through the drop-down menu above the scatter plot. The bubble size follows the formula: value / maximum value.

Select x-axis / y-axis indicator

G4 OVERALL READING (2001) ▼

Click on the x-axis or y-axis label, then select an indicator from the drop-down menu. Note that this x-axis selection acts as a bookmark for use in the program (a small panel appears to show this).

Use the drop-down menu in the top of the Graph panel to change the scale of the 'bubbles' according to a selected indicator.

Graph Options
Use the 'Graph Options' icon in the Graph panel to show or hide the trendline. Move the mouse over the trendline to see the slope and trendline equation.

Adjusting graph size
To change the graph size, move the mouse to the sides or corners of the Graph panel until you see the cursor change to look like the one shown on the left. Click and hold down the left mouse button, then drag the panel to the size you want. Release the mouse button once you have the right size.

Adjusting graph scale
The graph scale can be adjusted by clicking on the top or bottom graph values. The value can then be edited in the popup window.

Search
The search function brings up a popup which enables you to filter a list of indicators to find the one you need. The example shows the filter "geo" applied to find indicators for the subject Geometry.

Search: geo

G4 GEOMETRY (TIMSS - Grade4 - Content)
G8 GEOMETRY (TIMSS - Grade8 - Content)

Close
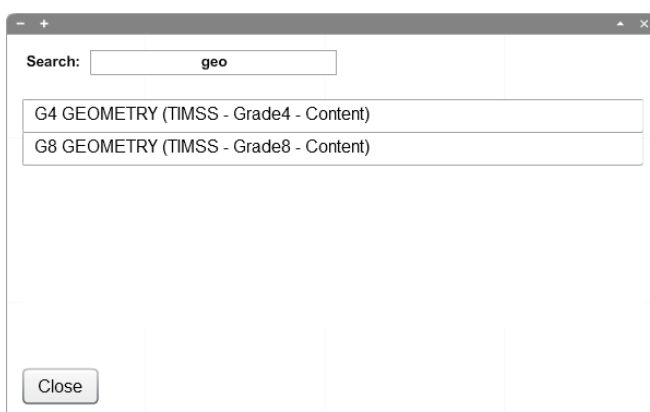
6 Country Selection Panel

Countries can be selected in various ways. An efficient way of finding and selecting a country is through the Country Selection panel, as explained below. However, a country can also be selected by clicking on it in the map, Data Table panel, or Graph panel. In each case it will be highlighted in all of these components.

Click on a country in the list to select it. Clicking on a selected item will deselect it. You can press the first one or two letters of an item in the list to quickly jump to that item. For example, if it contains a list of countries, press 'b' to quickly jump to countries starting with the letter 'b'.

If this panel is hidden, click the 'select' button in the bottom-left corner of the screen to make it appear.

Select regions

Use the drop-down menu in the top of the Country Selection ~~Panel~~ panel to select and zoom into a different region, such as 'South Asia' or 'Europe'. It is also possible to select countries to define a custom region.

✓ Select button

Press the Select button to reduce the list to your selection. Any items which are not selected will be removed from view.

✗ Deselect All button

Press the Deselect All button to clear your selection.

↻ Refresh button

The Refresh button appears once you have created a custom region or group of items. It can be used to return to the original list.

🗑 Remove button

To remove items from the list, select those you wish to remove and press the Remove button.

7 Function Buttons

These buttons are found at the bottom-left corner of the screen and enable the setup of viewing options and data export.

Full Screen Mode Open/Close

The first of these buttons expands the display to fill the screen. The second button restores the previous view.

Hide/Show options

Move the mouse over the 'View' button in the bottom-left corner of the screen to see various options for showing or hiding map and graph elements, and other program components.

Map Area Labels

 Show or hide country or map area names on the map or graph (country names can
be shown in full, in abbreviated form or as ISO3 codes).

Popup

 This allows you to select what is displayed in the popups which appear when moving the cursor over a country in the map, or over the dot/bar representing that country in the graph.

Symbol Map

This brings up the Proportional Symbol Map (see below).

Panels

This selects which of the panels are visible:

Graph: the Graph panel (see Graph Panel)

Indicators: the Indicator Selection panel (see 4 Indicator Selection Panel)

Map Legend: the key to the map colours (see "Map Legend" in 3 Thematic Map)

Options: the Options panel (normally hidden - see Section 9 below)

Select: the Country Selection panel (see 6 Country Selection Panel)

Table: the Data Table panel (normally hidden - see Section 10 below)

Save/export

This button enables you to save the current map or graph as an image, or download the selected data as a .CSV file. To change the image type, size or quality, use the Options panel.

Proportional Symbol Map

This button applies proportional symbols (circles) according to the indicator being mapped overlaid on the chloropleth map. To show the symbol map, click the symbol icon (shown above). If you have

bookmarked an indicator, the symbol map represents the data for the bookmarked indicator, whereas the choropleth map represents the data for the selected indicator. If the bookmarked indicator is currently selected, both the symbol map and the choropleth map represent the bookmarked indicator.

Data Table

This button brings up the usually hidden Data Table pPanel (see section 10 below)

Selection Panel button

If the Selection panel is hidden, click the 'select' button in the bottom-left corner of the screen to make it appear.

8 Time Slider

The Time Slider allows you to compare data from cycle to cycle. It appears at the bottom of the screen below the map:


Use the slider or click on the arrow buttons to change the year. Click on the play button to show changes over time as an animation, starting from the beginning. The animation speed can be set in the Options panel.

Note that if a Benchmark (rather than the Benchmark/Trends category) is selected, then the slider changes to display the four benchmarking variables 'Low', 'Intermediate', 'High' and 'Advanced'.

9 Options Panel

This panel is normally hidden from view (select from the Hide/Show options) and is only used to select options relating to the overall display and export settings.
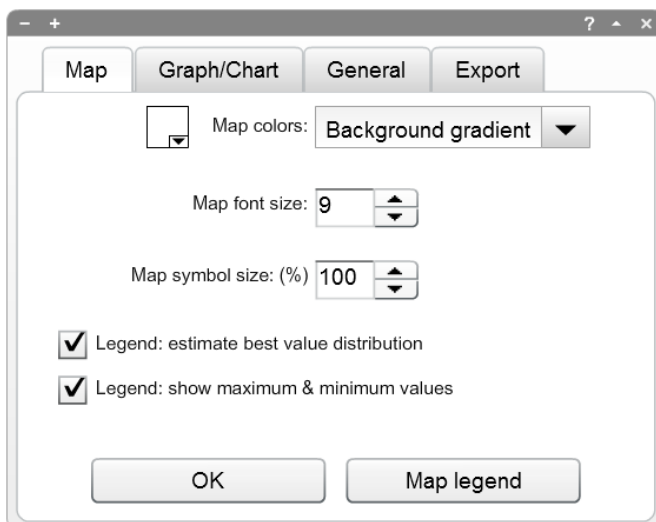
In summarized form you may alter the following:

Map:

- Map colors: map background, map borders, map text color, map text outline color, etc.;
- Map text size;
- Map symbol size (proportional symbol map symbols);
- Map legend - estimate best value distribution: adjust the values so that there is a more equal distribution of countries for each color class. This will usually result in a map with a better distribution of colors. If this is switched off, the value range for each color class will be set at equal intervals based on the highest and lowest value in the data range.
- Map legend - show maximum & minimum values
- Map legend colors.

Graph/Chart:

- Graph colors: background, bar & scatter points, scatter point borders;
- Graph text size;
- Transparency level of graph area (bars / bubbles);
- Size of bubbles (scatter plot graph);
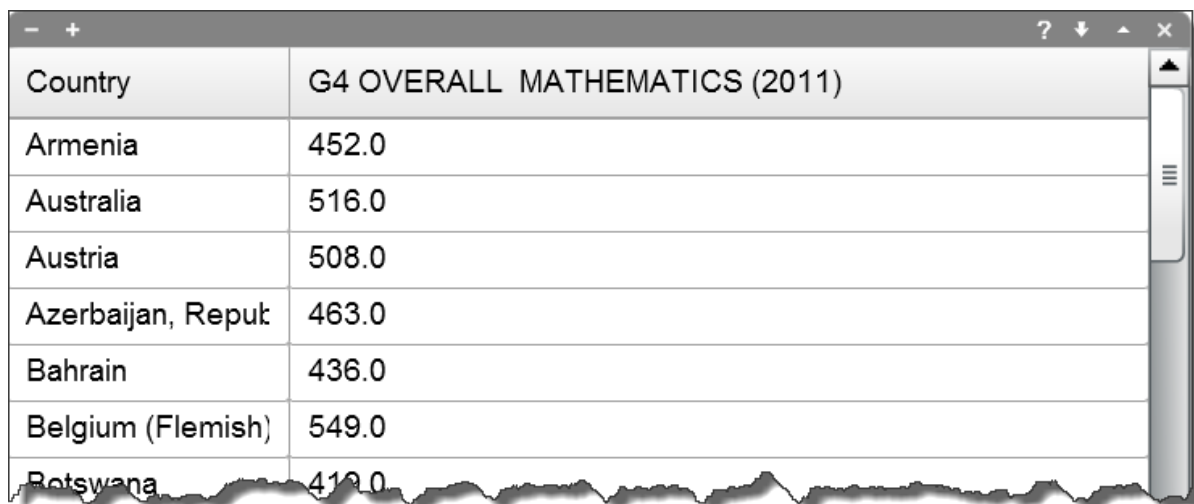- Bullet graph.

General options:

- Animation duration;
- Decimal places shown;
- Adjust the map/graph scale: The program automatically adjusts the map and graph scale to suit the data set. However, in some cases you may wish to keep it fixed, for example if you have made some changes to it yourself. You can set (or prevent) the automatic updating of the map/graph scale on (i) changing indicator, (ii) changing region, (iii) changing year. The default setting is for the program to adjust the scale when changing the indicator or region, but not the year. If you have chosen to not have the map scale updated, the map legend has a shortcut which you can use to 'refresh' the map legend at any time for the current indicator, year and region:

Save/export map or graph

- Set the image type: PNG or JPEG
- Change the image size as % of original
- Change the image quality (for JPEG images only)

10 Data Table

This table allows you to view the displayed data in tabular form:

Country	G4 OVERALL MATHEMATICS (2011)
Armenia	452.0
Australia	516.0
Austria	508.0
Azerbaijan, Repuk	463.0
Bahrain	436.0
Belgium (Flemish)	549.0
Botswana	419.0

The arrow button can be used to export this data to a .CSV format file.

11 Variable Tables

The following tables show the variables which may be displayed for each study:

TIMSS Variables, Grade 4

Category	Variable Label	Variable name per Year			
		1995	**2003**	**2007**	**2011**
Overall	OVERALL MATHEMATICS	ASMMAT0	ASMMAT0	ASMMAT0	ASMMAT0
	OVERALL SCIENCE	ASSSCI0	ASSSCI0	ASSSCI0	ASSSCI0
Content	DATA DISPLAY			ASMDAT0	ASMDAT0
	GEOMETRY			ASMGEO0	ASMGEO0
	NUMBER			ASMNUM0	ASMNUM0
	EARTH SCIENCE			ASSEAR0	ASSEAR0
	LIFE SCIENCE			ASSLIF0	ASSLIF0
	PHYSICS			ASSPHY0	ASSPHY0
Cognitive	MATH KNOWING		ASMKNO0	ASMKNO0	ASMKNO0
	MATH APPLYING		ASMAPP0	ASMAPP0	ASMAPP0
	MATH REASONING		ASMREA0	ASMREA0	ASMREA0
	SCIENCE KNOWING		ASSKNO0	ASSKNO0	ASSKNO0
	SCIENCE APPLYING		ASSAPP0	ASSAPP0	ASSAPP0
	SCIENCE REASONING		ASSREA0	ASSREA0	ASSREA0
Benchmark	INTERN. MATH BENCHMARK		ASMIBM01	ASMIBM01	ASMIBM01
	INTERN. SCIENCE BENCHMARK		ASSIBM01	ASSIBM01	ASSIBM01

TIMSS Variables, Grade 8

Category	Variable Label	Variable name per Year				
		1995	**1999**	**2003**	**2007**	**2011**
Overall	OVERALL MATH	BSMMAT0	BSMMAT0	BSMMAT0	BSMMAT0	BSMMAT0
	OVERALL SCIENCE	BSSSCI0	BSSSCI0	BSSSCI0	BSSSCI0	BSSSCI0
Content	ALGEBRA				BSMALG0	BSMALG0
	DATA AND CHANCE				BSMDAT0	BSMDAT0
	NUMBER				BSMNUM0	BSMNUM0
	GEOMETRY				BSMGEO0	BSMGEO0
	CHEMISTRY				BSSCHE0	BSSCHE0
	EARTH SCIENCE				BSSEAR0	BSSEAR0
	BIOLOGY				BSSBIO0	BSSBIO0
	PHYSICS				BSSPHY0	BSSPHY0
Cognitive	MATH KNOWING			BSMKNO0	BSMKNO0	BSMKNO0
	MATH APPLYING			BSMAPP0	BSMAPP0	BSMAPP0
	MATH REASONING			BSMREA0	BSMREA0	BSMREA0
	SCIENCE KNOWING			BSSKNO0	BSSKNO0	BSSKNO0
	SCIENCE APPLYING			BSSAPP0	BSSAPP0	BSSAPP0
	SCIENCE REASONING			BSSREA0	BSSREA0	BSSREA0
Benchmark	INTERN. MATH BENCHMARK		BSMIBM01	BSMIBM01	BSMIBM01	BSMIBM01
	INTERN. SCIENCE BENCHMARK		BSSIBM01	BSSIBM01	BSSIBM01	BSSIBM01

PIRLS Variables

Category	Variable Label	Variable name per Year		
		2001	2006	2011
Overall	PLAUSIBLE VALUE: OVERALL READING	ASRREA0	ASRREA0	ASRREA0
Content	PLAUSIBLE VALUE: LITERARY PURPOSE	ASRLIT0	ASRLIT0	ASRLIT0
	PLAUSIBLE VALUE: INFORMATIONAL PURPOSE	ASRINF0	ASRINF0	ASRINF0
Cognitive	PLAUSIBLE VALUE: INTERPRETING PROCESS	ASRIIE0	ASRIIE0	ASRIIE0
	PLAUSIBLE VALUE: STRAIGHTFORWARD PROCESS	ASRRSI0	ASRRSI0	ASRRSI0
Benchmark	INT. READING SCALE BENCHMARK REACHED	ASRIBM01	ASRIBM01	ASRIBM01