Next Gen ASET
Next Generation Alliance for Science Educators Toolkit

Exploring NGSS Science and Engineering Practices Using Next Gen ASET

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Next Gen ASET: An Overview

Need for NGSS PD processes, supporting tools, and expertise to support beginning and emerging NGSS practitioners that:

- Are evidenced-based *(rigorously tested/externally validated for effectiveness)*
- Include practitioners/educators *(end-users)* as co-researchers
- Are anchored in *fostering on-going dialogue among practitioners*
- Provide a structure for in-depth dialogue in *collaborative PD settings and ongoing communities of practice*

1. **NSF $$$**: Three-year $2 million grant from the National Science Foundation

2. **Collaborators**: Carnegie Foundation, Engineering is Elementary

3. **Project Aims**:

   - Develop *and field test* processes and tools that help beginning and emerging NGSS practitioners “unpack” NGSS and understand the shifts in curriculum, instruction, student learning
   
   - Develop/support a cadre of experts *(train-the-trainer model)* and network partners who use the tools/processes to support beginning and emerging NGSS practitioners and who contribute to continuous improvement of tools.
Next Gen ASET: Who We Are/Partners

➢ Our Experience

✓ Builds on evidence from 5-year NSF science PD project--10 districts

✓ Large nationwide, interdisciplinary team of faculty, teachers, researchers

✓ 1 of 6 nationwide projects selected to work with Stanford’s Carnegie Foundation on “continuous improvement” processes
Next Gen ASET: Who We Are/Partners

Leadership Team
- Rachelle DiStefano, PI, Director, CSER
- Corinne Lardy, Project Asst. Director
- Christine Lee, Co-I CSER Lead Researcher
- Michele Korb, Co-I, Sci. Ed. Faculty, CSUEB
- Danika LeDuc, Assoc. Dir., STEM Institute
- Karen Yang, ASET Grant Coordinator

Development Team*
- Howard Lei, Engineering Faculty, CSUEB
- Julie McNamara, Math Ed. Faculty, CSUEB
- Anna Newman, Science Coord., ACOE
- Deborah Tucker, former Sci.Ed. Consultant, CDE

*In addition to Leadership Team members

External Evaluators
- Joe Krajcik, Michigan State U.
- Helen Quinn, Stanford U.
- Nathan McNeill, U. of Colorado
- Heidi Diefes-Dux, Purdue U.
- Emily Van Zee, Oregon State U.

Technical Advisors
- Christine Cunningham, Founder/Director Engineering is Elementary, Boston MOS
- Phil Lafontaine, former Director of Professional Learning Support Div., CDE
- Paul LeMahieu, Sr. VP., Carnegie Foundation for Advancement of Teaching, Stanford U.
- Gary Nakagiri, former Science Coord., SMCOE
- Traci Wierman, Director, Curric. Implem. Netwk. Lawrence Hall of Science, UC Berkeley
Importance of Dialogue in Constructing One’s Understanding: *Reflection, Clarification, and Negotiation*

*Next Gen ASET ➔* NGSS understanding arises from well-guided, on-going dialogue

NGSS PD for teachers (as with instructional environments for students) must be anchored in what we know about knowledge building:

- Most meaningful knowledge building and “seeing connections” envisioned in the new Framework and NGSS will be realized and maintained by teachers by:
  - Active, collaborative engagement in knowledge building dialogic processes such as reflection, clarification, and negotiation.
  - Continuous discourses that co-construct and negotiate meaning results in sensemaking (*Scardamalia & Bereiter, 2003; Ravencroft, 2011*).
### Activating Prior Knowledge: “Identify the Practices You See”

Fill out the chart as you watch the video

<table>
<thead>
<tr>
<th>Practice</th>
<th>Present?</th>
<th>Quality Rating (0 = absent, 4 = excellent)</th>
<th>Describe where you saw this practice</th>
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<tbody>
<tr>
<td>1) Asking Questions and Defining Problems</td>
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<td>2) Developing and Using Models</td>
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<td>3) Planning and Carrying Out Investigations</td>
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<td>4) Analyzing and Interpreting Data</td>
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<td>5) Using Mathematics and Computational Thinking</td>
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<td>6) Constructing Explanations and Designing Solutions</td>
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<td>7) Engaging in Argument from Evidence</td>
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<td>8) Obtaining, Evaluating, and Communicating Information</td>
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Think-Pair-Share

• Which Science and Engineering Practices (SEPs) are most evident in the video?

• Where did you see these SEPs? What was the teacher doing and what were the students doing?
Next Gen ASET SEP Rubrics: An Overview

Features:
• Each Science and Engineering Practice (SEP) is broken into key components
• Detailed criteria for each SEP
  • Grade band-specific *(Currently focused on 6-8 Grade Band)*
• Components and criteria based on:
  • NGSS Appendix F
  • *Framework for K-12 Science Education*
  • NGSS Evidence Statements
  • Research literature

Process:
• Read through a science lesson that is meant to target one (or two) particular SEPs
• Rate the lesson from 0-4 for each component of the SEP
• Record specific evidence and reasoning from the lesson for each rating
• **Discuss** ratings and evidence with others
• Make suggestions for revising the lesson
Next Gen ASET SEP Rubrics: **Let’s try it!**

**Video Reflection**
- Read through the Next Gen ASET Rubric for one SEP.
- Watch the video again and then use the rubric to rate the lesson for how well it incorporates each component of this SEP.

**Think-Pair-Share**
- Compare your ratings and evidence with the person next to you.
- How might you improve the lesson to better incorporate this SEP?
- What might the teacher do in her lessons **after** this to build students’ abilities to engage in this SEP?
Next Gen ASET SEP Rubrics: Some Caveats

What this tool is...

• A way to critically examine science lessons to determine:
  • Which key aspects of a SEP are present in a lesson and to what extent
  • What revisions can be made to the lesson to better build students’ abilities to engage in a SEP
• Help science educators reflect on:
  • The complex nature of the SEPs, as described in NGSS
  • How can I build my students’ abilities to engage in all key aspects of this SEP over time?
• A tool to focus dialogue around the SEPs

What this tool is not intended for...

• A teacher evaluation tool
• Every lesson to be rated a 4 in all categories
• Reviewing all eight SEPs in a single lesson
SEPs in the Context of NGSS 3D Learning

Science & Engineering Practices (SEP)  Disciplinary Core Ideas (DCI)

Goals for Students: 3D Learning
Bringing the 3 dimensions together Thru Performance Expectations (PE) and lesson-level learning objectives

Crosscutting Concepts (CCC)
ASET 3D Map

Grounding Phenomenon ➔ Performance Expectation(s) ➔ Assessment(s)

Three-Dimensional Learning Goal

Science and Engineering Practice(s)

Disciplinary Core Idea(s)

Crosscutting Concept(s)

How does this lesson/unit make explicit connections between the target SEP(s) and DCI(s)?

How does this lesson/unit make explicit connections between the target SEP(s) and CCC(s)?

How does this lesson/unit make explicit connections between the target CCC(s) and DCI(s)?
For more information, please contact:
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THANK YOU!