

Advancing Tools and Processes for Next Generation Science

Model B: Planning for Instruction

Introduction to the Next Generation Science Standards (NGSS) and the *Five Tools and Processes for Translating the NGSS*

Introduction

During this introduction session, participants' prior knowledge, beliefs and misconceptions about the NGSS are elicited. Facilitators can use this time as an opportunity to learn more about the participants in order to best support teacher teams in their small groups during the later Five Tools sessions.

Goals:

- Provide an introduction to the shifts and innovations of the NGSS
- Deepen participants understanding of the research and rationale for the development of the *Five Tools and Processes for Translating the NGSS*

Prerequisite: NONE

Total Time: 120 minutes (2 hours)

Part 1 Introduction (Slides 1-10) [30 minutes]

Purpose: Set the stage for the focus of the session and begin to build community.

Summary: Participants have an opportunity to connect to one another and to the content of the day through the Magnetic Quotes activity. Professional Development (PD) Leaders review the goals and agenda. Initial group norms are agreed upon.

Part 2 Vision of the NGSS (Slides 11-12) [60 minutes]

Purpose: Provide participants with some of the underlying thinking behind the new standards.

Summary: Readings about the major NGSS shifts, the innovations of the NGSS and a summary of the research on How People Learn

Part 3 Overview of the Five Tools and Processes (Slides 13) [5 minutes]

Purpose: Introduction to the Five Tools and Processes

Summary: Participants watch the Five Tools and Processes introduction video and are presented with the Five Tools and Processes graphic.

Part 4 NGSS compared to old standards (Slides 14-15) [25 minutes]

Purpose: Introduction to an NGSS standards page

Summary: Through a comparison of a new standards page to an old one, participants are introduced to the NGSS architecture.

Materials

Charts

- List of Science and Engineering Practices (use BLUE font)
- List of Crosscutting Concepts (use GREEN font)

Handouts

HO 1 NGSS Shifts

- HO 2 NGSS Innovations
- HO 3 How People Learn
- HO 4 Five Tools Graphic
- HO 5 Sample page from the NGSS
- HO 6 Sample page from previous standards

Resources (optional for this session)

- R 1 *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (2012) by National Research Council
- R 2 *Next Generation Science Standards For States, By States Volume 1: The Standards* (2013) by NGSS Lead States
- R 3 *Next Generation Science Standards For States, By States Volume 2: The Appendices* (2013) by NGSS Lead States

Materials

- Chart paper
- Markers


Slides

- Slide 1 Introduction to the Five Tools
- Slide 2 Introductions
- Slide 3 My thoughts about the NGSS
- Slide 4 Magnetic Quote 1
- Slide 5 Magnetic Quote 2
- Slide 6 Magnetic Quote 3
- Slide 7 Magnetic Quote 4
- Slide 8 Magnetic Quote 5
- Slide 9 Magnetic Quote 6
- Slide 10 Goals
- Slide 11 Norms
- Slide 12 The vision of the NGSS
- Slide 13 Innovations of the NGSS
- Slide 14 Five Tools video
- Slide 15 NGSS vs. Old Standards
- Slide 16 Reflection

Advance Preparation

- Communicate with participants prior to the session. Decide if you want participants to sit in predetermined groups (based on grade level/topic).
- Select sample page from NGSS and related page from previous state standards.
- Print all 3 Handouts (1/participant).
- Prepare charts (list of SEPs and CCCs).
- Optional: participants can read their assigned text in advance of session.
- Optional – A Five Tools cover page and a “Foreword” by Rodger Bybee are included in the handouts pdf. These can be provided to participants prior to or during the session.
- If desired, link a timer program to the hourglass icon in the upper right of each slide.
- Determine the number of magnetic quotes that you will use for the group size. See PD Leader notes on slide 3.
- Write magnetic quotes on chart paper and hang around the room.

Part 1 Introduction (30 minutes)



Slide	Facilitation Notes
<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Advancing Tools and Processes for Next Generation Science Planning for Instruction</p> <p style="text-align: center;">Introduction to the Five Tools and Processes for Translating the NGSS into Instruction and Classroom Assessment</p> </div>	<p>Display Slide 1. Introduction to the Five Tools (0 min)</p> <ol style="list-style-type: none"> a. Welcome participants to the session.
<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;">Introductions</p> <ul style="list-style-type: none"> • Your name • Your role in your school/district • What do you hope to take away from this session? </div>	<p>Display Slide 2. Introductions (optional)</p> <ol style="list-style-type: none"> a. Introduce yourself. Have other facilitators introduce themselves. Click to show rest of slide. b. Share the prompts with participants. Allow time for participants to silently consider their responses. Ask for a volunteer to begin and continue around the room until everyone has had an opportunity to share. <p><u>PD Leader Note:</u> If participants already know each other, this slide can be omitted or shortened by using a Turn-and-Talk or table group conversation with a whole group sharing of common ideas shared.</p>
<div style="border: 1px solid black; padding: 10px;"> <p>My thoughts about the NGSS... </p> <p>Around the room are Magnetic Quotes about the NGSS.</p> <p>Choose a statement that “attracts” you and move to the appropriate chart.</p> <p>Share with those in your small group why you chose this statement. Be prepared to share a summary of your conversation</p> </div>	<p>Display Slide 3. My thoughts about the NGSS (slides 3-9: 15 min)</p> <ol style="list-style-type: none"> a. Explain to participants that the quotes around the room represent a number of reactions, thoughts and concerns about the NGSS. When standing near a quote, participants who do not yet know each other can introduce themselves b. Read aloud through all the magnetic quote options. c. After participants have discussed their quote in their small groups, lead the whole group in a brief sharing out. Themes across groups can be charted. Use this as an opportunity to gather participants’ prior ideas and beliefs about the NGSS. As questions arise, they can be charted as well, though they do not need to be answered at this time, nor do misconceptions need to be corrected. <p><u>PD Leader Note:</u> For larger groups, use all six of the quotes. For smaller groups, select 3-5 quotes that you anticipate will be the most relevant. If printed large enough, slides 4-9 can be hidden.</p>

<p>TEACHERS WANT TO ENGAGE STUDENTS, BUT FIND IT DIFFICULT TO FIND TIME TO INTEGRATE THE PRACTICES—IN PART DUE TO THE CURRENT FOCUS ON TESTING AND ASSESSMENT RESULTS. IF THE ASSESSMENTS REMAIN THE SAME, TEACHERS WON'T SEE A NEED TO CHANGE.</p>	<p>Display Slide 4. Magnetic Quote 1</p> <p>a. Read magnetic quote 1.</p>
<p>TEACHERS TEND TO BE CONTENT-FOCUSED AND DON'T HAVE MUCH EXPERIENCE OR INTEREST IN ENGINEERING. THE FOCUS ON ENGINEERING PUTS THEM OUTSIDE THEIR COMFORT ZONE. THIS WILL BE A CHALLENGE FOR US.</p>	<p>Display Slide 5. Magnetic Quote 2</p> <p>a. Read magnetic quote 2.</p>
<p>TRADITIONAL APPROACHES TO SCIENCE TEACHING—TEACHER-CENTERED, LECTURE-BASED, TEACHER AS THE HOLDER OF ALL KNOWLEDGE—WILL NOT MOVE US TO THE VISION SET FORTH IN THE NGSS. WE NEED TO BE ABLE TO HELP STUDENTS MAKE MEANING THROUGH THE NGSS.</p>	<p>Display Slide 6. Magnetic Quote 3</p> <p>a. Read magnetic quote 3.</p>
<p>TEACHERS TEND TO PLAN DAY-TO-DAY, THINK LESSON-TO-LESSON, AND TEACH THE SCIENTIFIC METHOD DURING THE FIRST FEW WEEKS OF SCHOOL. THE NGSS CALL FOR A FOCUS ON A UNIT OF INSTRUCTION WITH RICH TASKS THAT BUNDLES PERFORMANCE EXPECTATIONS.</p>	<p>Display Slide 7. Magnetic Quote 4</p> <p>a. Read magnetic quote 4.</p>


<p>WE (ALL) NEED INSTRUCTIONAL MATERIALS THAT EMBODY THE NGSS. HOW WILL WE FIND TIME TO DEVELOP EFFECTIVE UNITS OF INSTRUCTION? HOW CAN WE FIND HIGH QUALITY MATERIALS?</p>	<p>Display Slide 8. Magnetic Quote 5</p> <p>a. Read magnetic quote 5.</p>
<p>TEACHERS OFTEN MISS OUT ON OPPORTUNITIES TO GO MORE IN DEPTH AND ENGAGE STUDENTS IN DOING SCIENCE AS SCIENTISTS BECAUSE THEY ARE CONCERNED ABOUT TEACHING CONTENT SO STUDENTS WILL DO WELL ON TESTS. AND THEY ONLY HAVE LIMITED TIME TO TEACH SCIENCE AT THE ELEMENTARY LEVEL.</p>	<p>Display Slide 9. Magnetic Quote 6</p> <p>a. Read magnetic quote 6.</p>
<p>Goals</p> <ul style="list-style-type: none"> • To provide an introduction to the shifts and innovations of the NGSS • To deepen participants understanding of the research and rationale for the development of the <i>Five Tools and Processes for Translating the NGSS</i> 	<p>Display Slide 10. Goals (1 min)</p> <p>a. Explain that the purpose of this session to introduce participants to the NGSS and the Five Tools and Processes. The group will have an opportunity to get to know each other through discussions in order to set the stage</p>
<p>Norms</p> <p>Given the articulated goals for our work together and the need of the group:</p> <ul style="list-style-type: none"> • What behaviors address those goals and needs? • What norms promote these behaviors? 	<p>Display Slide 11. Norms (optional) (13 min)</p> <p>a. Small groups may need to set their own norms, but this time can be used to establish whole group norms. If your group already has group norms, this slide can be edited, although those norms should be revisited in the context of this session.</p> <p><u>PD Leader Note:</u> if your group is from the same organization/district, this is an opportune time to make connections between the NGSS and other initiatives. Insert slides as appropriate to frame how the NGSS and its conceptual shifts are important and support the organization/district's larger vision.</p>

Part 2 Vision for the NGSS (60 min)


PD Leader Note: The slides below are timed for participants to read their assigned texts during the session. If participants received their assigned reading in advance, more time can be spent in discussion.

Slide	Facilitation Notes
<div> <p>The vision of the NGSS: 3 Readings</p> <ul style="list-style-type: none"> Part 1: In your reading group, summarize the key ideas of the passage Part 2: In your jigsaw group, answer the following question on chart paper: <i>How does this help you think about your teaching and learning?</i> Part 3: Gallery walk / share-out  </div>	<p>Display Slide 12. The vision of the NGSS: 3 readings (55 min)</p> <ol style="list-style-type: none"> The readings will be completed as a jigsaw. Divide participants into three expert groups. Participants should read their assigned text and discuss the key ideas. Distribute HO1, HO2, and HO3. Let participants know that they are receiving all handouts, even though they are expected to focus on one reading at this time. In small groups made up of at least one member from each expert group, participants should chart the answer to the posted question. They can share about their reading but should spend more of their time looking for themes across the three readings, and how they can help them think about their own practice and classrooms. After a brief gallery walk, use the remaining time to share common themes that have emerged.
<div> <p>Innovations of NGSS</p>  <p>https://www.youtube.com/watch?v=JZZFJS3yUwo</p> </div>	<p>Display Slide 13. Innovations of the NGSS (5 min)</p> <ol style="list-style-type: none"> Share the video in which Roger Bybee and Peter McLaren discuss the innovations of the NGSS standards.

Part 3 Introduction to the Five Tools and Processes (5 minutes)

Slide	Facilitation Notes
<div> <p>How do we build the necessary teacher knowledge to translate the NGSS?</p>  <p>https://www.youtube.com/watch?v=EU1RfziAG1o</p> </div>	<p>Display Slide 14. How do we build... (5 min)</p> <ol style="list-style-type: none"> Share the video to introduce participants to the Five Tools. Distribute HO4 (Five Tools Graphic).

Part 4 NGSS Compared to Old Standards (25 minutes)

Slide	Facilitation Notes
<div> <p>NGSS vs. Our Old State Standards</p> <p>Compare a page from:</p> <ul style="list-style-type: none"> the state standards the NGSS <p>What do you notice?</p> </div>	<p>Display Slide 15. NGSS vs. Our Old State Standards (20 min)</p> <p><u>PD Leader Note:</u> Edit this slide as needed:</p> <ul style="list-style-type: none"> If your location is a recent adopter of the NGSS, select an appropriate page from the NGSS (HO5) to compare to a similar grade level and content page (HO6) from the previous state standards of the location where your PD is taking place. Alternatively, if your location adopted the NGSS several years ago, use this time to consider: 1) How has instruction has changed (or not) since adoption of the NGSS. 2) What shifts still need to occur in instruction for effective phenomena-focused three-dimensional teaching and learning to occur? <ol style="list-style-type: none"> Use this opportunity to allow participants to discover similarities and differences between previous standards and the new NGSS. Distribute HO5 and HO6. Allow participants time to talk in small groups. During the whole group share out, be sure to highlight the foundation boxes on the NGSS page, along with the Performance Expectations on the top of the page. Share the SEP (blue) and CCC (green) charts.
<div> <p>Reflection</p>  <p>What challenges do you anticipate in translating these new standards into instruction and classroom assessment?</p> </div>	<p>Display Slide 16. Reflection (5 min)</p> <ol style="list-style-type: none"> Gather final thoughts from participants. Collect remaining questions and concerns.