2018-2019: Lessons Learned from Scoring Student Work

Introduction

Rangefinding, scoring, and reviewing data for Washington Comprehensive Assessment of Science (WCAS) questions provided the opportunity to see thousands of student responses at each grade and to evaluate data summarizing student performance. The Science Assessment Team would like to share observations about student responses.

The WCAS measures the level of proficiency Washington students have achieved based on the _Washington State 2013 K–12 Science Learning Standards_. The standards are the _Next Generation Science Standards_ (NGSS), and are organized into four domains: Physical Sciences; Life Sciences; Earth and Space Sciences; and Engineering, Technology, and the Applications of Science. Each domain has three-dimensional Performance Expectations (PEs) that integrate science and engineering practices, disciplinary core ideas, and crosscutting concepts. Each WCAS question is aligned to two or three of those dimensions. Multi-dimensional learning, teaching, and assessment in the classroom supports student success on multi-dimensional WCAS questions.

This _Lessons Learned from Scoring Student Work_ document lists actions to improve student ability to demonstrate understanding of the science standards on the state science assessment. Because each question on the WCAS is aligned to two or three dimensions of a PE, it is sometimes challenging to pinpoint the reasons behind student performance. For example, is it the application of the science and engineering practice, the disciplinary core idea, or the crosscutting concept that causes students to miss a particular question? Is it a combination of these three dimensions?

Students should be familiar with the functionality of the item types used on the WCAS. The item types include: multiple-choice, multiple-select, matching items, editing task inline choice, hot text, table input, grid items (graphing, drag and drop), simulation response, and short-answer. Some WCAS questions have more than one part. For example, a question can have a part A that is multiple choice and a part B that is a multiple select. Multi-part questions are often needed to achieve alignment to at least two dimensions of a PE.

Although the item types and functionality on the WCAS are similar to those on the Smarter Balanced English language arts (ELA) and mathematics assessments, there are a few differences. One difference is collapsing stimuli (information sections). Collapsing stimuli are used to ensure that once a stimulus is presented to a student, that stimulus is readily available as the student navigates through a cluster. Another difference is locking. The locking of questions allows subsequent questions or stimuli to update the student with correct information, which helps prevent students from carrying errors forward to the next questions. The locking of questions also limits clueing among questions in a cluster. Students cannot change their answer to these questions once they have moved

to a different question. The student can return to the locked question to view the question and their answer.

The WCAS Training Tests, available through the WCAP Portal, should be used with students to familiarize them with the functionalities of locking questions, collapsing stimuli, and tools available on the WCAS. The Training Tests provide examples of most of the item types.

WCAS Training Test Lesson Plans for grades 5, 8, and 11 and a WCAS Training Test Quick Start Guide are posted on the WCAS Educator Resources webpage. The lesson plan documents describe how to practice using tools and item types with students, answer keys, and other information. The quick start guide describes how to access the training tests as a Guest User or through the secure browser.

This *Lessons Learned* document is updated annually. With each round of item development, field testing, and test administration, we will update and refine the observations shared.

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General Observations: Grade 5, Grade 8, Grade 11

- Students should be encouraged to attempt every question on the WCAS. There is no penalty for guessing. Partial credit can be earned on some multi-part and short-answer questions.
- Students need to read a stimulus section thoroughly when it is presented in a cluster.
  - Stimulus sections can include information in the form of text, diagrams, graphs, tables, and/or animations that provide evidence that is used in questions. Students are encouraged to return to stimulus sections and re-read the information as needed.
  - Many types of devices with different-sized screens are used for online testing. To ensure that students see all material available for every stimulus section and every question, encourage students to:
    - Collapse and expand stimulus sections and questions to access information (tables, diagrams, text, etc.).
    - Scroll up and down, left and right, when interacting with stimulus sections and questions so as not to miss any information.
    - Use the Zoom tool to enhance the viewing of information.
  - Students should be prepared to combine information from more than one stimulus section within a cluster when answering a question.
  - When students are referred to tables, diagrams, graphs, etc. within a question, they should refer to the information when answering the question.
- The parts of a multi-part question work together to achieve two- or three-dimensional alignment to a performance expectation. Multi-part questions can be worth 1 or 2 points.
  - Refer to the following 1-point WCAS [Training Test](#) questions. For each question, notice how closely part B is connected to part A.
    - Grade 5: Question 4, Question 10, Question 11
    - Grade 11: Question 1, Question 3
  - Refer to the following 2-point WCAS [Training Test](#) Questions. In each of these questions, part A and part B work together to achieve two- or three-dimensional alignment to a performance expectation. However, the answer to part B does not depend on the answer to part A, so each part is worth one point.
    - Grade 5: Question 2
    - Grade 8: Question 1, Question 2
    - Grade 11: Question 2, Question 6, Question 7

- Read directions carefully and answer each question thoroughly. Specific directions are included in some questions like drag and drop or matching items. Following those directions can help a student earn the point for a question. For example:
  - A matching item direction could include: "More than one box in each row may be selected." This direction could help a student realize that they are not limited to one "check" per row.
  - A drag and drop item direction could include: "Move only one label into each box". This direction could help ensure that the student's answer can be interpreted by the "scoring rubric" as the student intended. If a student drags multiple labels into a box, the answer on top is scored. Students should place answer labels only in designated answer space(s).Refer to the following WCAS Grade Training Test questions. Notice the extra directions above the drag and drop answer space.
  - Grade 8: Question 4
  - Grade 11: Question 2
- Students should be encouraged to complete an entire question before moving on. Students are required to interact with each question part at least once to move to the next question. The only exceptions are multiple select items where students make the specified number of selections before moving on and editing task inline choice items where every drop down must have a selection.
- Students should read all parts of a short answer item very carefully—ensuring that the response addresses all parts of the question, including any bulleted directions. Students sometimes only address the first sentence or the first bulleted direction of a short answer item. Students sometimes write true statements that do not answer the question being asked. Encourage students to re-read the question and confirm that their response is a complete answer to that question. Refer to the following WCAS Grade Training Test questions. Notice the bulleted directions above the answer box.
  - Grade 5: Question 9
  - Grade 11: Question 12
- Students should avoid vagueness in short answer responses. For example:
  - If a student response includes "amount of atoms," the word "amount" could mean number of atoms or mass of atoms.
  - If a student response includes "size of the sample," the word "size" could mean volume, mass, area, number, etc.

- o If a student response includes "the number of organisms changes," the word "changes" could mean increase or decrease.
- When providing evidence from a given data table, students should use the exact evidence in the table, avoiding a summary or rewording of the evidence.
- When asked to select the best solution to a problem, based on evidence, students should make a complete comparison.
  - o Refer to the WCAS Grade 5 [Training Test](#), Question 8. Sample full-credit responses for this question include:
    - The student chooses "Add a gate", and their description is: *The solution has a higher cost than the ditch and sandbags, but will last 100 years which is longer than the other two solutions. The time to install the gate is between the other two solutions.*
    - The student chooses "Dig a ditch", and their description is: *Although the ditch takes the most time to install, the ditch lasts longer than the sandbags but not as long as a gate. The ditch costs more than the sandbags but less than the gate.*
    - The student chooses "Place sandbags", and their description is: *Sandbags are the fastest to put in and have the lowest cost, even though they only last a year which is lower than the ditch and gate.*

Observations for Grade 5

- Students would benefit from additional practice with discussions about systems, functions of systems, inputs and outputs of systems, and how a change to one part of a system might affect the entire system.
- Students would benefit from additional practice using evidence to support a claim, description, explanation, argument, or prediction. Some examples of evidence are similarities and differences among variables, or patterns observed in data tables, graphs, models, or diagrams.
- Students would benefit from additional practice using information from different formats to construct an explanation. For example, compiling information from text, animations, tables, models, etc. to order the steps in a scientific process or the steps leading to a solution to a problem.
- Students struggle with criteria and constraints when analyzing solutions to a design problem. Students would benefit from learning what the terms criteria and constraints mean, from practice determining how well a solution meets the given criteria for a successful solution, and how a given constraint affects the outcomes of a solution. Refer to WCAS Grade 5 Training Test, Question 8.
- Students would benefit from practice interpreting diagrams and graphs, including those with keys.
- Students struggle when distinguishing between matter (e.g., air) and energy (e.g., light) when asked about the cycling of matter or the flow of energy within or among systems.
- Students struggle with modeling the movement of matter in a system using a food web. Refer to WCAS Grade 5 Training Test, Question 4.

Observations for Grade 8

- Students would benefit from additional practice with interactions within a system and among systems, subsystems, inputs and outputs between systems, and how a change to an input of an open system might affect the entire system.
- Students would benefit from additional practice interpreting and using evidence to support a claim, description, explanation, argument, and/or prediction. Some examples of evidence are relationships among variables and mathematical relationships from data tables, graphs, models, and diagrams.
- Students struggle with criteria and constraints when analyzing solutions to a design problem. Students would benefit from: learning what the terms criteria and constraints mean; practice describing criteria for a successful solution; practice describing the constraints on the success of a solution; and practice explaining how a constraint affects the outcome of a solution.
- Students would benefit from additional practice interpreting diagrams and graphs, including those with keys, to identify evidence that supports claims and explanations. Refer to WCAS Grade 8 [Training Test](), Question 2, Question 3.
- Students would benefit from additional practice distinguishing among independent (manipulated), dependent (responding), and controlled variables when given a description of, or data from an experiment.
- Students would benefit from practice modeling connections between changes of state and changes in thermal energy.
- Students would benefit from practice with using models to show how matter and energy are conserved.
- Students would benefit from practice making observations at different scales. For example, describing microscopic changes that cause a macroscopic change in a system, and using graphs and diagrams to describe the relative sizes or ages of objects.
- Students would benefit from additional practice using models to show relationships between objects at various time and spatial scales.

Observations for Grade 11

- Students would benefit from additional practice with discussions about interactions within a system and among systems, subsystems, boundaries, inputs and outputs between systems, how a change to an input of an open system might affect the entire system, inputs and outputs of feedback systems, and limitations of a model in making predictions about a system.
- Students would benefit from additional practice interpreting and using evidence to support a claim, description, explanation, argument, and/or prediction. Some examples of evidence are relationships among variables, mathematical relationships derived from data tables, graphs, models, or diagrams, and student's own experiences. Refer to WCAS Grade 11 Training Test, Question 3.
- Students struggle with criteria and constraints when analyzing solutions to a design problem. Students would benefit from: learning what the terms criteria and constraints mean; practice describing quantitative and/or qualitative criteria for a successful solution and whether a solution meets criteria for success; practice describing the quantitative and/or qualitative constraints on the success of a solution, and how a constraint could limit the success of a solution.
- Students would benefit from additional practice interpreting diagrams and graphs, including those with keys, to analyze evidence to support claims, construct explanations, support arguments, etc. Refer to WCAS Grade 11 Training Test, Stimulus Section 2 and Question 9
- Students would benefit from additional practice describing energy inputs, outputs, flows, transformations, and conservation within a system or among systems. Refer to WCAS Grade 11 Training Test, Question 10.
- Students struggle to describe the cycling of matter and flow of energy between Earth's systems and between trophic levels, as well as the transformation of energy for both photosynthesis and cellular respiration.
- Students would benefit from analyzing relationships among variables from formulas like the gravitational or electrical force formulas or analyzing patterns in data tables. Refer to WCAS Grade 11 Training Test, Question 4, Question 5, Question 6, Question 7.
- Students would benefit from additional practice using patterns from the periodic table or patterns in chemical properties to provide evidence to support claims, make predictions, or describe relationships among components of a system.
- Students would benefit from additional practice distinguishing among independent (manipulated), dependent (responding), and controlled variables when given a description of, or data from, an experiment.
- Students would benefit from additional practice with modeling relationships for, or analyzing data about, Earth's internal and surface processes at different scales.