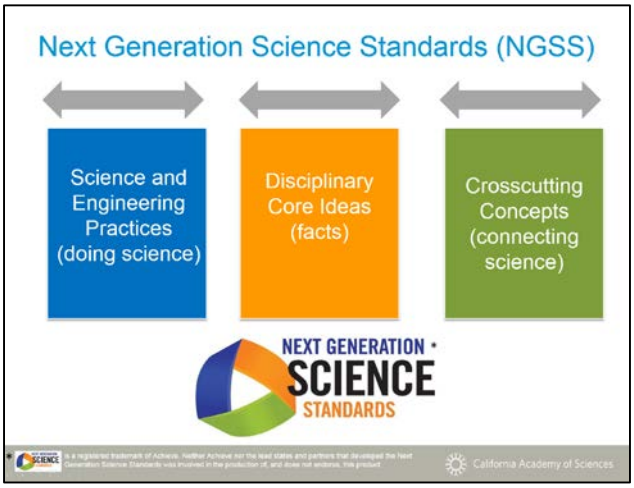
Introduction to the NGSS

Approximate time: 30 - 35 minutes (presentation)
Part 1: Why are the standards changing? (10 minutes)
Part 2: What do they look like? (5 minutes)
Part 3: How did this happen? (5 minutes)
Part 4: What happens next? (5 minutes)
Discussion and questions (5-10 minutes)



Learning Goals

Participants in this activity will

- gain a basic understanding of the philosophy behind the Next Generation Science Standards (NGSS)
- know what the three dimensions of the NGSS are
- be aware of the process that led to the creation of the NGSS
- know the basics of the next steps in the implementation process

Materials

"Introduction to the NGSS" PowerPoint

Background for Facilitators

When educators step into a training about the NGSS, they often arrive with a number of burning questions they hope to have addressed. To put their minds at ease, start your very first training by addressing some of the more straightforward questions about the NGSS. Once this basic introduction is out of the way, your participants will be able to focus on diving more deeply into exploring the three dimensions.

The PowerPoint presented here can be a good starting point to cover some of the more urgent questions. This is **absolutely not** a replacement for hands-on activities, and you should **not** expect your participants to be NGSS experts after this brief overview. However, it is an excellent starting point to kick off your training and lay a foundation for further learning.

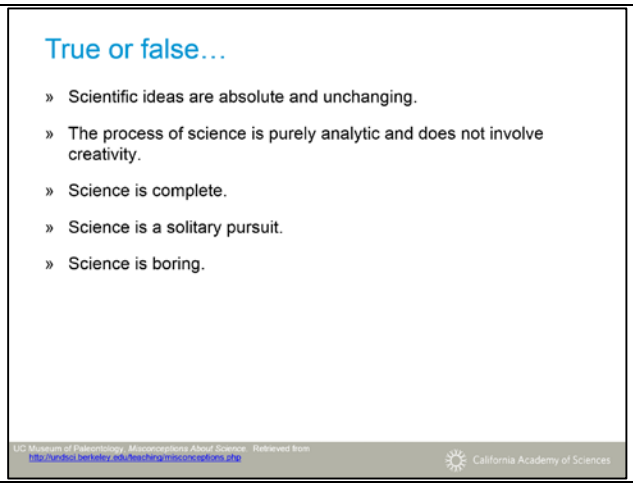
Prepare

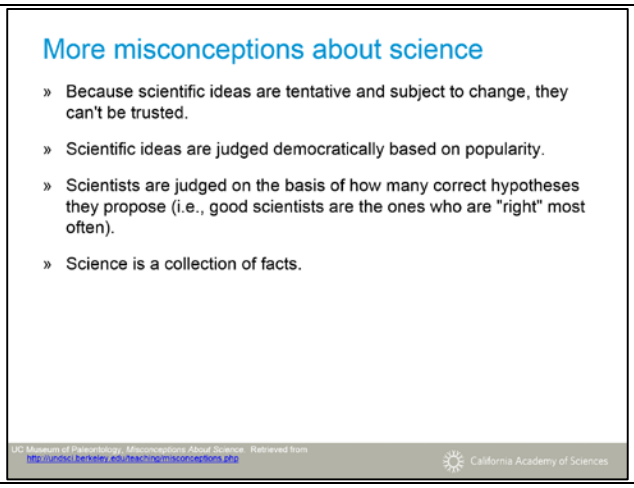
1. Review the PowerPoint and decide how much of it you want to use. We recommend customizing and adapting the PowerPoint as much as you like to meet the specific needs of your audience.
2. Some of the slides include information that is specific to California. If your audience is in a different state, take a few minutes to do some research and replace those slides with more relevant information. Your state's department of education website is likely a good place to start.
3. If you have more specific information about what is happening in your own district or school, add some slides to share that with your participants.

Procedure:

This activity consists of a PowerPoint presentation. Try to make this an interactive presentation, drawing questions, comments, and input from your participants. The notes below describe our talking points for each slide in the presentation. **Please do not view this as a script; rather, adapt the talking points to your own presentation style.**

Part 1: Why are the standards changing? (10 minutes)

<table>
<tr>
<td> 
</td>
<td>SLIDE 4: Pop quiz!
o Read each statement aloud. Have your participants call out whether it is true or false.
o Most scientists would say all these statements are false.
o AND YET, these are all common misconceptions that many students (and adults!) have about science.</td>
</tr>
</table>

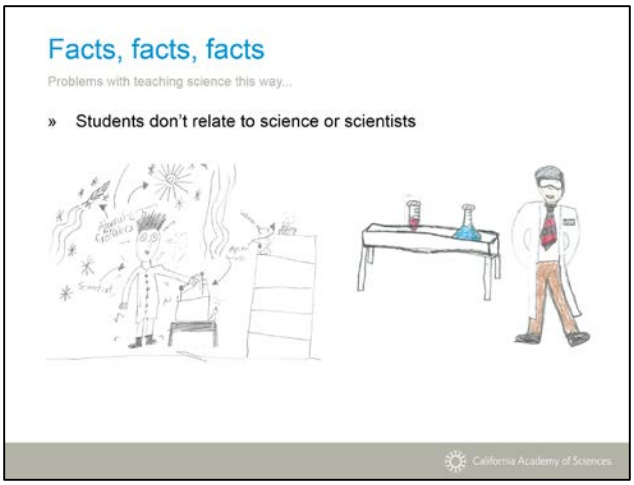


SLIDE 5: More common misconceptions

- These ideas are influenced by many factors, such as the media, life experiences, and even educational experiences.
- We are focusing on this last misconception, the idea that science is just a collection of facts (rather than an active process).
- The next slides discuss ways this misconception can be harmful.

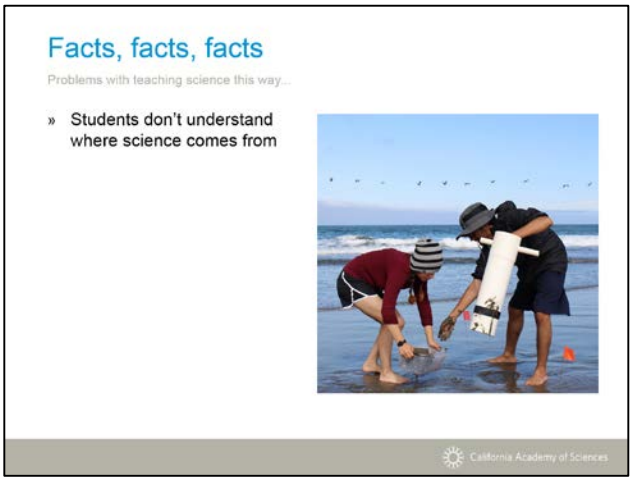
SLIDE 6: Building science skills

- If students experience science as something to memorize rather than as a process, they won't develop the skills to succeed in science careers or even in college science courses.
- What if we taught **soccer** the way science is often taught? Students would read about famous soccer matches, memorize rules and statistics, and learn about famous players. Then when they get to college, they would finally be handed a ball for the first time and be expected to play. It's easy to predict that they would not be successful.
- Science is the same; if we expect students to be able to DO science in college or career, they need many opportunities to practice before then.



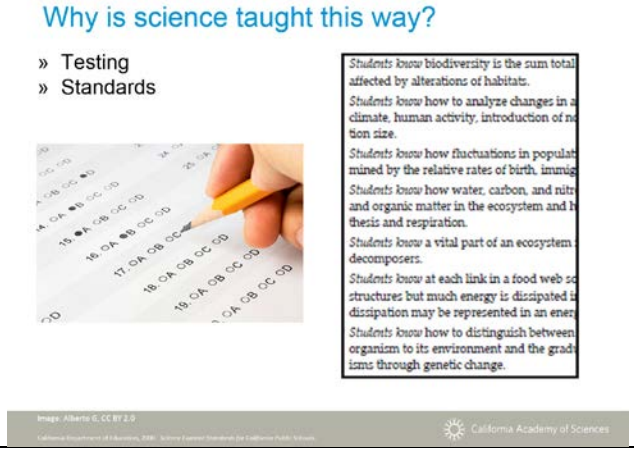
SLIDE 7: Science identity

- These pictures are by 4th graders when asked to draw a scientist. What do you notice about these pictures?
- [Listen to observations from your participants.]
- These pictures show white male chemists. Some scientists definitely look like this; however, many more do not.
- Most students drew something similar, which for most of them meant drawing someone very different from themselves.
- If students get to DO science, they are more likely to be able to see themselves as someone who could be a scientist.



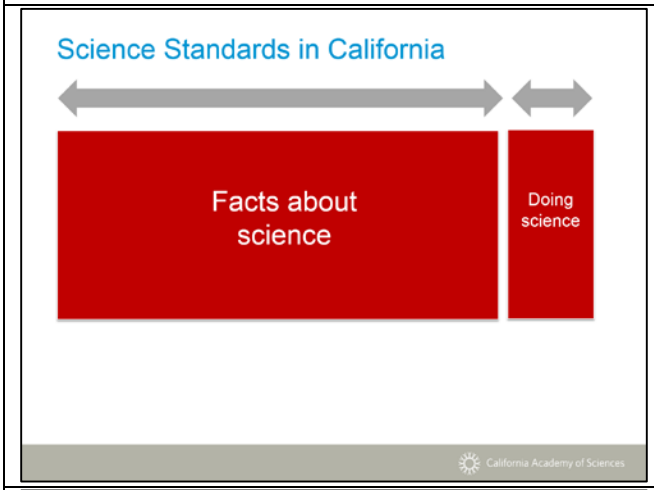
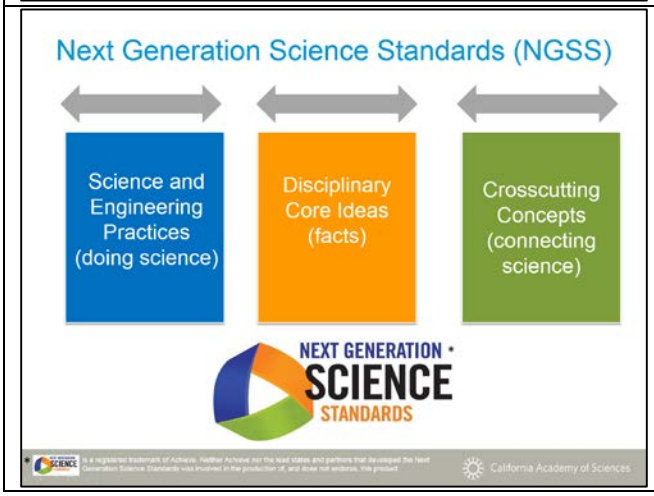
SLIDE 8: Informed citizens

- Even if students don't pursue science careers, understanding how it works is still important.
- We hear a lot in the media about topics based in science, like climate change or public health issues.
- Knowing how scientists think about things like evidence and uncertainty makes it easier to understand what's going on in these debates and to recognize when media could be misrepresenting the issue.



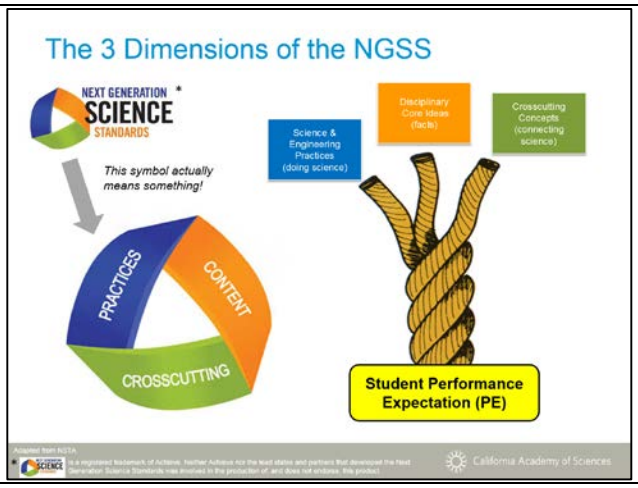
SLIDE 9: Why is science taught this way?

- Educators have known for a long time how important it is for students to DO science.
- AND YET, this is not reflected in many classrooms. Why?
- One driving factor is testing: if students are being measured solely on their ability to spit out facts, then that's what they'll be taught.
- Another key factor (and the one we're focusing on today) is the standards.

	o The old California science standards read like a list of things that students should know. Every sentence starts the same way: students know this, students know that, etc. o The standards tend to shape the curriculum (and influence the tests too). If your standards are basically a list of facts, then that is what will be taught.
	SLIDE 10: The old standards o The old California standards mostly a list of facts that students should know, plus a little slice of doing science (the investigation and experimentation standards). o The doing of science was overwhelmed by the facts about science, and there was no clear way to connect the pieces.
	SLIDE 11: The new standards o The NGSS fundamentally changes this balance. o The facts about science are still there (knowledge is important, after all), but it's now on equal footing with doing science, as well as with connecting ideas across science. o These three components are called the **three dimensions of the NGSS**.

After each section, be sure to pause and answer questions.

Part 2: What do they look like? (5 minutes)

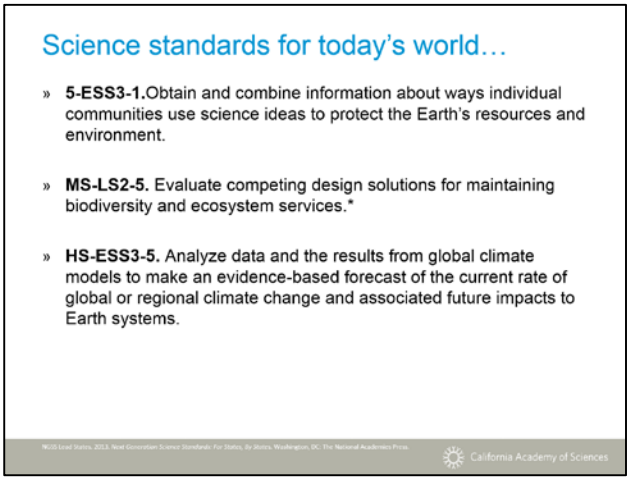


SLIDE 13: The 3 dimensions of the NGSS

- Did you know the NGSS logo actually means something? The three colored bands on represent the three dimensions and their equal balance in the NGSS.
- These components weave together to form Performance Expectations, which are statements of what students should be able to do.

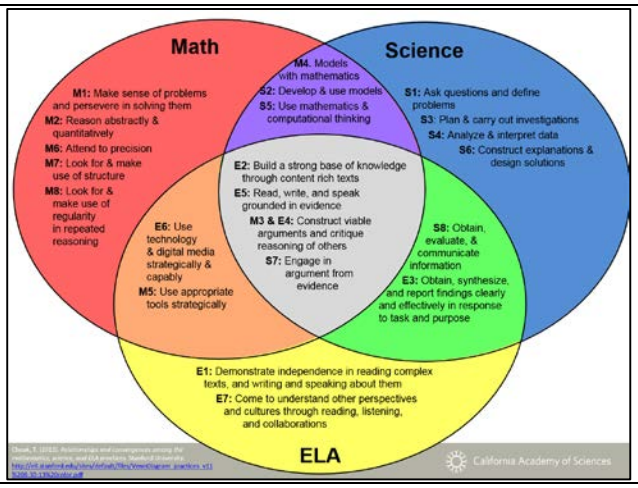
SLIDE 14: The cake analogy

- This analogy from NSTA illustrates the NGSS as "a piece of cake."
- The completed cake represents the performance expectation. The three dimensions are components of the cake.
- The processes that go into making the cake (the baking tools and techniques) represent the Science and Engineering Practices (SEPs).
- The content of the cake itself represents the Disciplinary Core Ideas (DCIs).
- The frosting represents the Crosscutting Concepts (CCCs), a layer that enhances the cake as well as many other desserts (like cupcakes or donuts).



SLIDE 15: Sample performance expectations

- [Read out these examples and ask your participants what they notice about them. How do they differ from the old standards? Listen to observations from your participants.]
- These statements are active—rather than "students know this fact," there are action words like "evaluate" and "analyze."
- The PEs we chose here include ideas like climate change and sustainability that were not prominent in California's past science standards.

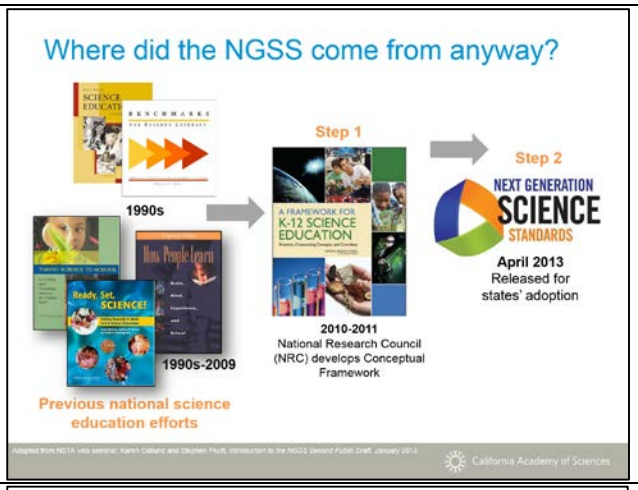


SLIDE 16: Integration

- There is intentional overlap and synergy between the NGSS practices and practices students are already learning in Common Core Math and ELA.
- This creates opportunities for integration across subject areas, and shows that ways of thinking are not isolated to one discipline.

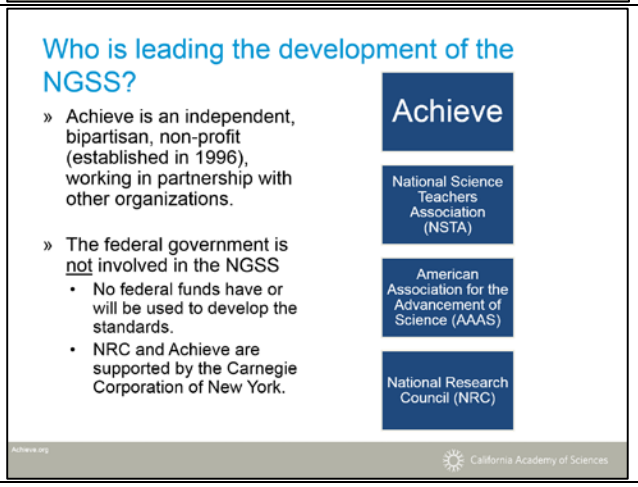
After each section, be sure to pause and answer questions.

Part 3: How did this happen? (5 minutes)



SLIDE 18: The backstory

- The philosophy of the NGSS draws on extensive evidence-based research in the science education field
- The outcomes of all this research were distilled to create the *Framework for K-12 Science Education*, which lays out the three-dimensional structure underlying the NGSS.
- This Framework was then translated into the form of new standards, which were released in April 2013.



SLIDE 19: Who made the NGSS?

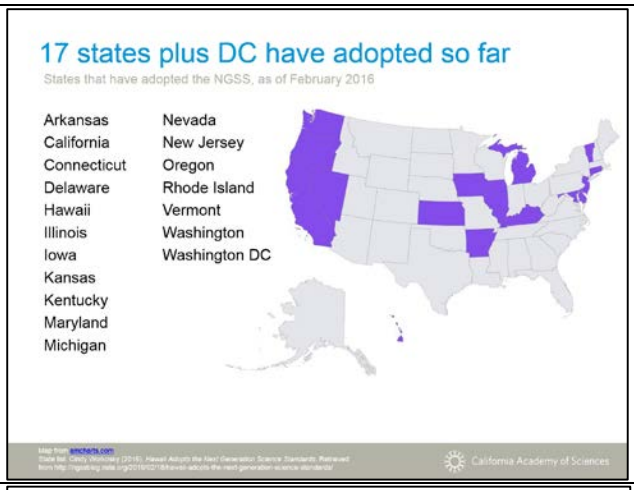
- The effort of translating the Framework into standards was led by a non-profit organization called Achieve in partnership with these other organizations and with the states.
- Given how politicized other standards have become, it's worth noting that the federal government has not been involved with the NGSS. They are sometimes described as "science standards by the states, for the states."

SLIDE 20: Lead states

- These 26 lead states were involved in writing the standards.
- Each state had a committee composed of various stakeholders, including teachers, administrators, and scientists.
- Achieve sent drafts to the states for feedback and made changes based on that input.
- There were also two public review periods during which anybody could view the drafts and provide feedback.

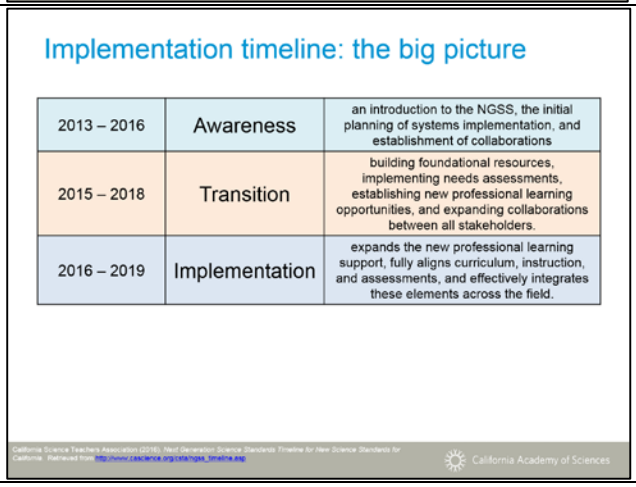
After each section, be sure to pause and answer questions.

Part 4: What happens next? (5 minutes)



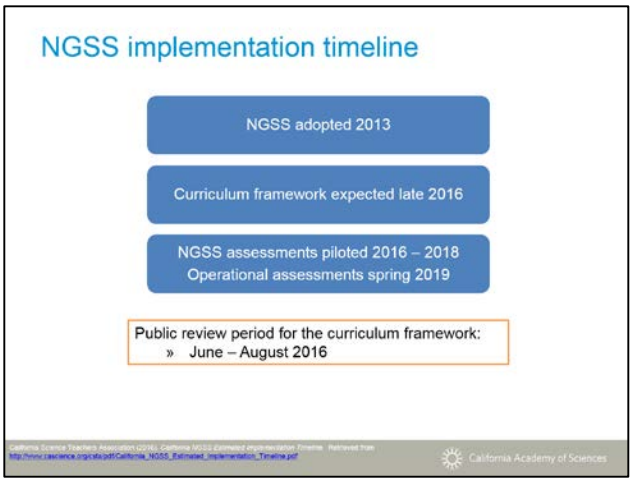
SLIDE 22: Adoption

- Since the standards were released, 14 states plus DC have officially adopted them.



SLIDE 23: Implementation

- In California, the implementation process has three phases: awareness, transition, and implementation.
- [Read out or summarize the descriptions of each phase.]
- You may notice that these periods overlap, as some schools and districts are at different points in the process than others.



SLIDE 24: Curriculum framework

- California's curriculum framework will outline what this may look like in the classroom .
- NGSS-aligned assessments will be pilot-tested over two years.
- Assessments are expected to be operational in spring of 2019. This means that the 2018-2019 school year is when science teaching needs to be fully NGSS-based.
- This means you don't need to stress about completely overhauling your science teaching right this minute—that's great!
- On the other hand, **don't** wait until the last minute either…
- We strongly suggest starting to incorporate the SEPs and CCCs into your teaching now. These dimensions work with any content, so you can try them out and get a feel for how they work even before you shift to NGSS content. This way when you do make the full switch, you'll already be comfortable with two of the three dimensions, and the transition will be that much easier for you.

Introduction to the NGSS

At the end of the presentation, spend 5 – 10 minutes answering questions. Some of this information can be a little overwhelming the first time you hear it, so be sure to use strategies like wait time to let your participants process and formulate their questions. Don't rush on to the next thing too quickly, or you may leave your audience feeling lost and frustrated.

Keep in mind that there are still many unknowns about the NGSS. Don't feel bad if there are questions that you can't answer, and be honest with your audience – let them know that some things just aren't known yet, and that some of it we will all be figuring out together.

Key Messages

Make sure participants leave with:

- a basic understanding of the philosophy behind the NGSS
- knowledge of what the three dimensions are
- awareness of the next steps in the implementation process

Next steps:

- Follow this up with some hands-on activities so your audience can start to process all this abstract information in a more tangible way and begin to build deeper knowledge. Check out some hands-on explorations for the Practices and Crosscutting Concepts in our NGSS Demystified toolkit.