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.
Introduction

In today’s Daily Do, Why does it sizzle?, families participate in a Dinner Table Discussion (see below) about the phenomenon of food making a sizzling sound while cooking. This sensemaking discussion has four parts:

1. Families raise the question Why does it sizzle? by introducing the phenomenon of the sound foods make when they are fried or grilled. Students and their families observe the sounds of cooking food - why do some foods make sizzle noises when you cooked in certain way?
2. Families ask students to explain what they currently understand about what happens to food when it "cooks".
3. Families prompt students to generate questions about what they observe when a food, like meat, cooks. Food cooked on a stove top makes a different sound than the same food cooked in a microwave. For example, one method causes the food to sizzle and the other does not.
4. Families watch a video and/or do an activity together to find some answers to their questions about how and why food makes a sizzling sound depending on how it is cooked.

What are Dinner Table Discussions (DTD's)?

In today's Daily Do, Why does it sizzle?, families participate in a Dinner Table Discussion (see below) about the phenomenon of food making a sizzling sound while cooking. This sensemaking discussion has four parts:

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4. Families watch a video and/or do an activity together to find some answers to their questions about how and why food makes a sizzling sound depending on how it is cooked.

Dinner Table Discussion - Guidance for Families

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 a 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.

Why Does it Sizzle?
Have you ever cooked and wondered why food sizzles when you put it in a hot pan or on a grill? Have you ever wondered why food sounds different depending on how you cook it? Many of you have probably heard the sound food makes when you cook it but might not have noticed that it doesn't always sound the same. Cooking a food one way instead of another may make you wonder "Why does it sizzle?"

In today's Daily Do, we will figure out some things about the sizzle of cooking and what it means!

Introducing the Phenomenon & Raising the Question
Many students are familiar with the sounds food makes when it is cooking, but may never have noticed not all cooking sounds are the same. Ask students if they have ever helped cook anything or if they have cooked anything themselves. Have them think about what they remember about their cooking experiences and ask them to share. Common experiences include remembering the food they cooked and how the food smelled and tasted. Sound is not usually something students mention when asked about a cooking experience. If a student does bring up the way something sounded when cooking, ask them to share.

When everyone has shared, tell students you have something you want them to listen to. Have them get out a sheet of paper. Play the video below but don’t let students see the screen. Tell them to listen to the sound and write down their prediction.

Making Observations and Developing Explanations
Next, have students share their predictions with someone, this could be another classmate or someone else in the household. Some kids may think the sound is running water and others may say it is something cooking. As students share their ideas, prompt them to include why they made the prediction they did. (What was it about the sound that led them to make the prediction they did?)
When students finish sharing, play the video again and this time let them watch. When the video is over have students share what they noticed. If students are older, you can have them record their observations.

Additional Guidance: Not all students eat meat. Consider using this video of potatoes being cooked in a pan (from 2:30 - 3:00) instead. Please note the chef speaks throughout the video, so remind students to focus on the sound they here coming from the pan.

Have students make an initial model about what they think is going on with the food they observed. Tell each student to make a **Before, During, and After** chart on a sheet of paper. Have students draw a model to explain what they think is going on in each of the cooking stages.

Next, ask them to share their model with another student, a small group, or someone else in the home. Have students notice similarities and differences between the models. Prompt students to explain their models by asking them about specific interactions such as:

- Do you think anything happens when the food hits the hot pan?
- What do you think happens to the air around the pan?
- Is there anything on the stove when you are frying food?
- If you put food into a hot pan, where do you think the liquid in the pan comes from?

Next, have a discussion about what was common in the models. Commonalities between students' models could include:

- the food's color changing
- heat being added to the pan and/or food
- a smell (or smells) coming from the pan

**Guidance:** If you are working with younger children, you might want them to draw their model and then explain what they think is going on through discussion.

**Tell Us What You Know...**

Encourage your students to explain what they know (or think they know) about why food makes a sizzling sound when you cook it in a pan or on the grill. Ask them, **“Explain the science of why some food changes color and makes sizzling noise when you cook it.”** Students will attempt many varieties of explanations, but our goal here is not to distinguish between right and wrong answers or ideas. Rather, we want to foster discussion about how or why these things happen.

**Accessing Prior Knowledge**

Students may call on knowledge from previous grade levels during this part of the discussion.

- Early elementary students (grades K-2) may mention that they know when things "cook" they can change. They might also talk about how the appearance of food changes when it is cooked versus food that warms on a counter after being taken out of the refrigerator or freezer. For example, bread that has been frozen still looks the same when it warms up (defrosts). However, it looks and smells different when it has been cooked (toasted).
- Upper elementary students (grades 3-5) may mention heating or cooling a substance can cause changes that can be observed. Sometimes these changes are reversible and
sometimes they are not. They may also mention the properties of some food changes and changes can be physical and/or chemical.

- Middle or high school students may talk about energy, and how when (thermal) energy is added it changes the food somehow. Some may know that different foods contain different macromolecules (fats, carbohydrates, proteins) and that macromolecules can go through chemical changes when they are cooked.

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?
Tell students to think about the video and the initial models they developed. Ask them to share any questions they have about what is happening when food cooks.

Common questions could include:
- Why does food change color when it is cooked in the pan?
- What makes the smell come out of the food?
- Does all food cook the same way?
- Where does the liquid come from when the pan was dry?
- What is the stuff that is bubbling?
- Is this the same when other things change color, like pieces of fruit when you leave them out?

Pursuing Common Questions
Explain that not all cooking has the same effect on food. Cooking meat in a frying pan is different than cooking meat slowly, like in a crockpot, to make stew. You have to have high heat to get the meat to make a sizzling noise and turn brown. When foods are cooked this way, a chemical reaction occurs. Scientists call this specific chemical reaction, the Maillard reaction. The Maillard reaction is actually very complicated and can result in many different chemical reactions between the different food molecules. To help explain what is happening, have students watch the following videos. These videos contain some complicated science; consider discussing the video with younger students to have them put what they understand into their own words. For very young students, consider only showing them the second video from Scientific American.

1. PBS video, Food - Delicious Science/The Maillard Reaction: The Science of the Sizzle (watch as a family or individually)
2. Scientific America video, What is the Maillard Reaction? - Instant Egghead #44

Ask students these questions after viewing the video(s):
- What is one new thing you learned that you didn’t know before?
- Which of our original questions can we answer now?
- What other questions do you have about the Maillard reaction or why foods sizzle when
they are fried, grilled, or roasted?

Additional Guidance: For elementary students, it would be enough for you to talk to them about the differences between some basic food science words and do a little kitchen experimenting. For example, you could make some observations of a slice of bread at room temperature and then place it in the freezer overnight. Record observations of that same slice of bread the next day while it is frozen and again after it has thawed and is at room temperature again. Next, toast the bread in a toaster or with some butter in a frying pan (this will get the sizzle sound) and make observations. Last, ask students what they think would happen to bread if they let it cool down to room temp. Will it change back to what it looked like before it was cooked? At this age, it is not necessary to get into chemical changes but you can start to introduce terms like warming versus cooking, freezing, thawing, and cooling.

Additional Activities: There are many investigations you can do that involve the Maillard reactions and/or sizzling! Consider engaging kids in some of the other investigations described below. These investigations can be done before or after the article is read.

- Cook something like a hot dog or potato by boiling and then by grilling or frying and make observations. Did they both reach the Maillard reaction or only one? Did they smell and taste the same? What did they look like when they were done cooking?
- Make homemade cookies with your family or students. While you are making the cookies talk about the different ingredients you used and their properties. As the cookies are baking ask students to explain what they think is happening to the cookies as they are baking. You could also watch The chemistry of cookies video which explains what goes on inside the cookie dough as the cooking bakes.

Why Does It Sizzle?
Now that we understand more about the sizzle sound food makes when you cook it, it makes us wonder about other sounds we have heard while cooking. If you and your students would like to pursue another activity connected to this Dinner Table Discussion, check out Why does some corn pop? Daily Do.

NSTA Collection of Resources Today's Daily Do
NSTA has created a Why does it sizzle? 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).

Check Out Previous Daily Dos from NSTA
The NSTA Daily Do is an open educational resource (OER) and can be used by educators and families providing students distance and home science learning. Access the entire collection of NSTA Daily Dos.