



# EATING THE ALPHABET

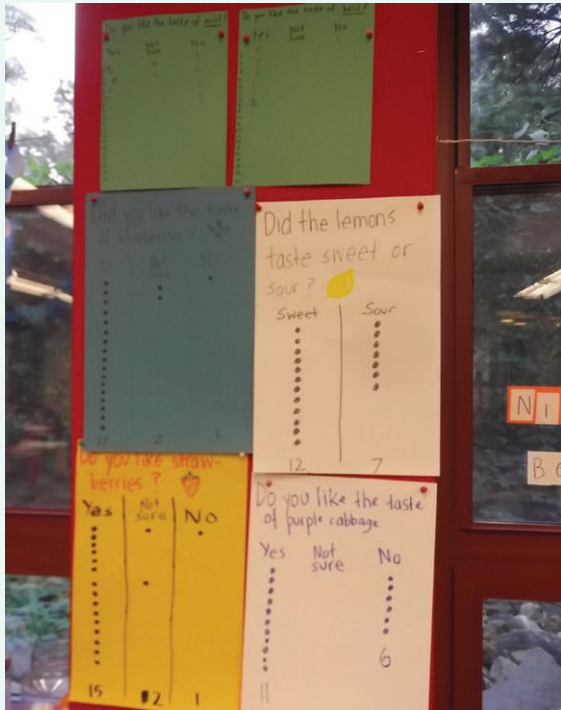
Using a daily morning routine to link science, math, literacy, and social studies in a kindergarten classroom

By Jyoti Gopal

In kindergarten, we start September with a “study of color”—red day, yellow day, blue day, and so on. For a couple of weeks, the children and teachers all wear the color of that day. Activities in the classroom center around the colors we study. As part of the color study, I have on display in our science area various items from nature that add other sensory experiences to color, such as texture and smell—a whole coconut with its rough brown husk, some smooth black river stones, some brilliant yellow lemons with their knobby skin and tangy scent. The children can see, touch, and smell the various colors.

**FIGURE 1.**

### Lemon bar graph.



A few years ago, as my students were exploring these items, I heard conversations about taste, especially about the lemons. Some had tasted lemons before and couldn't say enough about how delicious they were; others were not sure if they had or had not tried them; some were sure they would taste terrible; and some talked about lemonade. While listening to all this talk, it struck me that I was hearing an opportunity to introduce investigation.

### Inspired by Color

I announced to the children that I was cutting up the lemon so they could smell and taste the inside. Some immediately backed away from me in nervousness and others let out cries of delight. As I cut up the lemon into slices and offered each child a slice, I asked each to tell me whether the lemon was sweet, sour, or a little bit of both. Those who had no desire to taste the lemon did not have to. I noted the children's responses using dots, creating a graph (see Fig-

### Taste Testing on a Budget

For each taste test, you need to have only enough for everyone to get a small bite or sip. Sometimes, depending on the item, you will have enough for seconds; other times, you will not. I am fortunate that my school's budget allows for me to do a few taste tests a week. This enables us to really explore the letter sounds and experience a variety of tastes (i.e., cilantro, cranberries, and chamomile for C week). It also allows for opportunities to taste different varieties of the same fruit or vegetable.

If budget constraints are a factor, consider the following suggestions:

1. Limit it to one or two taste tests per week.
2. Ask parents to rotate, sending in items for each letter.
3. Check with your PTA to see if they can fund the taste tests.
4. Talk to your local grocery store. They may be interested in partnering with your class and donating taste tests free for the year (practically free publicity!).

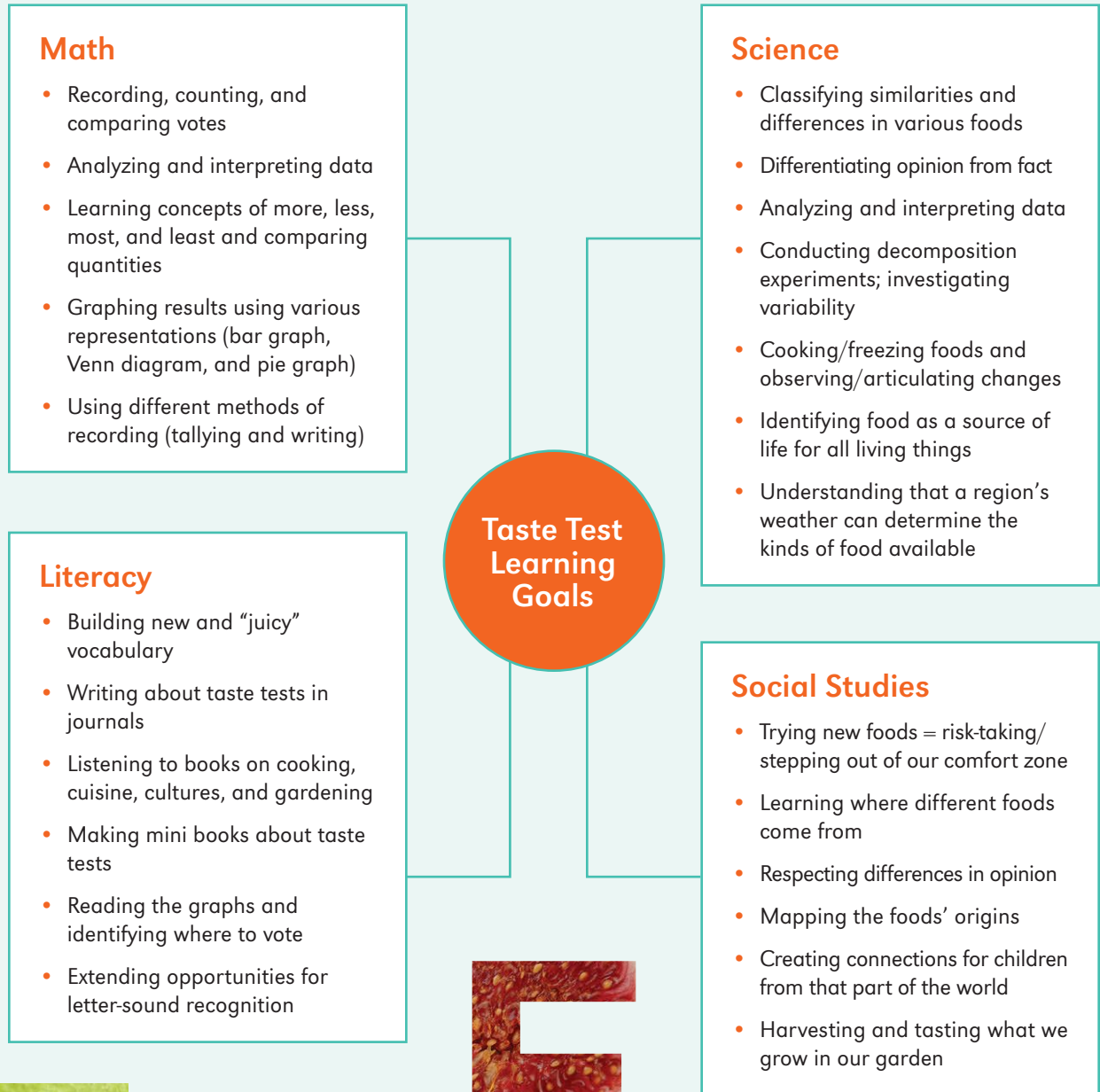
ure 1). Throughout the rest of the morning, I had repeat requests for seconds and thirds of lemon and there was a lot of chatter about the way it tasted and the way people looked as they tasted it (including me!). Some who had not tasted it the first time decided they wanted to try it after all. I ended up taking down votes for "liked it," "did not like it," and "not sure" on another graph.

During story time, I shared the graphs I had made and the children almost immediately started identifying whether more children thought the lemon was sour or sweet. They also noted that "liked it" got the most votes and "not sure" got the least. We counted the votes together and wrote the totals down in the corresponding columns.

Because of the palpable energy around the lemon tasting and the richness of the discussion following it, I de-

**FIGURE 2.**

Curriculum web.



decided to repeat the experience the next day for purple day. I brought in a purple cabbage, a vegetable I thought most of the children would not be familiar with. I chopped some of the raw cabbage into thin slices and set it out on a table for tasting. It was the first



thing children noticed as they walked through the door in their various purple paraphernalia! There was excitement, curiosity, and—yes—trepidation on some of the faces. We tried it raw, described how it tasted (crunchy, bland, juicy, like salad), filled out another graph, and then wondered whether the taste would change if we cooked it. Of course, when we did, the cabbage lost its crunchiness and the chil-

## Our Taste Tests A to Z

Here's a sample of what my kindergartners tasted this year with each letter of the alphabet (I only offered fruits, vegetables, and dairy products—no meat or poultry).

- A Asiago cheese, arugula, apricots, apple pear
- B buttermilk, brussels sprouts, black beans, banana chips
- C cranberries, coconut, cilantro, chamomile
- D dill, dates, dragon fruit
- E eggplant, edamame
- F figs, fennel, feta cheese
- G guava juice, ginger cubes, gouda
- H horseradish cheese, hummus
- I iced tea, iceberg lettuce, iddiappam
- J jackfruit, jelly (mint), juice of carrot
- K kefir, kiwi, kale
- L lychee juice, leeks, limeade
- M mango (dried), mango chutney, mushrooms (enoki)
- N navel oranges, naan, New England cheddar
- O okra, olives, olive oil
- P persimmon, papaya juice, pomegranate, parsley
- Q quail eggs, loquat, quinoa
- R red chard, radish, radicchio
- S starfruit, spinach, snow pea shoots, seaweed
- T tamarind, tzatziki, turnips
- U udon noodles, ugli fruit
- V vegetable juice, vinaigrette
- W wild rice, water chestnuts, wasabi peas
- X flax seeds (ground and not ground)
- Y yogurt (plain), yams, yeast
- Z zucchini, zima tomatoes, lemon zest

## Safety



Check for student allergies with the school nurse before eating in the classroom. Provide parents with written notification prior to the activity and instruct them to let the teacher know if there are any health issues they might be aware of relative to food tasting or eating. Cover tables with paper and use disposable dishes. Make sure fresh vegetables and fruits are thoroughly scrubbed and washed to lower or prevent exposure to pesticide or microbes. Try to secure sugar-free and preservative-free canned foods. Be sure to monitor students for proper hand washing, and follow your school or district guidelines for eating in the classroom. Supervise tasting/eating in case of choking or other emergency. Once the activity is completed, clean up all food on tables and the floor to discourage visitations by insects, rodents, and so on. Do not allow food to stay out in the classroom overnight. Always place it in a refrigerator or other secure location as appropriate. Make sure the trash receptacle is emptied and cleaned at the end of each day.

dren noted this as they described the taste. It was an easy way to highlight the core idea in physical science that heating can change a substance and that in this case, it was also not reversible.

## Reflecting on Curricular Connections

As I reflected on my day, it dawned on me that through each taste test activity, I had been able to teach and weave together some math, literacy, social studies, and science concepts. If I continued providing similar experiences, the opportunities for building on this integration and creating a spiraled learning process were tremendous. I decided to use a backward design model and think about the following question: What science, math, literacy, and social studies objectives of our kindergarten curriculum would these taste tests help to achieve? What could the tangible and the intangible learning be? I used a curriculum web (see Figure 2) to illustrate how I answered this question. Diving even deeper into the *Next Generation Science Standards* (NGSS Lead States 2013), I realized that I would be able to highlight



some disciplinary core ideas, cross-cutting concepts, and science practices through extension activities linked to daily taste tests (see *Connecting to the Next Generation Science Standards*).

As soon as the color study is completed each year, the kindergarten classes start our Letter Study program in which each week is devoted to a letter of the alphabet. With the introduction of the weekly taste test, my challenge became to find foods that would integrate well with the letter of the week while still intriguing and testing my kindergartners' palettes. Living in New York City made it easy to find a wide variety of foods from around the world. I could hop into my local Chinese grocery store for loquats or water chestnuts or my Indian store for tamarinds or naan. Whole Foods was also indispensable! If your class budget does not allow for this, see the Taste Testing on a Budget sidebar for suggestions for reducing cost.

## The Daily Routine

We set up the taste tests at the same table every morning. The table also had labels for the food we would taste that day and a graph we printed out and placed near the food. Children had time to taste the food during a period we call Choice Time, when they are trickling into the classroom, unpacking, checking in with teachers, getting their morning snack, and getting ready to start the school day. By the time we start the morning meeting, everyone is expected to have tried the taste test and filled out the graph. For many months, I created the graphs and each time a new graph was introduced, I modeled for the children how to fill it out. My students very quickly became familiar with my expectations and errors in recording became opportunities for discussion about accurate representation of information and data collection. As students became familiar with the different graphs, I started asking for volunteers to create graphs of their choice to represent the data to be collected. Discussions about the taste test, the information collected on the graph, and any investigations we may want to conduct on a taste test always took place during our morning meeting, immediately after Choice Time.

FIGURE 3.

Taste testing setup.



It is important to highlight that while the taste testing is not a traditional “science” activity, the specific investigations that arise out of these taste tests are very deliberately linked to some disciplinary core ideas, science practices, and crosscutting concepts recommended by the NGSS, although by

no means confined to them. The taste tests are an ongoing, year-round activity built into our classroom morning routine a few times a week. As represented by the curriculum web (Figure 2, p. 52), this activity encourages strong connections between science, math, and literacy, which is actively recommended by NGSS. It does not take the place of other investigations that can teach the same conceptual understandings and practices in science but instead is another entry point for students to experience science through a familiar activity. In my fifth year of using taste tests in the classroom, I have found them to be effective in encouraging children to “wonder”—to ask questions about the “where,” “how,” and “what-ifs” of the foods we taste.



## Setting Up for Success

As I integrated the taste tests into our classroom routines, I struggled with whether or not to make them optional. My first thought was that everyone needed to try it in order to vote, if only to encourage them to step out of their comfort zone. However, I also recognized that some children needed more time than others to find their way out of any discomfort. I compromised by making it optional in the first few weeks and then gradually increasing expectations for everyone. This allowed for students to initiate the “risk-taking” at their own pace while giving me time to get to know the students who were not tasting and figuring out ways to encourage them to do so without making it an ordeal. In order to create a sense of safe community, children also needed to feel free to truly express their opinion. I found that the most important way to do this was to lay the groundwork for differences of opinion and remove the notion that a particular response “won” when it had the most votes. Emphasizing that it was okay not to like a taste test and modeling how to do a taste test was crucial for laying this groundwork. My assistant and I spent the first couple of weeks showing children how to taste and describe what they are tasting, sometimes modeling why we like a particular flavor and other times why we do not. We have also, at times, deliberately modeled hesitation with a taste test, citing unfamiliarity, so that our students can see our uncertainty and our willingness to overcome it. We gave the children firm guidelines:

1. Take a little nibble.
2. Describe the taste to a teacher or classmate without using the word “yuck.”
3. Finish it if you like it. Put it in the food scraps bucket if you do not.
4. Vote your opinion.

Interestingly, I found that some children who were hesitant or resistant to the taste tests would sometimes have hesitations in other areas of the curriculum, whether it was so-



Students tally up their classmates' preferences.

cial, physical, or academic. Encouraging them to cross that threshold to try a new food encouraged some risk-taking in other areas as well. See the tasting table setup in Figure 3.

## Investigations in Science

When children compared the various foods we tasted and classified them, they were beginning to look for observable similarities and differences that formed the basis of our classification system. We spoke about the different kinds of citruses we tasted and how they are similar or different from each other. We discussed whether the taste test food is a fruit, vegetable, or neither. One student wanted to know how many cheeses we had tasted and so ended up working with friends to go through all the graphs to make that determination.

Children questioned whether the taste test food grows here in the United States or elsewhere. We discussed and compared foods that grow in hot climates, like dates or pineapples, with others such as apples and pumpkins that are harvested in cooler climates. And although this is not a focus of the activity, we sometimes ended up exploring the growing conditions that are ideal for a food we taste, another disciplinary core idea in the life sciences strand of the NGSS.

My students began to differentiate between opin-

ion (“I like the taste of this food”) versus fact (“It is a citrus fruit”). During group meetings, we charted out what is an opinion about a food we taste and what is a fact. This helped us assess which students had grasped the difference and which were still learning to differentiate the two. We compared and contrasted our taste test data with our weather graph discussing how the information on our weather graph is based on daily factual observations while the information collected for our taste tests is based on likes and dislikes, and are thus opinions. Other data collection activities, such as when children record the weekly growth of paperwhite bulbs, offer the opportunity to compare and contrast objective and subjective data. Remind stu-

students they should never eat bulbs used in the classroom. Students also started observing and articulating changes to the food when we cooked it (for example, when we cooked fresh cranberries or sautéed leeks), froze it (when we froze apple cider and grape juice into pops), or unfroze it (when we left a cider pop out to confirm that it would melt back into liquid apple cider). We learned that heating or cooling a substance can cause observable changes, some of which are reversible (freezing and unfreezing the apple cider) and some of which are not (cooked cranberries).

Students were encouraged to start formulating questions about how a fruit or vegetable could be further investigated. Depending on the foods we taste and the questions students have, these investigations can vary year to year. Once, we decided to make raisins by leaving leftover grapes on a sunny ledge and observing the process of change as well as noting the time it took for the change to occur.

In the beginning of the year, mathematical thinking through taste tests focused on one-to-one correspondence and conversations around quantity. Is there one vote for every student? Which got the most votes? Which got the least? As

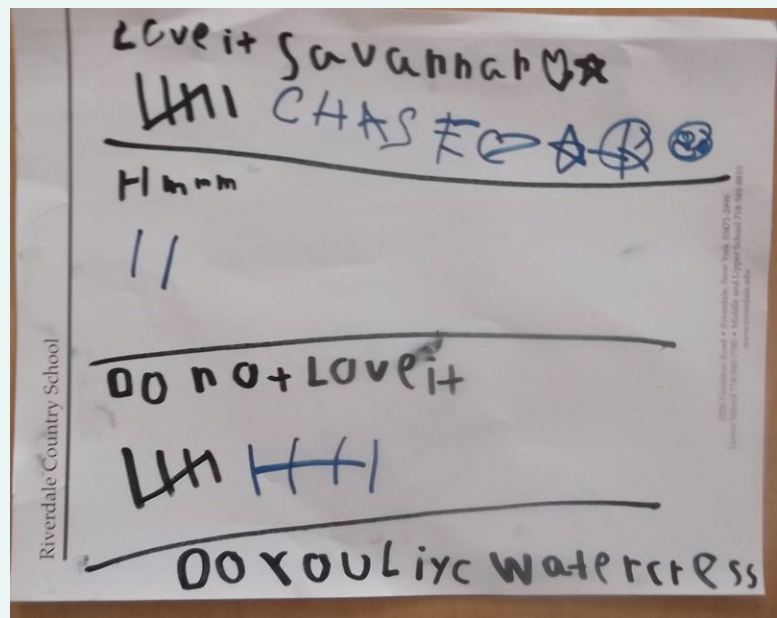
**FIGURE 4.**

A page of our taste test graph book.



**FIGURE 5.**

Student-made representation of watercress taste test data.



the children gained familiarity with our taste test station and the procedures, I started introducing them to different kinds of graphs for recording the votes: first bar graphs, then Venn diagrams, pie charts, and surveys. We discussed how many more or fewer votes a response got as compared to another. The use of math language became a norm in our conversations as the children identified and interpreted the information the graphs give us. The graphs were added every week to the class Taste Test Graph Book (Figure 4), which became a favorite to look through at rest or reading time.

I offered my students different ways of recording information; at times, they recorded their votes directly onto a graph that I had created. At other times, unifix cubes stacked up or craft sticks in voting cans were the method. Students began exploring various ways to represent this information on paper and some started independently taking surveys or recording information about other things they were interested in. For example, we had one student conduct a survey on a favorite color and collate the information herself into a bar graph, while several decided to create their own graphs for our watercress taste test (see Figure 5).

## Assessing for Understanding

At our daily morning meetings, my assistant and I noted how students answered the questions we posed about the taste test and related investigations, which students volunteered to make the graphs, as well as any questions students asked. Because the activity encompasses science, math, and literacy and happens almost daily, we were consistently able to gauge a number of understandings in each of these disciplines during these “turn and talk” partner conversations during morning meetings. Therefore much of the assessment was formative; it involved listening to what students said and asking them for the “why” of their responses to get to their underlying understanding, whether it was in science, math, or literacy. Science journal entries about the taste test investigations also gave us a sense of the thinking that students were engaging in and informed our teaching.

## Building Community

The experience of tasting different foods together and using it as an anchor for various investigations did more than provide my students with numerous opportunities for learning science concepts and practices (as well as concepts in math, literacy, and social studies). It was also a wonderful community-building experience. Because I introduced a wide variety of foods from all over the world, my students had the opportunity to experience tastes beyond their day-

## Connections to the Common Core State Standards (NGAC and CCSSO 2010)

### Literacy

#### *Comprehension and Collaboration*

*CCSS.ELA-Literacy.SL.K.1* Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups

*CCSS.ELA-Literacy.SL.K.2* Confirm understanding of information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood

#### *Phonics and Word Recognition*

### Math

*CCSS.Math.Content.K.CC.B.4* Understand the relationship between numbers and quantities connect counting to cardinality

*CCSS.Math.Content.K.CC.C.6* Identify whether the number of objects in one group is greater than, less than or equal to the number of objects in another group

to-day experiences (see the Our Taste Tests A to Z sidebar). In doing so, I also found that I could create connections for children whose families have come from that part of the world and who eat these foods on a regular basis. Living in a populous, multicultural city such as ours, my students were already familiar with a wide range of cuisines and took much of it for granted. Learning that the food originates elsewhere and needs to be transported here was an added dimension to their knowledge of the food and provided an introduction to our global connectedness and the technologies that make this possible. So go ahead, eat the alphabet—you will be surprised at the many things that you and your students can learn from the experience! ■

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### References

- National Governors Association Center for Best Practices and Council of Chief State School Officers (NGAC and CCSSO). 2010. *Common core state standards*. Washington, DC: NGAC and CCSSO.
- NGSS Lead States. 2013. *Next Generation Science Standards: For states, by states*. Washington, DC: National Academies Press. [www.nextgenscience.org/next-generation-science-standards](http://www.nextgenscience.org/next-generation-science-standards).



## Connecting to the Next Generation Science Standards (NGSS Lead States 2013)

### 2-PS1 Matter and Its Interactions

[www.nextgenscience.org/2ps1-matter-interactions](http://www.nextgenscience.org/2ps1-matter-interactions)

<b>Performance Expectations</b> <i>The materials/lessons/activities outlined in this article are just one step toward reaching the performance expectations listed below. Additional supporting materials/lessons/activities will be required</i>	<b>Connections to Classroom Activity</b>
<p>2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.</p> <p>2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.</p>	<p>Students compare and contrast their investigation of the decomposition of various fruits and vegetables.</p> <p>Students cook various foods and freeze/unfreeze various liquids we taste throughout the year and use these experiences to explain reversible versus irreversible changes.</p>
<b>Science and Engineering Practices</b>	
<p>Analyzing and Interpreting Data</p> <p>Using Mathematics and Computational Thinking</p> <p>Obtaining and Evaluating Information</p>	<p>Students</p> <ul style="list-style-type: none"> <li>• Observe, record and communicate changes in the foods they are investigating, through science journal entries and “turn and talk” conversations.</li> <li>• Use various kinds of graphs to record information about the foods we taste.</li> <li>• Use mathematical language to share their understanding of the data collected in the graphs.</li> <li>• Differentiate between opinion and fact.</li> </ul>
<b>Disciplinary Core Ideas</b>	
<p>PS1.A Structure and Properties of Matter</p> <ul style="list-style-type: none"> <li>• Different kinds of matter exist and many of them can be either solid or liquid depending on temperature. Matter can be described and classified by its observable properties.</li> </ul> <p>PS1.B Chemical Reactions</p> <ul style="list-style-type: none"> <li>• Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible but sometimes not</li> </ul>	<p>Students identify taste tests as plant products or animal products, as harvested directly from nature or created with human intervention (as in a cooked food).</p> <p>Students conduct cooking investigations (fresh cranberries into cranberry sauce is one example) as well as freezing investigations (freezing and un-freezing apple cider and grape juice is one example) to observe changes that can happen to the foods as they are heated or cooled.</p>
<b>Crosscutting Concepts</b>	
<p>Patterns</p> <p>Cause and Effect</p> <p>Scale, Proportion, and Quantity</p>	<p>Students begin to classify the various foods they taste into different categories. This forms the basis of the understanding that observed patterns of characteristics form the basis of classification.</p> <p>Students conduct cooking and freezing investigations and determine the cause of observable effects.</p>