



## Data Collected Through the PIAAC

### Module Objectives

- Describe main components of PIAAC including the Background Questionnaire (BQ) and four assessment domains (definitions, measures, and types of items)
- Describe PIAAC assessment design (administration, workflow, background questionnaire features, computer-based assessment (CBA), paper-based assessment (PBA) items, and CBA adaptive process)
- Describe PIAAC data reporting (scales and proficiency levels)

### PIAAC Main Components

- Background Questionnaire (BQ)
- Direct assessment: four domains
  - Literacy: Both paper- and computer-based
  - Reading Components: only paper-based
  - Numeracy: Both paper- and computer-based
  - Problem solving in technology-rich environments (PS-TRE): only computer-based
- All countries are required to administer literacy and numeracy
- U.S. assessed all four domains

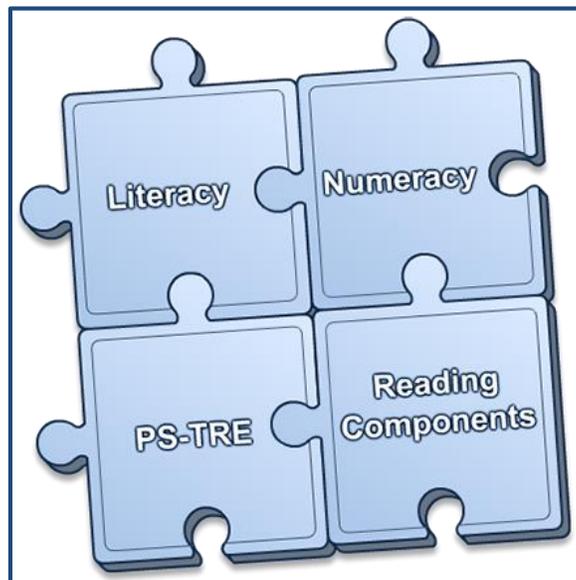
### PIAAC Background Questionnaire (BQ)

- Identifies skills critical to functioning successfully in today's society
- Identifies how participants acquire those skills
- Indicates how those skills are distributed
- Participating countries may add up to 5 minutes of country-specific items and may adapt items for country-specific context, with OECD's permission

### PIAAC U.S. Background Questionnaire

- U.S. additions and adaptations are related to
  - Education (current/ past/ required)
  - Country of origin/language/ethnicity
  - Training courses
  - Occupation
  - Health
  - Economic Sector
  - Earnings

### PIAAC Direct Assessment Domains



### Evolution of Adult Survey Assessment Domains

Survey	Assessment domains
Young Adult Literacy Survey (YALS)	Prose literacy, document literacy, quantitative literacy
National Adult Literacy Survey (NALS)	Prose literacy, document literacy, quantitative literacy
International Adult Literacy Survey (IALS)	Prose literacy, document literacy, quantitative literacy
National Assessment of Adult Literacy (NAAL)	Prose literacy, document literacy, quantitative literacy, fluency and vocabulary recognition
Adult Literacy and Lifeskills Survey (ALL)	Literacy (combined prose and document), numeracy, problem solving (paper-based)
Program for the International Assessment of Adult Competencies (PIAAC)	Literacy (combined prose and document), numeracy, problem solving in a technology-rich environment, reading components

### Domain Definitions

- Literacy
  - "Understanding, evaluating, using and engaging with written text to participate in society, to achieve one's goals and to develop one's knowledge and potential."
- Reading Components
  - Measure literacy skills at lower end of the literacy spectrum, focusing on components that are comparable across range of languages
    - Reading vocabulary
    - Sentence comprehension
    - Basic text passage comprehension and fluency

### Domain Definitions (Continued)

- Numeracy
  - "The ability to access, use, interpret, and communicate mathematical information and ideas, to engage in and manage mathematical demands of a range of situations in adult life."
- Problem solving in technology-rich environments (PS-TRE)
  - "Using digital technology, communication tools, and networks to acquire and evaluate information, communicate with others, and perform practical tasks."

### Assessment Items Within Domains

- Authentic (to the degree possible)
- Culturally appropriate
- Presented in "real life" contexts
- Intended to reflect various purposes across cultures
- Cover different levels of ability
- Adaptive to conventions across the participating countries (e.g., numeracy, measurement systems and currencies)

**Literacy Domain: Item Distribution by Context**

<b>Context</b>	<b>Number of items</b>	<b>Percent</b>
Work	10	17
Personal	29	50
Community	13	23
Education	6	10
<b>Total</b>	<b>58</b>	<b>100</b>

**Numeracy Domain: Item Distribution by Context**

<b>Context</b>	<b>Number of items</b>	<b>Percent</b>
Everyday life	25	45
Work-related	13	23
Society and community	14	25
Further learning	4	7
<b>Total</b>	<b>56</b>	<b>100</b>

**PS-TRE Domain: Item Distribution by Context**

<b>Dimension</b>	<b>Number</b>	<b>Percent</b>
Personal	8	57
Work/Occupation	4	29
Civic	2	14
<b>Total</b>	<b>14</b>	<b>100</b>

**Literacy Domain Construct**

- Items use continuous (prose) and non-continuous (document) texts
- Cognitive processes
  - Access and identify
  - Integrate and interpret
  - Evaluate and reflect
- Mediums
  - Digital texts, including hypertext and text in interactive environments (forms, blogs)
  - Print-based texts

**Literacy Items: Examples of Task Aspects by Cognitive Process**

Process	Examples
Access and identify	<ul style="list-style-type: none"> <li>• Locating items of information in a text</li> <li>• Finding required information that is directly and plainly stated in the text</li> <li>• Making inferences and having rhetorical understanding</li> </ul>
Integrate and interpret	<ul style="list-style-type: none"> <li>• Understanding the relationship(s) between different parts of a text, which may be explicitly signaled or may require the reader to make inferences</li> <li>• Comparing and contrasting</li> <li>• Reaching an understanding of a text as a whole</li> </ul>
Evaluate and reflect	<ul style="list-style-type: none"> <li>• Assessing the relevance, credibility, argumentation and truthfulness of the information presented in the text within a context of information not presented</li> <li>• Evaluating the purposefulness, register, structure, or reader-awareness of the text, or the success with which the author uses evidence and languages to argue or persuade</li> <li>• Being aware of the strategies used in texts to persuade readers to a particular end, and of the intended audience for the text</li> </ul>

**Literacy Domain: Item Distribution by Cognitive Process**

Cognitive Process	Number of items	Percent
Access and identify	32	55
Integrate and interpret	17	29
Evaluate and reflect	9	16
<b>Total</b>	<b>58</b>	<b>100</b>

**Literacy Domain: Item Distribution by Medium**

Medium	Number of items	Percent
Print-based texts	36	62
Digital texts	22	38
<b>Total</b>	<b>58</b>	<b>100</b>

**Reading Components Domain Construct**

- Includes measures of accuracy and fluency for three sections
  - Vocabulary knowledge
  - Sentence processing
  - Passage comprehension
- Fluency measured by response times, where shorter response times implied greater fluency
- Designed for consistent measurement across languages and countries

**Reading Components Domain: Examples of Task Aspects by Component**

Component	Examples
Word knowledge (Vocabulary)	<ul style="list-style-type: none"><li>• Circling the word that matches a picture</li></ul>
Sentence processing	<ul style="list-style-type: none"><li>• Assessing whether a sentence makes sense in terms of the properties of the real world or the internal logic of the sentence</li></ul>
Passage comprehension	<ul style="list-style-type: none"><li>• Reading a passage and circling the word that makes sense among underlined alternative words</li></ul>

**Numeracy Domain Construct**

- Cognitive/Response Process
  - Identify, locate or access
  - Act upon and use
  - Interpret and evaluate
- Content
  - Data and chance
  - Dimension and shape
  - Pattern, relationships and change
  - Quantity and number

**Numeracy Items: Examples of Task Aspects by Cognitive/Response Process**

Process	Examples
Identify, locate, or access	<ul style="list-style-type: none"> <li>Identifying, locating or accessing some mathematical information that is present in the task or situation</li> </ul>
Act upon, use	<ul style="list-style-type: none"> <li>Using arithmetic operations such as counting and making calculations</li> <li>Ordering or sorting, estimating or using various measuring devices</li> <li>Using (or developing) a formula that serves as a model of a situation or process</li> </ul>
Interpret, evaluate/analyze, communicate	<ul style="list-style-type: none"> <li>Interpreting the meaning and imputations of information of a mathematical or statistical nature</li> <li>Making a judgment or developing an opinion about mathematical or statistical information</li> <li>Analyzing a problem and evaluating the quality of the solution against some criteria or contextual demands</li> <li>Representing and communicating mathematical information, describing the results of actions or interpretations to someone else, or explaining and justifying the logic of analysis or evaluation</li> </ul>

**Numeracy Domain: Item Distribution by Cognitive/ Response Process**

Response process	Number of items	Percent
Act upon, use	34	61
Identify, locate or access	3	5
Interpret, evaluate	19	34
<b>Total</b>	<b>56</b>	<b>100</b>

**Numeracy Domain: Item Distribution by Mathematical Content**

<b>Mathematical content</b>	<b>Number of items</b>	<b>Percent</b>
Data and chance	12	21
Dimension and shape	16	29
Pattern, relationships, and change	15	27
Quantity and change	13	23
<b>Total</b>	<b>56</b>	<b>100</b>

**PS-TRE Domain Construct**

- Cognitive Dimensions
  - Goal-setting and progress monitoring
  - Planning and organizing
  - Accessing and evaluating information
  - Making use of information
- Technology Dimension
  - Performance in simulated software applications
  - Use commands and functions commonly found in email, web pages, and spreadsheets

**PS-TRE Domain Construct (Continued)**

- Tasks Dimension
  - Range from online shopping, to finding interactive health prevention information, to managing personal information and business finances
- Complexity Dimension
  - Single step
  - Multiple steps

**PS-TRE Domain: Examples of Task Aspects by Cognitive Dimensions**

Dimension	Examples
Goal setting and progress monitoring	<ul style="list-style-type: none"><li>• Articulating one's needs or purposes</li><li>• Establishing and applying criteria for constraint satisfaction and achievement of a solution</li><li>• Monitoring progress</li><li>• Detecting and interpreting unexpected events, impasses and breakdowns</li></ul>
Planning and organizing	<ul style="list-style-type: none"><li>• Setting up adequate plans, procedures and strategies</li><li>• Selecting appropriate devices, tools or categories</li></ul>
Accessing and evaluating information	<ul style="list-style-type: none"><li>• Orienting and focusing one's attention</li><li>• Assessing reliability, relevance, adequacy and comprehensibility</li><li>• Reasoning about sources and contents</li></ul>

**Examples of Task Aspects by Cognitive Dimensions (Continued)**

Dimension	Examples
Making use of information	<ul style="list-style-type: none"> <li>• Selecting information</li> <li>• Organizing information, integrating across potentially inconsistent pieces and across formats</li> <li>• Transforming information, e.g. through writing</li> </ul>

**PS-TRE Domain: Distribution of Items by Cognitive Dimensions**

Dimension	Number*
Setting goals and monitoring progress	4
Planning	7
Acquiring and evaluating information	8
Using information	6
*Does not add up to 14 as some tasks are coded to more than one dimension	

**PS-TRE Domain: Distribution of Items by Technology Dimensions**

<b>Dimension</b>	<b>Number*</b>
Web	7
Spreadsheet	4
E-mail	9
*Does not add up to 14 as some tasks are coded to more than one dimension	

**PS-TRE Domain: Distribution of Items by Intrinsic Complexity**

<b>Complexity</b>	<b>Number of Steps</b>
Single step	8
Multiple steps	6
<b>Total</b>	<b>14</b>

### Example Items

- Examples of literacy, numeracy, and problem solving in technology-rich environments items at various proficiency levels can be found through [Education and Skills Online](#)
- Examples of reading component items are available from the [PIAAC section of the NCES website](#)

### PIAAC Assessment Design: Administration and Workflow

- PIAAC requires in-person interviews to complete the background questionnaire before administering direct assessments in the four domains
- Direct assessment modes
  - Paper-based
  - Computer-based

**PIAAC Assessment Design: Workflow**

<b>Workflow Step</b>	<b>Duration</b>
Case Initialization	5 minutes
Background Questionnaire – CAPI	45 minutes
Assessment Core – Computer- or paper based	
ICT Core – Computer-based only	5 minutes
Literacy/Numeracy Core	5 minutes
Direct Assessment Items	60 minutes
<b>APPROXIMATE TOTAL TIME</b>	<b>2 hours</b>

**PIAAC Administration and Workflow**

- BQ Routing - Respondents routed according to labor force status
  - Employed
  - Unemployed / out of labor force
  - In education
- Adaptiveness - Computer delivery (CAPI) allows
  - Language selection within country
  - Age and gender adaptation
    - Health-related questions in U.S.
    - Samples extended to other age groups in Canada

### **PIAAC Background Questionnaire Sections**

- A: General Information
- B: Past Education and Current Education and Training
- C: Current Status and Work History
- D: Current work (if applicable)
- E: Last Job (past 12 months if respondent is not currently holding a job)
- F: Skills used at work (JRA)
- G: Literacy, Numeracy, ICT at work
- H: Literacy, Numeracy, ICT at home
- I: About yourself
- J: Background

### **Information Communication Technology (ICT) Core**

- Includes a set of basic computer tasks (e.g., cut and paste, move, highlight) to assess basic functional computer skills necessary to take the main assessment on a computer
- Serves as a basis for routing participants to the computer-based assessment (CBA) or paper-based assessment (PBA) literacy/numeracy core and items

### Literacy/Numeracy Core

- Short, easy literacy and numeracy tasks
- Gather information about basic literacy and numeracy cognitive skills
- Serve as a basis for routing participants to the literacy/numeracy items or the reading components booklets
- CBA literacy/numeracy core: 3 literacy and 3 numeracy items
- PBA literacy/numeracy core: 4 literacy and 4 numeracy items

### Paper-Based Assessment (PBA) Process

Assessment	Duration
Core Literacy / Numeracy Assessment	10 minutes
Randomly Assigned Cluster of Literacy or Numeracy Items	30 minutes
Assessment of Reading Component Skills	20 minutes
<b>APPROXIMATE TOTAL TIME</b>	<b>1 hour</b>

### **Paper-Based Assessment (PBA) Process**

Adaptive process allows participants to be directed to sets of easy, medium, or difficult items as they advance through two modules (each module has 2 stages)

Module 1 (30 minutes)

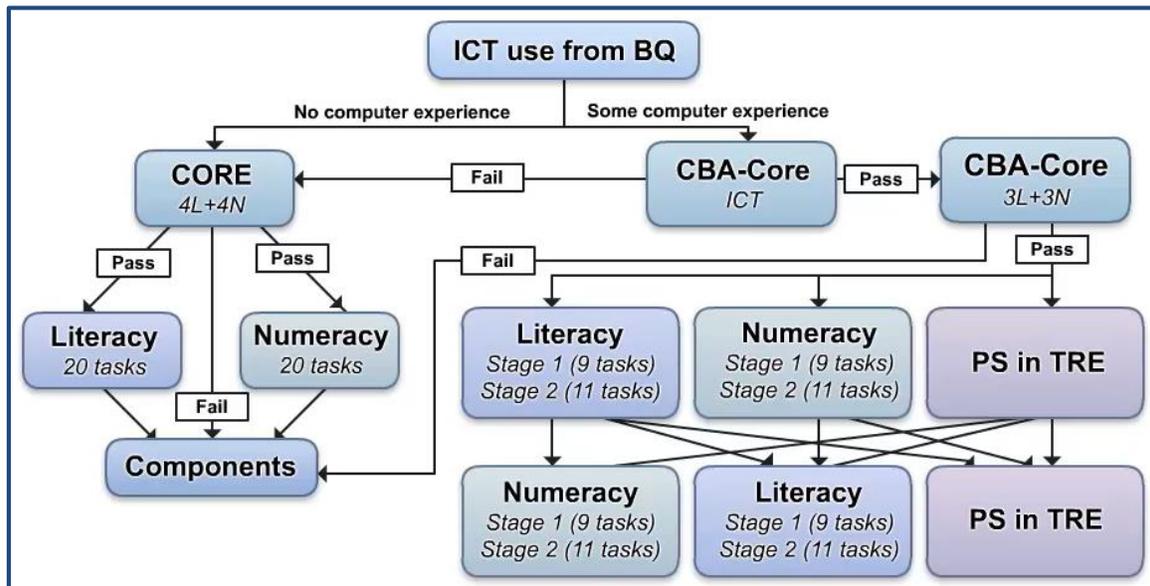
- Stage 1: Assignment of a domain is random; testlet selected based on:
  - Level of education
  - Status of native or non-native language speaker
  - Performance on CBA core (both literacy/ numeracy and ICT)
- Stage 2: Same domain; testlet selected based on same variables as Stage 1, plus participant performance on Stage 1 items

### **CBA Adaptive Process - Module 2**

Module 2 (30 minutes)

- After Module 1, participants will be directed to an alternate domain in Module 2
- Selection of module 2 domain is random
- Includes 2 stages within the same domain
- Length and selection of items is similar to Module 1

PIAAC Workflow



Cognitive Items per Assessment Mode and Domain

Domain (Subscale)	Assessment Mode	Total # of Items	# of Linking Items	Total # Unique Items
Literacy	CBA	52	18	58
	PBA	24		
Numeracy	CBA	52	20	56
	PBA	24		
PS-TRE	CBA	14	N/A	14
Reading	PBA	100	N/A	0
<b>TOTAL</b>				<b>128</b>

NOTE: 18 literacy and 20 numeracy items were linking items between the PBA and CBA assessment mode, meaning these items were identical; thus PIAAC contained a total of 128 unique items.

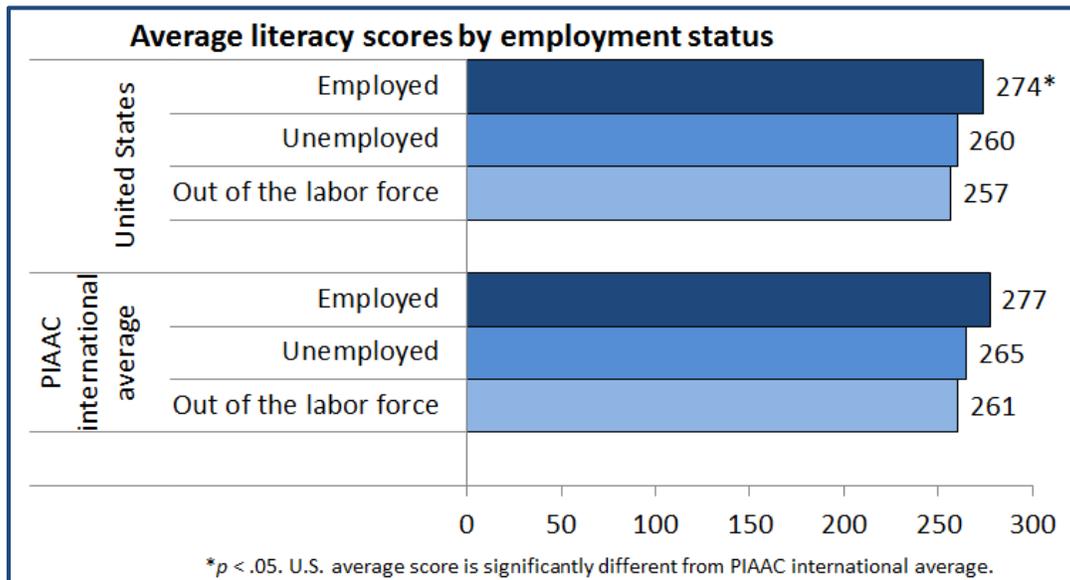
**Distribution of Items Across Surveys**

Survey	Number of Literacy Items	Number of Numeracy Items
IALS + PIAAC	1	0
IALS + ALL + PIAAC	8	0
ALL + PIAAC	21	32
PIAAC Only	28	24
<b>Total</b>	<b>58</b>	<b>56</b>

**PIAAC Data Reporting: [Proficiency Scores](#)**

- Proficiency is considered as a continuum of ability involving the mastery of information-processing tasks of increasing complexity. Adults are scored on this continuum according to their performance on an assessment
- All test questions or "items" are placed a scale of 0-500 for each domain, with 500 representing the point at which the most complex task could be placed on the continuum
- Adults scoring at any point on the scale may be able to complete more difficult items (that is, those with a higher scale score), but their probability of success decreases as the distance between their score and an item's placement on the scale increases
- Conversely, adults will also be able to complete easier items with a greater chance of success

**PIAAC Analysis Example: Average Scores by Employment Status**

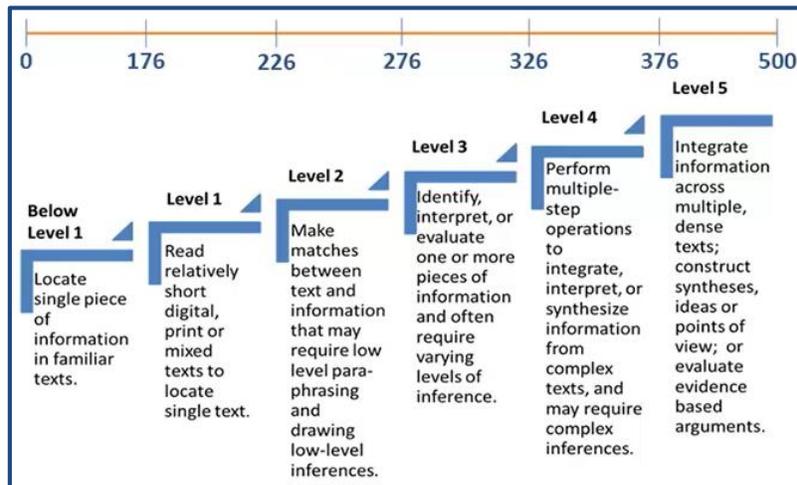


**PIAAC Data Reporting: Proficiency Levels**

Reported as the percentages of adults scoring at

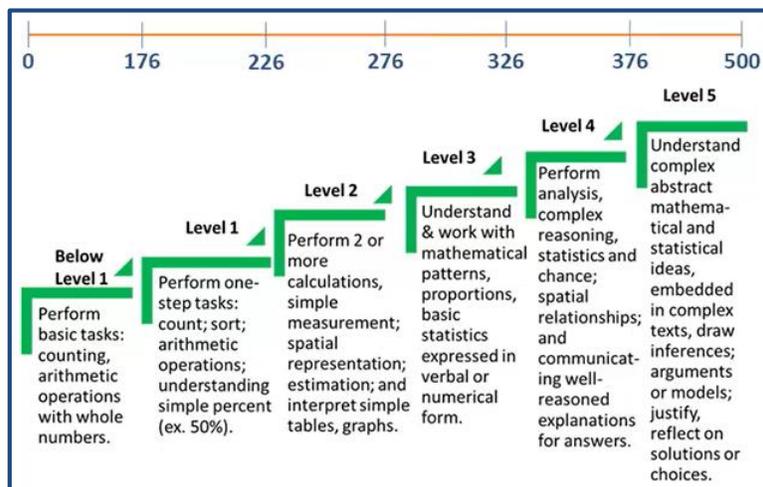
- Six performance levels in literacy and numeracy
- Four performance levels in problem solving in technology-rich environments

### Literacy Proficiency Levels



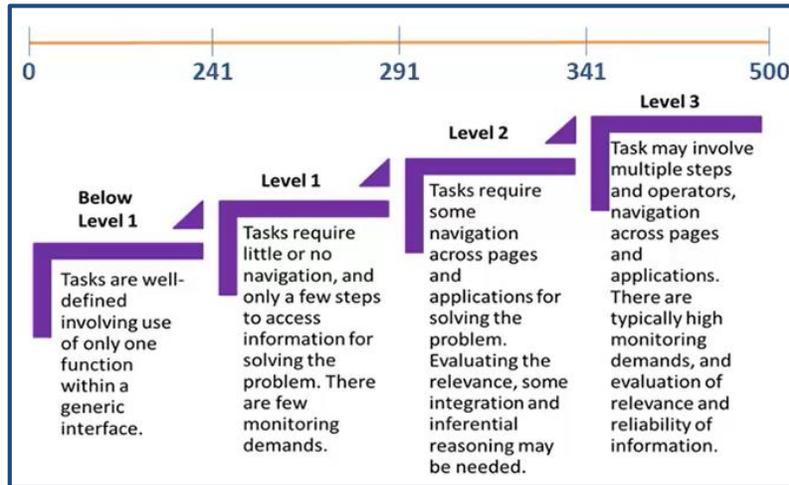
NOTE: The proficiency score ranges are as follows: Below Level 1 = 0-175; Level 1 = 176-225; Level 2 = 226-275; Level 3 = 276-325; Level 4 = 326-375; and Level 5 = 376-500.

### Numeracy Proficiency Levels



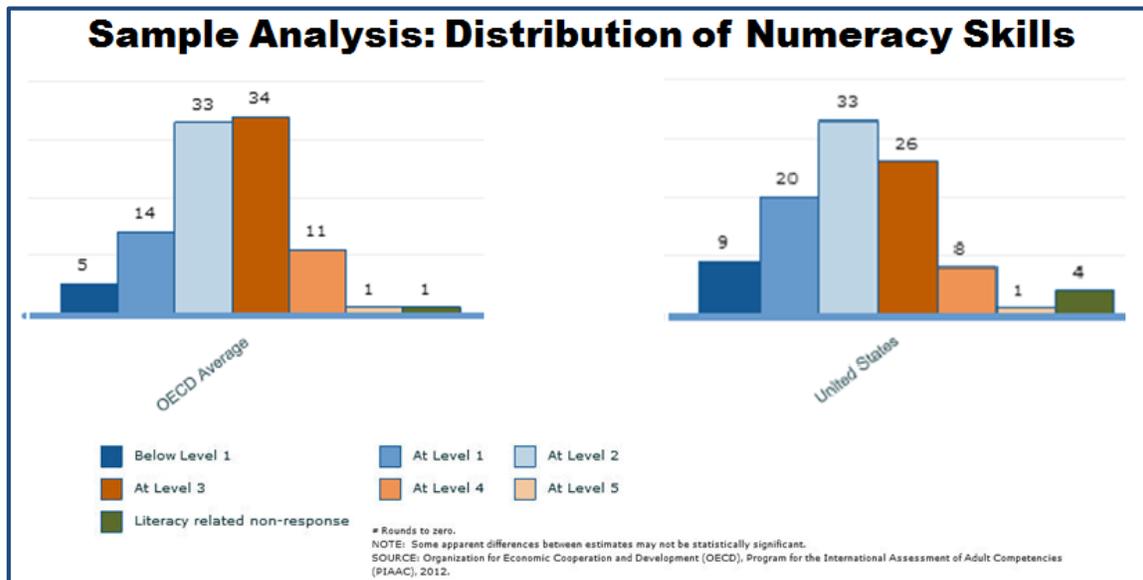
NOTE: The proficiency score ranges are as follows: Below Level 1 = 0-175; Level 1 = 176-225; Level 2 = 226-275; Level 3 = 276-325; Level 4 = 326-375; and Level 5 = 376-500.

### Problem Solving in Technology-Rich Environments Proficiency Levels



NOTE: The proficiency score ranges are as follows: Below Level 1 = 0-240; Level 1 =241-290; Level 2 = 291-340; Level 3 = 341-500.

### Analysis of Direct Assessment Domains



## Summary and Resources

### Summary

- Described main components of PIAAC including the Background Questionnaire (BQ) and four assessment domains (definitions, measures, and types of items)
- Described PIAAC assessment design (administration, workflow, background questionnaire features, computer-based assessment (CBA), paper-based assessment (PBA) items, and CBA adaptive process)
- Described PIAAC data reporting (scales and proficiency levels)

### Resources

- [PIAAC Background Questionnaire](#)
- [OECD Education and Skills Online Presentation \(literacy, numeracy, and PS-TRE sample items\)](#)
- [PIAAC sample reading component items](#)
- [Proficiency Scores Resource Document](#)