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Measuring Essential Skills of Postsecondary Students: Final Report of the Essential Adult Skills Initiative Appendix

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A. Reading Components Subtest

The *Education and Skills Online Technical Report (2015)* describes the Reading Components subtest as follows:

The Reading Components assessment is designed to better understand the difficulties faced by test-takers who demonstrate poor reading skills. Reading Components represent the basic set of skills necessary to gain meaning from written text – knowledge of vocabulary, ability to process meaning at the level of the sentence, and fluency in reading passages (OECD, 2015, p. 73).

Criteria

Test-takers are asked to complete the Reading Components subtest if their literacy score on the first part of the Core Assessment is below a certain threshold. Depending on their literacy score, they take the Reading Components subtest in one of three different combinations with the other ESO test components. These combinations and the related literacy score thresholds are described below.

Literacy score greater than 250: The test-taker is not asked to complete the Reading Components subtest. The test-taker must complete the Core Assessment (literacy and numeracy) and Problem Solving in Technology-Rich Environments (PS-TRE) component in order to finish the ESO.

Literacy score between 249 and 200: The test-taker must complete the Core Assessment and PS-TRE component in order to finish the ESO. They are given the option to take the Reading Components subtest if they wish to do so.

Literacy score between 199 and 150: The test-taker must complete the Reading Components subtest and the Core Assessment in order to finish the ESO. They are not given the option of taking the PS-TRE component and as such receive no PS-TRE score upon completing the ESO.

Literacy score below 150: The test-taker only has to complete the Reading Components subtest. They will have no literacy, numeracy or PS-TRE scores but will be included in any literacy and numeracy score distributions as “Below Level 1.”

Task Categories

Note: *The descriptions below were created by the OECD for PIAAC. The wording used here is drawn directly from page 74 of the ESO Technical Report (2015), though it has been edited in places to improve clarity.*

Vocabulary: Items testing print vocabulary consist of a picture of an object and four printed words, one of which refers to the pictured object. Respondents are asked to click on the word that matches the picture.

Sentence comprehension: The sentence comprehension items require the respondent to assess whether a sentence makes sense in terms of the properties of the real world or the internal logic of the sentence. The respondent reads the sentence and clicks on yes if the sentence makes sense or no if the sentence does not make sense.

Passage comprehension: In items assessing passage comprehension, respondents are asked to read a passage in which they are required at certain points to select the word that makes sense from the two alternatives provided.

Task Scoring

Note: *The descriptions below were created by the OECD for PIAAC. The wording used here is drawn directly from page 74 of the ESO Technical Report (2015), though it has been edited in places to improve clarity.*

Scores for each of the Reading Components skills are measured in terms of accuracy and rate. The rate is calculated as the average time to complete each item in each of the three sections (vocabulary, sentence completion and passage comprehension). The accuracy is the percentage of correct responses in each section. For each skill, results are reported in the score report and the data download in terms of low, medium and high skills. For each literacy score, ETS has calculated the high and low cut points for vocabulary, sentence comprehension, and passage comprehension for both rate and accuracy. The high and low cut points are set at the 25th and 75th percentiles for rate and accuracy for that particular literacy score (based on 10-point increments) for that particular language.

Test takers receive the following descriptions of their skills:

- **High accuracy and fast rate:** Basic reading skills are good. The focus can be on building comprehension skills
- **High accuracy and low or medium rate:** Basic reading skills are good. The focus can be on building comprehension skills and increasing rate
- **Low or medium accuracy and fast rate:** The individual might be trying to go too fast. He or she needs to build basic skills
- **Low or medium accuracy and low or medium rate:** Work is needed on basic skills and getting faster

B. ESO Proficiency Level Descriptions

Literacy Level Descriptions

Note: *The descriptions below were created by the OECD for PIAAC. The wording used here is drawn directly from pages 63–68 of the ESO Technical Report (2015), though it has been edited in places to improve clarity.*

Below Level 1 (0 to 175)

Task Types: The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs or make use of other text features. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. While the texts can be continuous, the information can be located as if the texts were non-contiguous. Tasks below Level 1 do not make use of any features specific to digital texts.

Abilities: Adults in this level are able to locate specific information from a text with a few sentences or paragraphs about familiar topics. For example, they are likely able to:

- Locate a phone number or address of a store from a newspaper advertisement
- Locate the date and time of a community art show from a flyer
- Identify the winner of an employee contest from a company announcement
- Identify key ingredients from a food package label

Challenges: They might sometimes have trouble using literacy skills to understand longer unfamiliar texts or to complete a form. For example, they might find it challenging to:

- Complete a short form to order a magazine subscription
- Submit a vote for or against a new workplace dress code on an employer's web page
- Locate the link on a theater's website that would be used to find information about the theater
- Use a table in a newspaper article to identify the top three companies with the most employees
- Name two reasons stated in a newspaper article for an increase in local food prices
- Use a music store's web page to compare and contrast several reviews to determine which song to download based on the price and the type of music you like

Literacy Level 1 (176 to 225)

Task Types: Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-contiguous, or mixed texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Some tasks, in the case of some non-contiguous text, may require the respondent to enter personal information into a document. Little if any competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognizing basic vocabulary, evaluating the meaning of sentences and reading paragraph text is expected.

Abilities: Adults in this level are typically able to understand longer texts about familiar topics. For example, they are likely able to:

- Identify key ingredients from a food package label
- Complete a short form to order a magazine subscription
- Submit a vote for or against a new workplace dress code on an employer’s web page
- Locate the link on a theater’s website that would be used to find information about the theater
- Use a table in a newspaper article to identify the three companies with the most employees

Challenges: They might sometimes have trouble understanding longer and more complicated texts. For example, they might find it challenging to:

- Determine what forms are needed to return a damaged telephone according to instructions in the warranty brochure
- Identify information in a camera store’s single web page that explains how this year’s photo contest rules differ from those in previous years
- Name two reasons stated in an employee newsletter for an increase in company sales
- Use a music store’s web page to compare and contrast several reviews to determine which song to download based on the price and the type of music one likes

Literacy Level 2 (226 to 275)

Task Types: At this level, the complexity of text increases. The medium of texts may be digital or printed, and texts may comprise continuous, non-contiguous or mixed types. Tasks in this level require respondents to make matches between the text and information, and may require paraphrasing or low-level inferences. Some competing pieces of information may be present. Some tasks require the respondent to:

- Cycle through or integrate two or more pieces of information based on criteria
- Compare and contrast or reason about information requested in the question
- Navigate within digital texts to access and identify information from various parts of a document

Abilities: Adults in this level are typically able understand longer and more complicated texts about unfamiliar topics. For example, they are likely able to:

- Submit a vote for or against a new workplace dress code on an employer’s web page
- Determine what forms are needed to return a damaged telephone according to instructions in the warranty brochure
- Identify information in a camera store’s single web page that explains how this year’s photo contest rules differ from those in previous years
- Name two reasons stated in an employee newsletter for an increase in company sales

Challenges: They might sometimes experience frustration understanding longer and more complicated digital and printed texts with a variety of text features. For example, they might find it challenging to:

- Find out whether a utility company accepts the same type of payment if paid by mail or online using information from a monthly billing statement
- Use a music store’s web page to compare and contrast several reviews to determine which song to download based on the price and the type of music you like
- Search several web pages of a national health organization for evidence supporting the claim that exercise can lead to greater work productivity
- Determine which parents in a childcare discussion forum share a similar viewpoint by comparing their comments

Literacy Level 3 (276 to 325)

Task Types: Texts at this level are often dense or lengthy, including continuous, non-contiguous, mixed or multiple pages. Understanding text and rhetorical structures become more central to successfully completing tasks, especially in navigation of complex digital texts. Tasks require the respondent to identify, interpret or evaluate one or more pieces of information and often require varying levels of inferencing. Many tasks require the respondent to construct meaning across larger chunks of text or perform multistep operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate text content to answer accurately. Competing information is often present, but it is not more prominent than the correct information.

Abilities: Adults in this level are typically able to understand longer and more complicated digital and print texts with a variety of text features. For example, they are likely able to:

- Name two reasons stated in an employee newsletter for an increase in company sales
- Find out whether a utility company accepts the same type of payment if paid by mail or online using information from a monthly billing statement
- Use a music store’s web page to compare and contrast several reviews to determine which song to download based on the price and the type of music you like
- Search several web pages of a national health organization for evidence supporting the claim that exercise can lead to greater work productivity

Challenges: They might find it challenging to:

- Use online search results for books on alternative energy to identify a book that includes arguments both for and against solar energy
- Evaluate posts in a discussion forum on health remedies by comparing the information they provide against that in a website from a well-known medical centre

- Use several links in a city’s transportation web page to locate information about special fares or services on holidays
- From a list of workplace safety suggestions, determine which one a company will be likely to adopt based on a complex chart showing the company’s existing policies and procedures

Literacy Level 4/5 (326 to 500)

Task Types: Tasks at the lower end of this level often require respondents to perform multiple-step operations to integrate, interpret, or synthesize information from complex or lengthy continuous, non-contiguous, mixed, or multiple-type texts. Complex inferences and application of background knowledge may be needed to perform successfully. Many tasks require identifying and understanding one or more specific, non-central ideas in the text in order to interpret or evaluate subtle evidence claim or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information. At the higher end of this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a key requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialized background knowledge.

Abilities: Adults at this level are able to use literacy skills to understand longer and more complicated texts from a number of different sources. For example, they are likely able to:

- Find out whether a utility company accepts the same type of payment if paid by mail or online using information from a monthly billing statement
- Use a music store’s web page to compare and contrast several reviews to determine which song to download based on the price and the type of music you like
- Search several web pages of a national health organization for evidence supporting the claim that exercise can lead to greater work productivity
- Evaluate posts in a discussion forum on health remedies by comparing the information they provide against that in a website from a well-known medical centre
- Use several links in a city’s transportation web page to locate information about special fares or services on holidays
- Determine which claims in a newspaper article about the benefits of sleep are supported by information and graphs in two long research articles

Numeracy Level Descriptions

Note: The descriptions below were created by the OECD for PIAAC. The wording used here is drawn directly from pages 69–73 of the ESO Technical Report (2015), though it has been edited in places to improve clarity.

Numeracy Below Level 1 (0 to 175)

Task Types: Tasks at this level are set in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors and require only simple processes such as counting, sorting, performing basic arithmetic operations with whole numbers or money, or recognizing common spatial representations.

Abilities: Adults at this level are typically able to do simple arithmetic in familiar situations. For example, they are likely able to:

- Figure out how much money it will cost to buy a few common items in the grocery store
- Identify the amount that corresponds to an unlabeled mark on a measuring cup
- Find the range in daily temperatures by subtracting the lowest from the highest temperature

Challenges: They may have trouble using numeracy skills that require computing with per cents and decimal numbers, or understanding mathematical information in a table. For example, they might find it challenging to:

- Figure out the price of a shirt that will be discounted by 25%
- Determine the price of a single bottle of water when given the cost of an entire case of bottles
- Look at a weekly timesheet to find out which employee worked the most hours in a single day

Numeracy Level 1 (176 to 225)

Task Types: Tasks in this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors. Tasks usually require simple one- or two-step processes involving, for example, performing basic arithmetic operations; understanding simple per cents such as 50%; or locating, identifying, and using elements of simple or common graphical or spatial representations.

Abilities: Adults at this level are typically able to compute with per cents and decimal numbers, or understand mathematical information in a table. For example, they are likely able to:

- Identify the amount that corresponds to an unlabeled mark on a measuring cup
- Find the range in daily temperatures by subtracting the lowest from the highest temperature

- Figure out the price of a shirt that will be discounted by 25%
- Determine the price of a single bottle of water when given the cost of an entire case of bottles

Challenges: They may have trouble using numeracy skills that require performing an intermediate computation before being able to answer a question, having to interpret a graph or using ratios. For example, some adults with scores in this range might find it challenging to:

- Determine how many months in a year had sales above the mean sales for the year from a table of monthly sales
- Identify which predicted monthly gasoline price was most accurate based on line graphs of predicted and actual gasoline prices for a year
- Determine the amount of concentrated lemonade flavouring and water needed to make a large container of lemonade that is in the same ratio of flavouring to water as a smaller amount of lemonade

Numeracy Level 2 (226 to 275)

Task Types: Tasks in this level require the respondent to identify and act upon mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors. Tasks tend to require the application of two or more steps or processes involving, for example, calculation with whole numbers and common decimals, per cents and fractions; simple measurement and spatial representation; estimation; and interpretation of relatively simple data and statistics in texts, tables and graphs.

Abilities: Adults at this level are typically able to perform an intermediate computation before being able to answer a question, understand mathematical information in a table or interpret a simple graph. For example, they are likely able to:

- Figure out the price of a shirt that will be discounted by 25%
- Determine the price of a single bottle of water when given the cost of an entire case of bottles
- Determine how many months in a year had sales above the mean sales for the year from a table of monthly sales
- Identify which predicted monthly gasoline price was most accurate based on line graphs of predicted and actual gasoline prices for a year

Challenges: They may have trouble using numeracy skills that require using ratios, reading a complex graph or comparing changes in percentages. For example, they might find it challenging to:

- Determine the amount of concentrated lemonade flavouring and water needed to make a large container of lemonade that is in the same ratio of flavouring to water as a smaller amount of lemonade
- Read a complex graph, comparing the amount of salt, sugar and fat in a typical diet for men versus a typical diet for women, to determine the amount of sugar consumed by men
- Convert the number of students enrolled in a university each year into percentages, and then compute the change in the percentage of students enrolled each year

Numeracy Level 3 (276 to 325)

Task Types: Tasks in this level require the respondent to understand mathematical information that may be less explicit, embedded in contexts that are not always familiar and represented in ways that are more complex. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes. Tasks tend to require the application of, for example, number sense and spatial sense; recognizing and working with mathematical relationships, patterns and proportions expressed in verbal or numerical form; and interpretation and basic analysis of data and statistics in texts, tables and graphs.

Abilities: Adults at this level are typically able to use ratios, understand mathematical information in a table or read a complex graph. For example, they are likely able to:

- Determine the price of a single bottle of water when given the cost of an entire case of bottles
- Determine how many months in a year had sales above the mean sales for the year from a table of monthly sales
- Identify which predicted monthly gasoline price was most accurate based on line graphs of predicted and actual gasoline prices for a year
- Determine the amount of concentrated lemonade flavouring and water needed to make a large container of lemonade that is in the same ratio of flavouring to water as a smaller amount of lemonade
- Read a complex graph, comparing the amount of salt, sugar and fat in a typical diet for men versus a typical diet for women, to determine the amount of sugar consumed by men

Challenges: They may have trouble using numeracy skills that require using percentages, using rates or understanding how quantities are related. For example, they might find it challenging to:

- Convert the number of students enrolled in a university each year into percentages, and then compute the change in the percentage of students enrolled each year
- Determine how much medicine to give to a child when the dosage is based on the child's body weight
- Calculate profit from a table containing lists of income and expense sources

Numeracy Level 4/5 (326 to 500)

Task Types: Tasks at the lower end of this level require the respondent to understand a broad range of mathematical information that may be complex, abstract, or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes. Tasks tend to require analysis and more complex reasoning about, for example, quantities and data; statistics and chance; spatial relationships; change; proportions; and formulas. Tasks in this level may also require comprehending arguments or communicating well-reasoned explanations for answers or choices. Tasks at the higher end of this level require the respondent to understand complex representations and abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and justify, evaluate, and critically reflect upon solutions or choices.

Abilities: Adults at this level are typically able to use percentages and rates, interpret information presented in various ways or understand how quantities are related. For example, they are likely able to:

- Identify which predicted monthly gasoline price was most accurate based on line graphs of predicted and actual gasoline prices for a year
- Determine the amount of concentrated lemonade flavouring and water needed to make a large container of lemonade that is in the same ratio of flavouring to water as a smaller amount of lemonade
- Convert the number of students enrolled in a university each year into percentages, and then compute the change in the percentage of students enrolled each year
- Read a complex graph, comparing the amount of salt, sugar and fat in a typical diet for men versus a typical diet for women, to determine the amount of sugar consumed by men
- Determine how much medicine to give to a child when the dosage is based on the child's body weight
- Calculate profit from a table containing lists of income and expense sources

PS-TRE Level Descriptions

Note: The descriptions below were created by the OECD for PIAAC. The wording used here is drawn directly from pages 75–79 of the ESO Technical Report (2015), though it has been edited in places to improve clarity.

PS-TRE Below Level 1 (0 to 240)

Task Types: Tasks are based on well-defined problems involving the use of only one function within a generic interface to meet one explicit criterion without any categorical, inferential reasoning or transforming of information. Few steps are required and no sub-goal has to be generated.

Abilities: Adults at this level are typically able to complete tasks that are quite routine for them using familiar technology programs. For example, they are likely able to:

- Use a familiar email program to open and read emails
- Write a short summary of a club meeting using a word processing program they know well
- Enter the name of a local store into a search engine they have used in the past to find the store's phone number

Challenges: They might sometimes have trouble using technology to solve problems that are more complex. For example, they might find it challenging to:

- Open and read email using an unfamiliar email program similar to one they regularly use
- Select a website from the results of a search and locate specific information on the homepage of that website
- Organize a small set of emails into one or two folders

PS-TRE Level 1 (241 to 290)

Task Types: At this level, tasks typically require the use of widely available and familiar technology applications, such as email software or a web browser. There is little or no navigation required to access the information or commands required to solve the problem. The problem may be solved regardless of one's awareness and use of specific tools and functions (e.g., a sort function). The task involves few steps and a minimal number of operators. At a cognitive level, the person can readily infer the goal from the task statement; problem resolution requires one to apply explicit criteria; and there are few monitoring demands (e.g., the person does not have to check whether he or she has used the adequate procedure or made progress toward the solution). Identifying contents and operators can be done through simple match: only simple forms of reasoning, for example assigning items to categories are required. There is no need to contrast or integrate information.

Abilities: Adults at this level are typically able to use unfamiliar software programs that work like ones they have used in the past to solve problems where the goal is clear and a limited number of steps are required. For example, they are likely able to:

- Open, read and respond to email using an unfamiliar email program
- Locate specific information on the homepage of a website that a friend has recommended
- Set up a system of folders that allow files or emails to be organized and easily retrieved

Challenges: They might sometimes have trouble using technology to solve problems that are more complex. For example, they might find it challenging to:

- Figure out how to send an email message to a number of contacts using an unfamiliar bulk email function
- Use a sorting tool to make it easier to locate sales numbers for a specific product in a company spreadsheet
- Conduct a web search to find out how to solve a problem with other software, such as how to view a column that won't display properly in a spreadsheet
- Find an email message or file that has been "lost" somewhere on a computer hard drive

PS-TRE Level 2 (291 to 340)

Task Types: At this level, tasks typically require the use of both generic and more specific technology applications. For instance, the person may have to make use of a novel online form. Some navigation across pages and applications is required to solve the problem. The use of tools (e.g., a sort function) can facilitate the resolution of the problem. The task may involve multiple steps and operators. In terms of cognitive processing, the problem goal may have to be defined by the person, though the criteria to be met are explicit. There are higher monitoring demands. Some unexpected outcomes or impasses may appear. The task may require evaluating the relevance of a set of items to discard distractors. Some integration and inferential reasoning may be needed.

Abilities: Adults at this level are typically able to use software they have never seen before to solve problems that are more complex, even when unexpected impasses/outcomes occur. For example, they are likely able to:

- Figure out how to send an email message to a number of contacts using an unfamiliar bulk email function
- Use a sorting tool to make it easier to locate sales numbers for a specific product in a company spreadsheet
- Conduct a web search to find out how to solve a problem with other software, such as how to view a column that won't display properly in a spreadsheet
- Find an email message or file that has been "lost" somewhere on a computer hard drive

Challenges: They might sometimes have trouble using technology to solve problems that are more complex. For example, they might find it challenging to:

- Establish criteria for narrowing a web search, documenting results using a spreadsheet and communicating the results to others through email
- Evaluate a number of web search results to determine which has the most relevant and reliable information. Part of this process includes evaluating and refining a search to determine if additional or different types of websites should be considered

- Use a software program that they have never seen before with limited or unclear directions based on general experience with technology or by consulting other online resources including websites or user blogs
- Select from among a number of choices the best software to use for a particular task.

PS-TRE Level 3 (341 to 500)

Task Types: At this level, tasks typically require the use of both generic and more specific technology applications. Some navigation across pages and applications is required to solve the problem. The use of tools (e.g., a sort function) is required to make progress toward the solution. The task may involve multiple steps and operators. In terms of cognitive processing, the problem goal may have to be defined by the person, and the criteria to be met may or may not be explicit. There are typically high monitoring demands. Unexpected outcomes and impasses are likely to occur. The task may require evaluating the relevance and the reliability of information in order to discard distractors. Integration and inferential reasoning may be needed to a large extent.

Abilities: Adults at this level are typically able to use one or more complex software programs to solve ill-defined problems with multiple goals. For example, they are likely able to:

- Conduct a web search to find out how to solve a problem with other software, such as how to view a column that won't display properly in a spreadsheet
- Figure out how to send an email message to a number of contacts using an unfamiliar bulk email function
- Evaluate a number of web search results to determine which has the most relevant and reliable information. Part of this process includes evaluating and refining a search to determine if additional or different types of websites should be considered
- Use a software program that they have never seen before with limited or unclear direction; success may be based on a user's general experience with technology or information may be gathered by consulting other online resources including websites or user blogs
- Select from among a number of choices the best software to use for a particular task

C. References

OECD. (2015). *Education and Skills Online Technical Documentation*. Updated October 2016. Paris: OECD Publishing. <http://www.oecd.org/skills/ESonline-assessment/assessmentdesign/technicaldocumentation/>.



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