Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project

Grade 5 Science

Unit 2: Designing Equitable Assessments for Diverse Learners

Matter and Energy in Organisms and Ecosystems

December 2022

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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, and 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 11) 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 11) 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 promote students' ability to respond fully and accurately to each prompt or item. The annotations on the example science assessment task, "Matter and Energy in Organisms and Ecosystems," provided for use by the Nebraska Department of Education 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.

Student Worksheet

CCR-Science Standard

SC.5.8.2 Gather and analyze data to communicate understanding of matter and energy in organisms and ecosystems.

Task

Orients student to the task and elicits prior knowledge.

Providing a simple completion checklist helps students to independently monitor progress and completion.

This task is about matter, growth, and energy. Answer the four prompts below.

Freddy sees a strange plant growing by the front steps of his house. He decides to do research on different types of plants. Freddy finds out that it is a pumpkin plant. Freddy is excited about the plant because his family uses pumpkins to decorate their yard in the fall. He wonders if they can grow their own decorations. He decides to watch and record the growth of the pumpkin.

Freddy starts a pumpkin journal. He plans to record five observations of the pumpkin growth over the next 42 days.

Directions are clear and concise.

Authentic scenario that leads to the prompts.

Prompt 1

First, Freddy records where the pumpkin is growing. Below is the picture that Freddy draws in his journal. His picture includes living and non-living things. He thinks that all of these could have an effect on how the pumpkin plant grows.

Providing the Task and Prompts digitally allows students to access the information as needed.
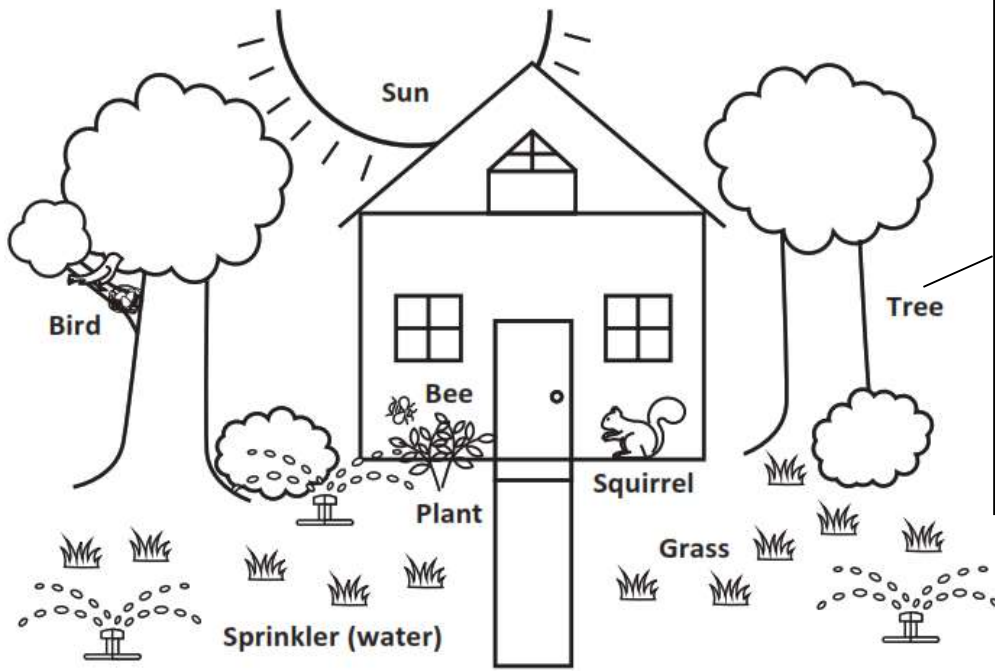
The drawing provides context for the living and non-living things. The drawing could be cut apart and used to complete the chart, "Freddy's Picture: Living and Non-living Things.
Reducing the clutter by including less images (e.g., only one tree, one sprinkler, less grass, no sidewalk, etc.) would keep the physical appearance easier to identify and interpret the key information in the drawing.

The task is presented in simple, clear, and intuitive language.

Use Freddy's journal picture and the word bank of living and non-living things to complete the chart below. Identify the living and non-living things Freddy drew in his picture. Place the following terms in the correct category.

Word Bank: sun, air, tree, house, soil, squirrel, grass, water, plant, bushes, bird

Freddy's Picture: Living and Non-living Things

| Living	Non-living
The words can be provided on word cards or placed in digital text boxes for all students to have the option to sort cards, drag and drop digital cards, or write to complete the task, allowing for assistive technology. Allowing the student to determine where to place the word bank/cards provides student choice and increases accessibility (e.g., preferred field of vision).	

Prompt 2

Freddy draws a picture to record the growth of the pumpkin. He wants to know how the large pumpkins they buy can grow from a small plant. His mom tells him about **photosynthesis.** This is the process used by plants to convert light energy into fuel for plants. His mom tells him that pumpkins aren't just for decorating. They provide food for animals and humans.

Photosynthesis is defined and background information is provided.
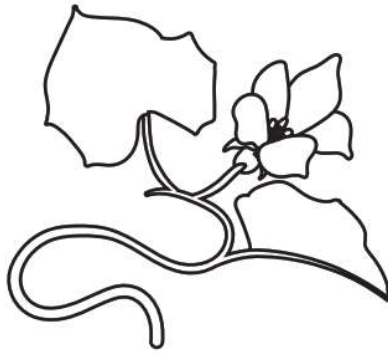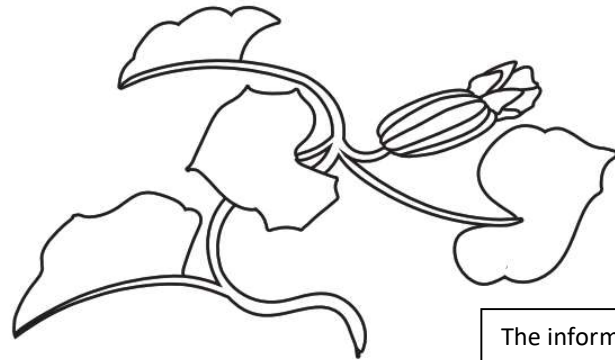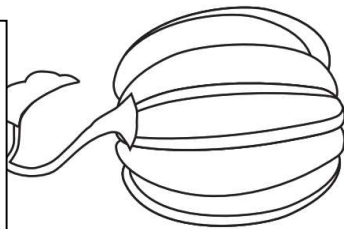
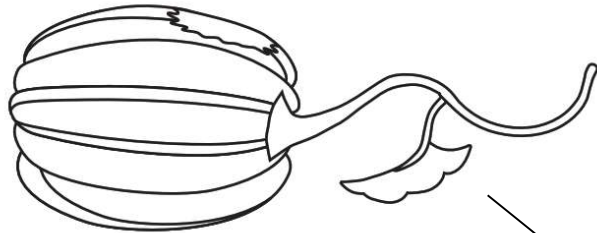**Day 1**   **Day 7**

The information and related graphic being on the same page reduces barriers.

Freddy draws a picture on day 28. He sees a hole in his pumpkin. He is not sure what has caused it.

Providing a definition of science terminology that is not being assessed can reduce barriers, allowing the student to demonstrate understanding of the targeted concept(s).

Day 21   **Day 28**

The physical appearance is clear with plenty of white space and line spacing.

Word Bank: Decomposer Environment Plant Animal Transfer Matter

Using Freddy's science journal, the word bank above, and your own knowledge explain:

a) How did the pumpkin get a hole?

_____

_____

_____

_____

_____

b) What is the relationship between the pumpkin and the components that interact with it in this scenario?

_____

_____

> Providing a definition and/or examples of components can be provided to support students.

_____

_____

_____

Prompt 3

Freddy draws a picture on day 42. He records his observations in his journal.

- Hole is larger

- Pumpkin is flattening on top

- Black and white color covers the top around the hole

- The bottom of the pumpkin is flattening and feels soft

- The pumpkin is rotting

> Providing the task on paper and digitally allows for ease of accommodations (e.g., text to speech, enlarging font size, word prediction, and spell check.
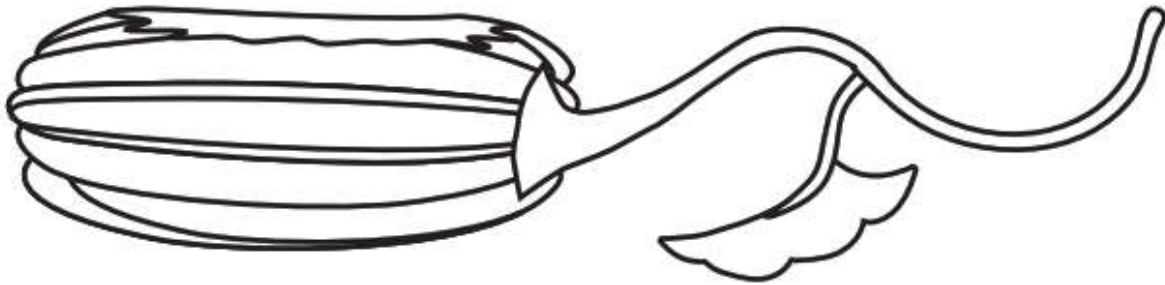
Freddy's brother comes to look at the pumpkin. He says that fungus and bacteria break down organisms. This is decomposition. It causes the pumpkin to turn black around the hole. Charlie draws a model. It shows matter transfer between the animals, pumpkin, and decomposer.

Providing the pumpkin, animals, and decomposers as well as blank arrows as cutouts or in a digital format provides options for students to cut and paste or drag and drop in order to create the model.
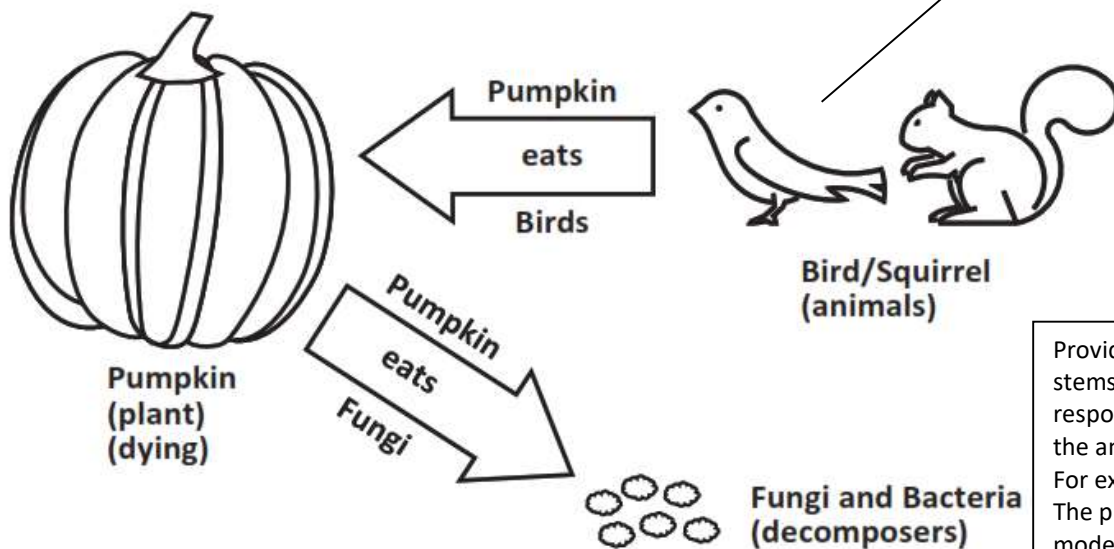
Providing possible sentence stems can prompt students' responses without cueing the answer.
For example:
The problem with Charlie's model is . . . .
The correct cycle . . . .

Freddy realizes that Charlie's Model is incorrect.

In the box below, redraw the model to show the cycling of matter. Use Charlie's drawing to explain why Charlie's model was incorrect. Be sure to include all elements located in the word bank. Label pictures.

Word Bank: Decomposer Plant Animal Transfer Environment Matter

Revised Model

Prompt 4

Freddy fixes Charlie's model. He understands that there are relationships between the components in the environment. He creates a list to identify each component.

Use all the information to give examples of the component to complete the table:

	Component	Example
Ex.	Shelter	House
1.	Plant	
2.	Animal	
3.	Decomposer	
4.	Environment	

He then draws a model to describe the movement of matter that occurs among the components.

Complete the model below to show the movement of matter between the components.
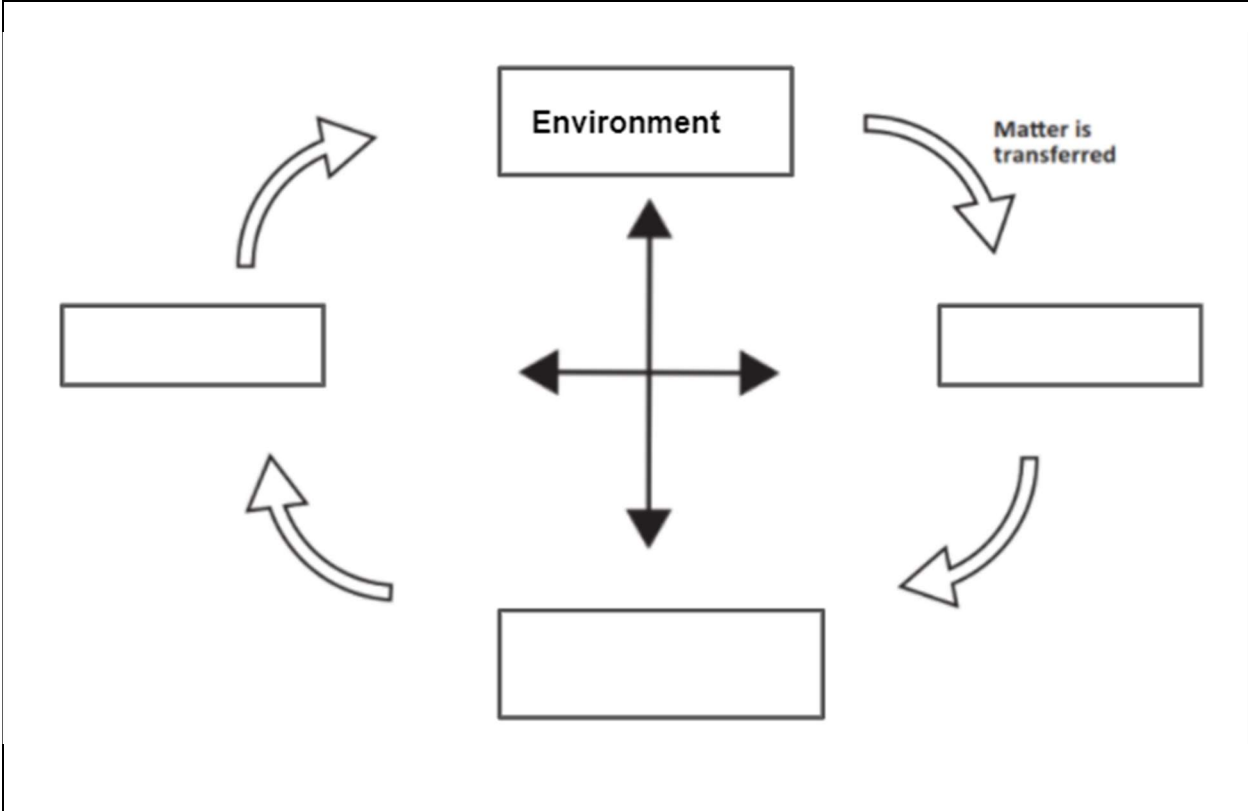
Accessibility and Fairness Review Worksheet

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 or 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, socio-economic 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.*