Teaching K-12 Science and Engineering During a Crisis: Maintaining High-Quality Science and Engineering Learning During the Pandemic
Questions for you

Q1: How is your school/district operating right now?

• Fully in person
• Some students in person, some virtual
• Same students are sometimes in person, sometimes virtual
• All virtual
Questions for you

Q2: BEFORE the pandemic, how would you describe your level of comfort with integrating or teaching with technology?

- Technophobe
- Total novice
- Comfortable, but used limited # of tools
- Comfortable, used many tools
- Very comfortable, adapted new tools easily
- Bleeding edge, early adopter
Outline

- Overview of the book
- Foundational principles
- Jamboard reflections
- Highlight on student agency
- Q & A -- please type your questions into the chat box.
Carnegie Corporation of New York approached BOSE to ask if we could provide guidance to complement and enhance the CCSSO guidance. To respond quickly we:

- Used the approach that produced *Ready, Set, Science!* and *Seeing Students Learn Science*

- Leveraged multiple consensus study reports from BOSE

- Hired an outside author to work with a group of consultants and BOSE staff

- Peer reviewed through the National Academies process
The Team

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Source Material

Reports from BOSE:

• *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*

• *Developing Assessments for the Next Generation Science Standards*

• *Guide to Implementing the Next Generation Science Standards*

• *Seeing Students Learn Science*

• *Science and Engineering for Grades 6-12: Investigation and Design at the Center*

• *English Learners in STEM Subjects*

• *Reopening Schools During the COVID-19 Pandemic*

Interviews and examples from educators across the country
Contents

1. Introduction
2. Foundational Principles
3. Prioritizing Relationships and Equity
4. Adjusting Instruction in Changing Environments
5. Managing and Modifying the Scope of Content and Curriculum
6. Monitoring Learning for Continuous Improvement
7. Supporting Collaborations and Leveraging Partnerships
1. Maintain a focus on the Framework’s vision for high quality science and engineering education

2. Prioritize relationships, equity, and the most vulnerable students.

3. Recognize families and communities as critical assets for science and engineering learning

4. Approach adjusting to changing learning environments and recovering from disrupted learning as an ongoing process that takes time.
Foundational Principles

1. Maintain a focus on the *Framework’s* vision for high quality science and engineering education:
   - 1a. Learning science and engineering is essential for all students at all grade levels,
   - 1b. Instruction focuses on student engagement with real-world phenomena and problems, and
   - 1c. The three dimensions (practices, crosscutting concepts, and disciplinary core ideas) need to be integrated during learning and instruction.

   e.g., various ways to save instructional time in Chapter 5
Foundational Principles

2. Prioritize relationships, equity, and the most vulnerable students.

“Equitable outcomes require attention to how people think about student access, inclusion, engagement, motivation, interest, and identity, and about the actions and investments required to achieve such outcomes.”

*Science and Engineering for Grades 6-12: Investigation and Design at the Center, p. 13*

e.g., finding driving phenomena that work for all students including the most vulnerable (Chapters 3 and 5)
3. Recognize families and communities as critical assets for science and engineering learning

- Leveraging funds of knowledge (Chapter 3)
- Increasing relevance to students (Chapters 3 and 5)
- Partnering to support students (Chapter 7)
- Monitoring how implementation is going (Chapter 6)
4. Approach adjusting to changing learning environments and recovering from disrupted learning as an ongoing process that takes time.

- Planning over several years (Chapter 5)
- Ongoing monitoring of student needs rather than "unfinished learning" (Chapter 6)
- Give yourself a break! (Chapter 3)
Reflecting on the 4 principles:

• Where do you think you have had the biggest successes in teaching science this year? What do you feel good about in your science teaching this year?

• Where do you wish you had more support for teaching science this year?
Jamboard Sharing Logistics

• Go to the link (see link in chat)
  https://jamboard.google.com/d/10tDkx_syU28iU8VheXjw0kfoz
  pDrIpCjmhiSSigpUN0/edit?usp=sharing

• There are 2 pages, one for successes and one for needing more support.

• Write your reflections on a sticky note and place it on the page

• Take a couple of minutes and read other participants’ responses. Add stickies in response where you feel inspired to
Building Student Agency

Students are more independent in remote or in non-traditional environments:

• Setting goals
• Monitoring their progress
• Fulfilling tasks

This sets them up for success in the future!
Building Student Agency

• Phenomenon-driven instructional flow
• Student Choices
• Support for understanding directions, and online tools
• Student-centered assessment
Phenomenon-driven instructional flow:

- Coherent from the students’ perspective
- Driven by student questions
Student Agency Strategies

Student Choice, e.g.,

• task scheduling
• research topics
• investigation ordering (when all choices work coherently)
• assessment modality
Student Agency Strategies

Support for understanding directions, and online tools, e.g.,

• Recorded directions for repeated viewing
• Student-led development of procedures and directions
• Student-led troubleshooting
Student Agency Strategies

Student-centered assessment, e.g.,
• Student participation in grading rubric creation
• Self-reflection on feedback
Questions? Comments?

Please type them into the chat
Thank you for joining us!

To access the book:

https://www.nap.edu/resource/25909/interactive/

To access all National Academies’ reports:

www.nap.edu