Why Is Our Fruit Turning Brown?

Welcome to NSTA's Daily Do

Teachers and families across the country are facing a new reality of providing opportunities for students to ***do*** science through distance and home learning. The **Daily Do** is one of the ways NSTA is supporting teachers and families with this endeavor. Each weekday, NSTA will share a sensemaking task teachers and families can use to engage their students in authentic, relevant science learning. We encourage families to make time for family science learning (science is a social process!) and are dedicated to helping students and their families find balance between learning science and the day-to-day responsibilities they have to stay healthy and safe.

What is Sensemaking?

Sensemaking is actively trying to figure out how the world works (science) or how to design solutions to problems (engineering). Students ***do*** science and engineering through the science and engineering practices. Engaging in these practices necessitates students be part of a learning community to be able to share ideas, evaluate competing ideas, give and receive critique, and reach consensus. Whether this community of learners is made up of classmates or family members, students and adults build and refine science and engineering knowledge together.

Materials

Items: Prepare to bake an apple dessert with your student/child or use apple slices and 4 of the following fruits/vegetables: Tomatoes, Apples, Squash, Grapes, Onions, Plums, Peaches, Bananas, Zucchini

Article: Scientific American – Why do apple slices turn brown after being cut?

Video: YouTube – Fruit and Vegetable Decomposition, Time-lapse

Informational Handout: What Are Dinner Table Discussions (DTD's)? & Dinner Table Discussion – Guidance for Families

Optional Handout: Science and Engineering Practices – Developed by NSTA using information from Appendix F of the Next Generation Science Standards

Collection of Resources: Direct links to all videos, articles, handout materials, and other resources – https://bit.ly/DD-04-17-2020

Introduction

In today's Daily Do, Why is our fruit turning brown?, families participate in a Dinner Table Discussion (see below) about the phenomenon of fruits (e.g., apples, pears, and bananas) turning brown. This sensemaking discussion has four parts:

1. Families raise the question "Why is our fruit turning brown?" by introducing the phenomenon of fruit turning brown by observing apples (bananas, pears and other "fleshy" fruits also work well) in different states - before slicing, after slicing, before cooking, after cooking, etc.

2. Families ask students to explain what they currently understand about why they think fruit turns brown.

3. Families prompt students to generate questions about why fruit turns brown.

4. Families read an article together to find some answers to their questions about why fruit turn brown

Why is our fruit turning brown?

We have all, at one time or another, looked a piece of fruit and said "No way I'm eating that!" It leads us to ask the question : Why do some fruits turn brown?

Have you ever left a sliced apple sitting out on the counter? What did it look like after some time had passed? Do bananas change in appearance as the days wear on? Does this happen with all fruits? These are some of the things we will explore today in our NSTA Science Daily Do.

Introducing the Phenomenon & Raising the Question

There are 2 options for introducing this phenomenon:

1. Bake an apple dessert (cobbler, pie, etc.) with your children. Make observations about the apples when you peel and cut them versus when you cook them. Ask leading questions such as:

    1. *What do you notice about the apples before we cook them?*

    2. *What do you notice about the apples as they sit on the counter?*

    3. *Do you think this happens with all fruits, or just apples? Why or why not?*

2. Slice apples for a meal, but don't eat all of them. After the meal, or longer, (minimum of 30 min. later) call the children's attention to how the apples look. Ask leading questions such as:

    1. *What do you think happened to the apples?*

    2. *Why do they look different now compared to when we cut them?*

Tell us what you know...

Encourage your children to explain to you what they know (or think they know) about why fruits, like apples, turn brown.

Ask them to *"explain the science of why fruit turns brown"*. Children will attempt many varieties of explanations, but our goal here is not to distinguish between right vs. wrong answers or ideas. Rather, we want to foster discussion about the *"how"* and the *"why"* of fruit turning brown (which will ultimately lead making sense of science idea of oxidation, the chemical reaction that occurs when plant tissue is exposed to oxygen).

Accessing Prior Knowledge

Students may also call on knowledge from previous grade levels during this part of the discussion. They may mention that cutting an apple is a *physical change* whereas an apple turning brown is a *chemical change*. Distinguishing between physical and chemical changes is fundamental to observing similarities and differences of objects and comparing their properties.

Students may also describe different properties when making observations. For example, we can use the property of color to identify oxidation of fruit (the flesh turning brown after being cut). This may lead students to ask follow-up questions such as "Why doesn't the skin turn brown too?" This could also lead students to mention the peel of a banana turns brown whereas an apple does not, and subsequently, ask why.
All of these connections to ideas and learning opportunities at previous grade levels should be encouraged by asking follow up questions such as:

- *"Can you tell me more about that?"*
- *"How do you know that?"*

What questions do you have?

You can say something like ***"It sounds like we have more questions than answers. What questions do you have about why apples, and other fruits, turn brown?"***

Encourage children to ask as many questions as possible that are relevant to the discussion.

Common questions could include:

- Does this happen with all fruits or just apples?
- Why does it only turn brown after you cut it or cook it? Is the reason for color change in cooking different? If so, how?
- Why does it get soft when it gets brown?
- Why do bananas turn brown?
- What about avocados? Are they a fruit? If they are, why does the pit keep them from turning brown?

Pursuing Common Questions

Read the Scientific American article (as a family or individually) : Why do apple slices turn brown after being cut? . High school students will be able to read this article independently. Younger students will need more assistance.

After reading the article, ask your children the following questions:

- What is one new thing you learned that you didn't know before?
- Which of our original questions did we answer in our discussion and by reading the article?
- What other questions do you have about how foods change when cut, peeled or cooked?

After discussing new things students learned, you will have students watch a time-lapse video of fruit and vegetable decomposition. Have them choose 4 fruits and/or vegetables to observe from the list below:

- Tomatoes
- Apples
- Squash
- Grapes
- Onions
- Plums
- Peaches
- Bananas
- Zucchini

Students can write their observations on a piece of paper or share them orally. When you are ready, play the video. You will stop the video at :30, 1:00, and 1:30 to have discussion with students about what they are noticing as their selected fruits and vegetables change over time. Ask them follow-up and clarifying questions similar to how you did before. Those questions include, but are not limited to:

- What did you notice?
- Why do you think that happened?
- How do you know?
- Can you tell me more about that?

Why are the bones still here?

Now that we understand more about how fruits and vegetables change in different conditions, it makes us wonder if other living things change in the same way. In this video, students watched fruits and vegetables (plants) decompose. Visit our Daily Do "Why are the bones still here?" to explore more about decomposition.

NSTA Collection of Resources for Today's Daily Do

NSTA has created a *Why is our fruit turning brown?* collection of resources to support teachers and families using this task. If you're an NSTA member, you can add this collection to your library by clicking ADD TO MY LIBRARY located near the top of the page (at right in the blue box).

What Are Dinner Table Discussions (DTD's)?

This activity is called a Dinner Table Discussion (DTD). Dinner Table Discussions do not have to physically happen at the dinner table. Rather, they are intended to facilitate connections for the family around a discussion about science ideas wherever you may congregate for a meal. Whether you cook dinner at home or order take-out, the Dinner Table Discussions are centered around relevant science phenomena and raise common questions children have about the world around them. The goals of DTD's are to:

(1) Foster connection among the family through discussion of relevant science ideas.

(2) Prompt students and their families to think about what they currently know.

(3) Help students and their families ask what they want to know more about.

(4) Discover something new that moves everyone along the learning continuum of a particular science idea.

Like Daily Do's, these types of activities are considered "micro-learning experiences". They are not intended to replace classroom science learning, and are not intended to be used as "home school" stand-alone science lessons. They are not intended to result in being able to generate robust, complete scientific explanations of phenomena. Conversely, they are intended to move student thinking along the continuum of learning.

These are intended to be family-style discussions, with provided parent talk-moves, that stimulate thinking among family members and move everyone along the continuum of learning. Each dinner table discussion has these components to them linked below. These components provide fertile ground for the discussion to be authentic, phenomena-driven, rooted in science, and focused on **sensemaking**.

Dinner Table Discussion - Guidance for Families

Dinner Table Discussions have three main components. The following guidance will support you in facilitating your family discussion.

Introducing the Phenomena & Raising the Question

Our goal is to raise a puzzling question for students that does three things: (1) prompts them to think about what they currently know, (2) makes them ask what they want to know more about, and (3) helps them discover something new that moves them along the learning continuum.

Tell me what you know....

We want to foster children explaining what they think they understand to be true. These previous understandings are critical to exposing what they know and the questions they have. As they work to explain their current understandings, they will realize they don't know as much as they think, which will spur the generation of further questions.

What questions do you have?

In developing insufficient explanations for things, students generate authentic questions they have that are the pathway to discovering the answer. In other words, these are our explanatory questions. That, if we were able to investigate, we would understand more about what we currently don't understand. Our goal here is to generate lots of questions, but anticipate the common ones. The common questions are central to developing an explanatory idea, and we want to foster that environment by giving adult family members discussion prompts (talk moves) to facilitate the discussion for students as they work to articulate what they want to know more about.

Pursuing Common Questions

Our goal here is not to develop a robust and complete scientific understanding of a particular phenomenon. However, our goal is to help students/children understand a puzzling phenomenon more deeply than they do. Learning is a continuum, and our goal with these discussions are to move students further along the continuum; not get them to the end. The objective is to stimulate thoughtful discussion that is rooted in a scientific phenomenon and a scientific explanation.