Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project

Grade 8 Science

Unit 4: Designing Equitable Assessments for Diverse Learners

Providing Solutions to Problems Using Simple Wave Properties

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SIPS Grade 8 Unit 4: Designing Equitable Assessments for Diverse Learners

How do we optimize accessibility for diverse learners and why is this important? This document provides steps to planning and developing equitable assessments that incorporate the principles of Universal Design for Learning (UDL) and the elements of Universally Designed Assessments (UDA). Both UDL and UDA are designed to promote access to instruction and/or assessment to the widest range of students. This includes, but is not limited to, students with varying abilities, cultures, primary languages, background knowledge, and interests. For more information about equitable assessment design and use, and why it is important, view *Chapter 4: Fairness and Accessibility* of the Strengthening Claims-based Interpretations and Uses of Local and Large-scale Science Assessment Scores (SCILLSS) Digital Workbook on Educational Assessment Design and Evaluation: Creating and Evaluating Effective Educational Assessments.

A multi-step process to promote the selection and design of equitable assessments for diverse learners is detailed which includes planning, selection and development, and evaluation and reflection. General information, links to tools and resources, and guiding questions provide additional considerations to support the implementation of this multi-step process.

Planning

Consider all students when designing the assessment task, including students' gender, race, ethnicity, socio-economic status, primary and secondary language, disability, cultural experiences, background knowledge, etc. Knowing what understandings and abilities different students bring to the assessment is vital to removing or reducing barriers to students' ability to demonstrate attainment of the assessed acquisition goals.

It is important to ensure that the requirements of the assessment task clearly target the selected acquisition goals. Consider how to include additional knowledge and skills that are related, but not specifically assessed, and how to elicit students' background knowledge to support students' accurate and complete demonstration of their learning through the evidence they produce.

Use the *Bias, Sensitivity, and Accessibility Review Worksheet* (see page 7) as part of the planning process.

Selection and Development

When selecting or developing an assessment task, consider how it will engage students, how the directions and information are presented to students, and how students will interact with the task requirements and materials. Developing the assessment task while considering these three components helps identify possible barriers and provides access to the widest range of students taking the assessment. Each component includes guiding questions to prompt a deeper look at the assessment task.

Student Engagement

1. Select or develop an assessment task that will engage students and encourage students to put forth the effort and time to fully demonstrate their understanding of the acquisition goals.
    a. Are the goals clear and understandable for students?
    b. Is the assessment task authentic and relevant?

c. Are options available for individual choices and decisions?

d. Is the time allotted to complete the task reasonable?

e. Does the task allow students to actively participate?

f. Are there opportunities to collaborate with peers?

Presentation of Content

2. Provide multiple and accessible ways to present the assessment task, including the directions, the information, and the materials.

   a. Can the assessment task directions be accessed as needed?

   b. Are the directions and information presented using simple, clear, and intuitive language (e.g., limit unnecessary wording, avoid multiple-meaning words, avoid unnecessary scientific terminology)?

   c. Can the assessment task directions and information be accessed in more than one way (e.g., auditorily, visually, use of technology, in the primary language, etc.)?

   d. Is the readability and comprehensibility of the information appropriate for the widest range of students (e.g., length, direct sentence structure, scientific and academic terminology explained or glossed)?

   e. Is the physical appearance of the included material easily read (e.g., plenty of white space, adequate font size; the standard font, etc.)?

   f. Is necessary background knowledge activated or supplied?

Student Interaction

3. Ensure all students can interact with the assessment task requirements and materials.

   a. Are there options for how the student can complete the task (choice of materials, tools, methods, etc.)?

   b. Are there multiple ways to participate in the task (e.g., technology, physical manipulation, variety of strategies)?

   c. Are the materials and task requirements easily accommodated for a student with a visual impairment, physical disability, cognitive disability, for a student using assistive technology (AT), or an alternative, assistive communication (AAC) system, etc.?

   d. Are differentiated levels of support available (e.g., modeling the process, peer mentoring, supplying background knowledge)?

   e. Are there varied opportunities to ask questions or express observations (e.g., designated time, individually, within small groups)?

   f. Are there multiple ways and levels of feedback throughout the task (e.g., using a checklist to self-monitor, encouraging students through the steps, and teacher checking for accuracy at each step)?

Evaluation and Reflection

Two evaluation and reflection checkpoints should occur. First, prior to administering the task, use the guiding questions above (see ***Selection and Development*** section) along with the *Bias, Sensitivity, and Accessibility Review Worksheet* (see page 7) to review how the assessment task will engage students, the presentation of the assessment task materials, and how the student interacts with the assessment task requirements and materials. Make any needed revisions to maximize equity to a wide range of students. Remember to ensure the assessment task can be further accommodated as necessary (e.g., tactile model for a student who is blind).

The second checkpoint should occur following the administration of the assessment task. Determine any barriers observed while students were completing the assessment task and note additional revisions that could be applied to remove or reduce the barriers. Use these notes when planning for instruction and when selecting or developing another assessment task.

Annotated Example

An annotated assessment task supports understanding and interpretation of the features of a well-designed, high-quality assessment task that promotes students' ability to respond fully and accurately to each prompt or item. The annotations on the example science assessment task, "Sound Waves," highlight features of an assessment task and suggest additional features that could be applied to optimize accessibility and equity for the widest range of students.

Exemplar Classroom Assessment Task, Rubric, and Student Exemplars

Grade: 8

CCR-Science Indicator: SC.8.2.2.B Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. [Clarification Statement: Emphasis is on both light and mechanical waves. Examples of models could include drawings, simulations, and written descriptions.] [Assessment Boundary: Assessment is limited to qualitative applications pertaining to light and mechanical waves.]

Provide cut-out drawings or pictures of a bowl without plastic wrap, a bowl with plastic wrap, two or three different types of radio speakers (e.g., free-standing, small blue tooth, standard radio), and labels for the student to use to create the model.

Place the requirements of the model on a checklist for the student to self-monitor accuracy.

Task

This task is about sound waves.

1. Can you make something move by using only sound? Think about the video you just watched. Develop a model and describe this phenomenon using a bowl with plastic cling wrap as the sound detector and a radio speaker as the sound source. Be sure to label the parts of your model. Be sure your model shows:
   - what is happening at the sound source;
   - how the sound source affects the surrounding medium;
   - how the medium causes changes to the sound detector; and
   - what happens to the salt on the sound detector.

Label the volume of the sound source (e.g., soft, loud, louder, loudest) for students who are deaf or have a hearing impairment.

Provide a word bank with definitions for terms that are not being assessed (e.g., medium, source, detector, phenomenon, etc.)

Place the salt in a shaker with a handle for ease of handling. Consider dying salt or rice a bright color with food coloring to add contrast between it and the plastic.

Provide a model of ways to show movement in a graphic (e.g., parallel curved lines, lines moving away from the direction the object is moving, arrows pointing in the direction the objects are moving, etc.)

Provide options for students who require more assistance in understanding the concept.

2. Based on your model, describe:
    - how sound waves are transmitted through the material;
    - why the salt appears to move differently during the song; and
    - why the plastic wrap acts as a sound detector.

Provide a word bank of terms to write the response (e.g., transmission, particles, longitudinal, kinetic, vibrate, etc.).

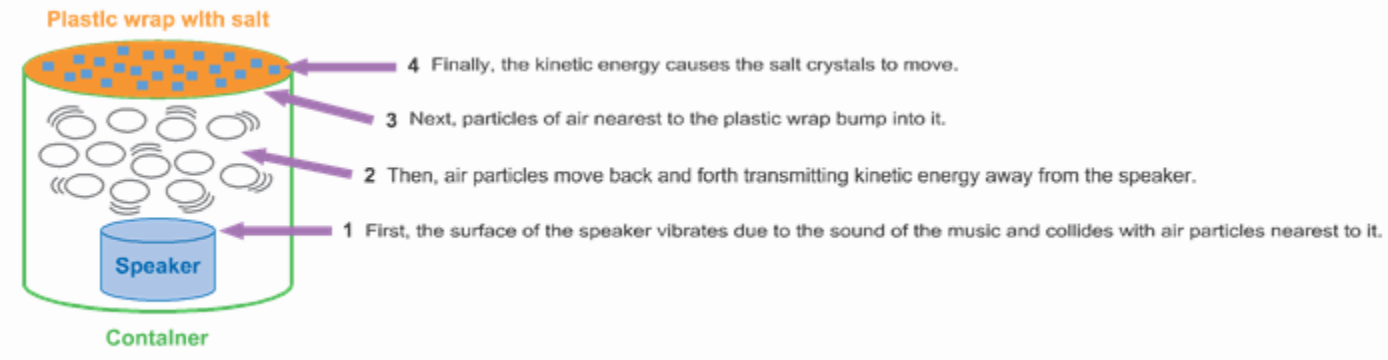
Ensure a student who uses an augmentative and alternative communication (AAC) device has the necessary vocabulary to complete the task. Allow students who are learning English to write their description in their dominant language first and then transcribe into English. Score for rubric elements and not on grammar.

Rubric

Dimension Element	0	1	2	3
Develop and use a model to describe phenomena.	No response or a response not related to the science and engineering practice.	Model does not make sense of the phenomena and does not indicate relationships between components.	Model describes the phenomenon, including a limited number of relevant components and describes some of the relationships between components.	Model makes sense of the phenomenon, by describing relative components including sound waves, materials through which the waves are reflected, absorbed, or transmitted, results of the interaction of the wave and the material, and source of the wave. Model describes the relationship between components including sound waves, materials through which the waves are reflected, absorbed, or transmitted, results of the interaction of the wave and the material, and source of the wave.
Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used.	No response or a response not related to the crosscutting concepts.	Model shows misunderstanding of the properties of the materials.	Model is used to interpret part of the context.	Model is used to describe why materials with certain properties are well-suited for particular functions.
A sound wave needs a medium through which it is transmitted.	No response or a response not related to the disciplinary core idea.	Response includes major misunderstandings or no attempt to show how sounds travels or demonstrates little understanding of how sound travels.	Response partially describes how sound travels.	Response describes how sound waves interact with different materials.

Student Exemplar(s)

Question 1: Construct a Model



Question 2: Constructed Response

"The vibrating speaker gives out sound. The sound travels through the air as longitudinal waves. The air particles next to the plastic wrap vibrate as the sound energy reaches it, making the salt crystals move. When the sound of the music is louder, it is more intense. This causes the salt crystals to move even more. The salt stops moving when the sound stops. This is why the plastic wrap is a good sound detector.

Accessibility and Fairness Review Worksheet

Review Criteria Category	Description	Agree	Disagree	For any statements of Disagree, please provide specific feedback to explain aspects of the tasks that need improvement.
The scenario, design problem, prompts, presented information, and expectations for the collection of student evidence…				
Bias/Sensitivity: The task does not provide an unfair disadvantage for a sub-group of students through the use of unfamiliar language, contexts, examples, or content that provokes negative feelings or challenges beliefs or values.	use appropriate vocabulary, phrases, and/or sentence structure for the assessed grade level.	☐	☐	Click or tap here to enter text.
	do not use content and language that may be considered offensive based on race, gender, sexual orientation, age, religion, ethnicity, socioeconomic status, and regional location.	☐	☐	Click or tap here to enter text.
	do not use vocabulary that may be considerably more familiar to some groups than others.	☐	☐	Click or tap here to enter text.
	do not include content that portrays any group of people in a negative or stereotypical manner.	☐	☐	Click or tap here to enter text.
Accessibility: The task is accessible to all students and adheres to the principles of Universal Design for Learning.	are accessible to students from Nebraska and will not interfere with students' ability to demonstrate their knowledge or understanding.	☐	☐	Click or tap here to enter text.
	provide equal opportunities for students to demonstrate their knowledge, skills, and abilities without giving students an unfair advantage over other students.	☐	☐	Click or tap here to enter text.
	include all information needed for students to demonstrate their knowledge, skills, and abilities in response to each question.	☐	☐	Click or tap here to enter text.
	provide a variety of response modes as represented by the types of work products (constructed response, drawing, completing a graph, selected response, etc.).	☐	☐	Click or tap here to enter text.