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FUTURELAB+

A GENENTECH SCIENCE EDUCATION PROGRAM

NGSS Innovations and Design Principles Feedback: Summative Review 2, Unit 2, Lesson 1

Contents

Executive Summary

Sponsored by Genentech, Futurelab+ brought together a coalition of partners to develop an innovative, modular, 2-year biotechnology curriculum, along with instructional materials, to expose students and educators to the breadth of education and career pathways across biotechnology. To increase adoption and access to such curricula in California and beyond, the modular curriculum was designed to align with the California Career Technical Education (CTE) Model Curriculum Standards for Biotechnology, meet at least 1 year of the University of California (UC) science (D) subject requirement, and incorporate some of the three-dimensional learning innovations of the Next Generation Science Standards (NGSS). The 2-year biotechnology curriculum has four core units per year; each core unit has nine lessons and a lab that each take approximately 1 week to complete (9–10 weeks for the full unit). In total, the biotechnology curriculum has 72 lessons and eight labs that span 2 full instructional years. Because the Futurelab+ biotechnology curriculum is modular, teachers can select specific units and materials to design biotechnology courses that are relevant and appropriate for their students and teaching environments.

As an organizational partner, the American Institutes for Research (AIR) provided external feedback about alignment of the curriculum to the three sets of standards to Futurelab+ curriculum developers during the formative period of the biotechnology curriculum. AIR is now providing external feedback and evidence regarding each unit of the final curriculum's alignment to each set of standards in three series of reports: CTE, UC science (D) subject requirement, and NGSS. The eight reports in the NGSS series provide feedback about aspects of NGSS in a sample of the curriculum (one lesson from each unit). AIR randomly selected Lesson 1 (Current Infectious Diseases) from Unit 2 (Taking Action in Your Community: Health Equity) for this report. **This review was completed on materials received October 18, 2021 and has not been updated to reflect any revisions made to materials since then.**

Of note, because the primary design element of the curriculum was alignment to CTE, AIR used the NGSS Lesson Screener (not the Educators Evaluating the Quality of Instructional Products [EQuIP] Rubric) to identify aspects of the curriculum that incorporate NGSS. The EQuIP Rubric is typically used to determine whether a unit was designed for the NGSS. **Because the curriculum was designed to align primarily to CTE standards, it was not expected that the curriculum would meet all NGSS criteria**. Nevertheless, in their current form, the materials from Unit 2, Lesson 1, **meet three NGSS criteria** and **approach the remaining three NGSS criteria**. AIR created the *approaching* rating to indicate where a modification to materials would increase the rating to *adequate*. NGSS criteria, ratings, and recommendations are summarized in Exhibit 1.

Exhibit 1. NGSS Criteria, Ratings, and Recommendations

	Criterion	Rating
NGSS Shifts	**A. Explaining Phenomena or Designing Solutions**	Adequate
	B. Three Dimensions	▪ DCI: Adequate ▪ SEP: Adequate ▪ CCC: Approaching Overall rating: Approaching
	C. Integrating the Three Dimensions for Instruction and Assessment	Approaching
Features of Quality Design	**D. Relevance and Authenticity**	Extensive
	E. Student Ideas	Extensive
	F. Building on Students' Prior Knowledge	Approaching

Note. DCI = disciplinary core ideas; SEP = science and engineering practices; CCC = cross-cutting concepts.

- **Criterion A: Explaining Phenomena or Designing Solutions** ***(Adequate)***. All activities in the lesson help students increase their understanding of how infectious diseases spread through communities and could potentially lead to a pandemic.
- **Criterion B: Three Dimensions** ***(Approaching)***. There is sufficient evidence that the current materials give students opportunities to build their understanding of science and engineering practices (SEPs) and disciplinary core ideas (DCIs). To fully meet this criterion, materials should allow students to develop their understanding of cross-cutting concepts (CCCs), such as patterns.
- **Criterion C: Integrating the Three Dimensions for Instruction and Assessment** ***(Approaching)***. There is sufficient evidence that materials give students opportunities to build their understanding of both SEPs and DCIs. To fully meet this criterion, materials should provide students an opportunity to demonstrate their understanding of CCCs, such as through prompting students to consider or identify how patterns are similar or different between groups.
- **Criterion D: Relevance and Authenticity** ***(Extensive)***. The reviewers found extensive evidence that the materials engage students and teachers in authentic and meaningful scenarios that reflect the real world. The materials provide opportunities for students to engage with materials in a meaningful way and provide students with a diverse representation of gender, ethnicities, and age groups, including a discussion of diseases that impact a variety of populations. Throughout the lesson, the materials present teachers with culturally responsive instructional strategies that are included with a link to information on how to incorporate them.
- **Criterion E: Student Ideas** ***(Extensive)***. The reviewers found extensive evidence that the materials provide students with opportunities to share their own ideas and provide feedback about their peers' ideas, both essential science skills. Several opportunities exist for students to reflect on their own thinking, including a self-survey, identifying ideas from their own research that students felt were most important, and the use of an Interesting But Irrelevant protocol to provide feedback to their peers.
- **Criterion F: Building on Students' Prior Knowledge** ***(Approaching)***. There is inadequate evidence that the materials identify and build on students' prior learning in all three dimensions. The materials make little to no connection between the prior knowledge in the SEPs and CCCs students are expected to have and learning in the unit. However, the materials clarify students' expected level of proficiency with the DCIs and CTE content learning in the unit. Alignment of materials to this criterion could be increased if the materials would provide explicit connections to students' prior learning concerning SEPs and CCCs.

AIR's review also included feedback regarding alignment of the lesson to three of the eight Futurelab+ guiding principles: equity, adaptability, and industry driven. Unit 2, Lesson 1, met all three of these guiding principles:

- ***Equity***. Materials include diverse representation throughout activities and visual media and incorporate several protocols for culturally responsive learning and increased student engagement. Materials also include a teacher note that identifies potentially sensitive topics, such as topics that may have personally impacted students, for example, the COVID-19 pandemic.
- ***Adaptability***. Materials appear to be adaptable and allow teachers to move between virtual, in-person, or hybrid settings, using different synchronous and asynchronous teaching methods.
- ***Industry driven***. Students engage in the discovery phase of the product life cycle as they conduct research to understand how an infectious disease spreads throughout a community.

Methodology

Released in 2013, the Next Generation Science Standards (NGSS) were developed by a consortium of states, teacher associations, and nonprofit organizations. The purposes of NGSS are to (1) combat ignorance of science, (2) create common teaching standards, and (3) develop greater interest in science among students so that more students choose to major in science in technology. The focus on the purposes requires changes in how science is taught and the materials used to teach science. These changes, or innovations, shift the focus of science instruction from an abstract recall of facts to students demonstrating proficiency by engaging in scientific practices.

Three dimensions are integrated into the NGSS and throughout NGSS-aligned materials: science and engineering practices (SEPs), cross-cutting concepts (CCCs), and disciplinary core ideas (DCIs).

Methods

The 2-year biotechnology curriculum consists of four core units each year. Each core unit has nine lessons and a lab. As is typical with NGSS-aligned lessons, a lesson consists of more than one class period of instruction to allow students the opportunity to develop their knowledge and understanding more fully. Lessons and labs take approximately five 45-minute instructional periods to complete. In its entirety, the biotechnology curriculum has 72 lessons and eight labs and covers 2 instructional years.

The American Institutes for Research (AIR) was asked to provide feedback and evidence of incorporation of some of the three-dimensional learning innovations common to the NGSS on a sample of the biotechnology curriculum. **Because the curriculum was designed to align primarily to CTE standards, it was not expected that the curriculum would meet all NGSS criteria**.

Additionally, there are significant similarities between the innovations measured by the NGSS Lesson Screener and the University of California (UC) science (D) subject requirement, as shown in Exhibit 2. For this reason, AIR selected to use the NGSS Lesson Screener for supporting evidence of three-dimensional learning.

Exhibit 2. Similarities Between UC Science Requirements and Measured Innovations

There are significant similarities between the UC science (D) subject requirement and the NGSS Lesson Screener criteria. Specific course content guidelines of the A–G Policy Resource Guide are briefly summarized here, with notations about which Lesson Screener criteria include the same or similar requirements.

- Explicitly integrate the eight NGSS SEPs (Lesson Screener Criteria B and C); this requirement is mentioned multiple times.
- Draw content generally from the NGSS (Lesson Screener Criteria B and C) and Common Core State Standards for Literacy in History/Social Studies, Science, and Technical Subjects.
- Provide opportunities for students to participate in all phases of the scientific process and require students to discuss ideas with other students (Lesson Screener Criteria B, C, D, and E).
- Be explicit about formative and summative assessment practices (Lesson Screener Criteria B, C, and E).
- Include real-world problems that engage all students in science learning (Lesson Screener Criteria A, D, and E).
- Specify minimum mathematics course requirements.
- Reserve at least 20% of class time for teacher-supervised, hands-on laboratory activities.
- Incorporate technology (to the extent possible) to increase access and computer-based skills for students.

NGSS Lesson Screener

The NGSS Lesson Screener, developed by Achieve in collaboration with the National Science Teaching Association, is a framework for collecting evidence on (1) whether a lesson being developed or revised is on the right track for incorporating NGSS innovations, (2) if a lesson warrants further review using the EQuIP Rubric, and (3) to what extent a group of reviewers have a common understanding of the NGSS or of designing lessons for the NGSS. Because these materials were designed primarily to align to CTE standards, with aspects of NGSS and three-dimensional learning incorporated, using the Lesson Screener was more appropriate than using the EQuIP Rubric.

The NGSS Lesson Screener includes six criteria (labeled A–F). The first three Lesson Screener criteria (A–C) consider evidence of three NGSS shifts: (A) Explaining Phenomena or Designing Solutions, (B) Three Dimensions (of learning), and (C) Integrating the Three Dimensions for Instruction and Assessment. The last three NGSS criteria (D–F) consider features of quality design: (D) Relevance and Authenticity, (E) Student Ideas, and (F) Building on Students' Prior Knowledge.

Each screener criterion lists several indicators that help determine the extent to which a lesson incorporates an innovation. In other words, these indicators, or descriptions, denote whether the lesson materials meet a criterion. **A rating of *adequate* or higher means that the lesson meets the criterion**.

Possible criterion ratings on the NGSS Lesson Screener include the following:

- None (no evidence to meet the criterion)
- Inadequate (limited evidence to meet the criterion or direct evidence that the materials are not aligned)
- Adequate (enough evidence to meet the criterion)
- Extensive (more than enough evidence to meet the criterion)

For this curriculum review, AIR added an *approaching* rating to the NGSS criterion ratings. This new rating, created by AIR, indicates where a slight modification to materials would increase the rating to *adequate*.

Sampling

To complete the series of NGSS Lesson Screener reviews, AIR sampled one lesson in each of the eight core units for a total of eight NGSS alignment and evidence reviews. **AIR randomly selected four of the lessons; the other four lessons were re-reviews of materials AIR reviewed during the formative review process**. AIR randomly selected Lesson 1 (Current Infectious Diseases) from Unit 2 (Taking Action in Your Community: Health Equity) for this report.

Two AIR staff independently and then collaboratively reviewed Unit 2, Lesson 1, to provide impartial evidence of where in the lesson and to what extent NGSS innovations are incorporated. After each AIR reviewer independently completed the review and provided a rationale for the ratings on each indicator, the team met to arrive at a final rating for each criterion (see Exhibit 3).

Exhibit 3. Lesson Review Process

Following the Lesson Screener standard review protocol, the AIR review team

- individually reviewed the lesson to record criterion-based evidence,
- individually made suggestions for improvement,
- collaboratively discussed findings to make a final rating determination, and
- summarized findings into a report.

Feedback and Evidence: Unit 2, Lesson 1

AIR found evidence that Unit 2, Lesson 1, materials meet three of the six NGSS criteria identified by the Lesson Screener and are approaching the remaining three criteria. All six criteria and evidence supporting AIR's ratings are discussed in detail in this section (see summary in Exhibit 1).

NGSS Ratings and Evidence

Rating for Criterion A: Explaining Phenomena or Designing Solutions: ***Adequate***

The reviewers found adequate evidence within the lesson that learning is driven by students making sense of phenomena. The goal of each of the activities reviewed in Lesson 1 was to increase student understanding of how infectious diseases spread through communities, in preparing students for designing a social awareness campaign. AIR did not review the design journal referenced in the materials, other than to confirm the project summary and design of the social awareness campaign.

The following bulleted evidence supports the *adequate* rating for this criterion because the lesson materials include examples of opportunities and support for students making sense of the phenomena:

- **Day 1 Activities:** The lesson begins by having students identify what they already know about how infectious diseases spread, using a self-survey and debriefing a video about the prevalence of infectious diseases in society (Teacher Section, p. 5).
- **Day 2 Activities:** Students brainstorm what they think an infectious disease specialist does and generate questions they have about that role. Then they work in small groups to research and create a presentation about an infectious disease of their choosing, including a description of the disease, the pathogen that causes it (if applicable), risk factors and causes, genetic or hereditary information if applicable, treatments, sociocultural details, physical environment, complications, symptoms, morbidity, mortality, possible preventative measures, and the actions and responsibilities of an infectious disease specialist when treating individual patients as well as outbreaks (Teacher Section, p. 7).
- **Day 3 Activities:** Students calculate and graph the growth of bacteria under various environmental conditions both favorable to the bacteria and unfavorable to the bacteria (Teacher Section, pp. 8–10).
- **Day 4 Activities:** Students simulate the spread of an infectious disease, using baking soda and a pH indicator to trade strips of paper—some strips "infected" with the infectious disease–causing agent—to gain an understanding of how such a disease could be spread throughout a community fairly quickly in favorable conditions (Teacher Section, pp. 11–13).
- **Day 5 Activities**: Students research how infectious diseases may disproportionately impact BIPOC and low-income communities and identify strategies to ensure equity in health care during a pandemic. Students then record these strategies in their Social Awareness Campaign Design Journal, which is used as the final project for the unit (Teacher Section, pp. 14–15).

Rating for Criterion B: Three Dimensions: *Approaching*

The reviewers found that, although materials do not fully meet this criterion by providing opportunities to build understanding of grade-appropriate elements in **all three dimensions**, materials *approach* this criteria. Specifically, there is sufficient evidence that materials give students opportunities to build their understanding in both SEPs and DCIs. Alignment of materials to this criterion could be increased if materials would provide students explicit opportunities to develop their understanding of CCCs, such as patterns. Although reviewers found examples of where CCCs could be incorporated or referenced, teachers who are new to NGSS would need additional guidance about where and how to incorporate this dimension.

The following bulleted evidence supports the *approaching* rating for this criterion because the lesson materials include examples of opportunities and support for students explicitly developing their understanding of elements of both DCIs and SEPs:

SEPs, including:

- **Obtaining, Evaluating, and Communicating Information**: Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source (Teacher Section, p. 16).

DCIs, including:

- **ETS1.A: Defining and Delimiting Engineering Problems**: Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and the requirements should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them (Teacher Section, p. 16).
- **ETS1.C: Optimizing the Design Solution**: Criteria may need to be broken down into simpler criteria that can be approached systematically. Decisions about the priority of certain criteria over other criteria (trade-offs) may be needed (Teacher Section, p. 16).

Rating for Criterion C: Integrating the Three Dimensions for Instruction and Assessment: *Approaching*

The reviewers found that, although materials do not fully meet this criterion by providing opportunities to build understanding of grade-appropriate elements in **all three dimensions**, materials *approach* this criterion. Specifically, there is sufficient evidence that materials give students opportunities to build their understanding of both SEPs and DCIs. Aligning materials to this criterion could be increased if the materials would provide students with explicit opportunities to demonstrate their understanding of various CCCs, such as patterns. As with Criterion B, reviewers found examples of where CCCs could be incorporated or referenced throughout the lesson; however, teachers who are new to NGSS would need additional guidance about where and how to incorporate this dimension.

The following bulleted evidence supports the *approaching* rating for this criterion because the lesson materials include examples of opportunities and support for students to explicitly demonstrate their understanding of elements of both DCIs and SEPs:

SEPs, including:

- **Obtaining, Evaluating, and Communicating Information**: Gather, read, and evaluate scientific and/or technical information from multiple authoritative sources, assessing the evidence and usefulness of each source (Teacher Section, p. 16).

DCIs, including:

- **ETS1.A: Defining and Delimiting Engineering Problems**: Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account,

and the requirements should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them (Teacher Section, p. 16).

- **ETS1.C: Optimizing the Design Solution**: Criteria may need to be broken down into simpler criteria that can be approached systematically. Decisions about the priority of certain criteria over other criteria (trade-offs) may be needed (Teacher Section, p. 16).

Rating for Criterion D: Relevance and Authenticity: ***Extensive***

The reviewers found extensive evidence that the materials engage students in authentic and meaningful scenarios that reflect the real world because materials provide opportunities for students to engage with materials in a meaningful way. Additionally, materials include a diverse representation of gender, ethnicities, and age groups and include a discussion of diseases that impact a variety of populations. Throughout the lesson, culturally responsive teaching strategies are included with a link to information about how to incorporate them.

The following bulleted evidence supports the *extensive* rating for this criterion:

- **Day 1, Day 3, and Day 5 Whole-Group Activities**: Multiple strategies from *Protocols for Culturally Responsive Learning and Increased Student Engagement*, adapted from Amy Coventry and the Center for Culturally Responsive Teaching and Learning, are used to elicit student ideas and understanding of topics in a meaningful way (Teacher Section, pp. 5, 8, and 14).
- **Day 2 Small-Group Activity***: Students can choose to create an audiovisual aid to enhance their oral presentations on infectious disease as a way to encourage different forms of expression that are culturally and linguistically relevant for students (Teacher Section, p. 7). *Materials indicate this part of the activity is a student choice, so some students may not choose to engage in this part of the activity.*
- **Day 4 Industry and Career Connection**: Students are tasked with using soft skills of written and oral communication, problem solving, and paying attention to details, which are important parts of the everyday work of an infectious disease specialist (Teacher Section, p. 11).
- **Day 5 Whole Group Activity**: Students are explicitly tasked with considering language, culture, religious affiliation, and barriers as they plan and build a social awareness campaign about the spread of an infectious disease within a community (Teacher Section, p. 15).

Rating for Criterion E: Student Ideas: ***Extensive***

The reviewers found extensive evidence that the materials provide students with opportunities to share their own ideas as well as provide feedback about their peers' ideas. Several opportunities exist for students to reflect on their own thinking, including a self-survey, identifying ideas from their own research that students felt were most important, and use of an Interesting But Irrelevant protocol to provide feedback to their peers.

The following bulleted evidence supports the *extensive* rating for this criterion:

- **Day 1 Whole-Group Activity**: Students engage in an *Infectious Disease Self-Survey* as an exercise in self-regulation and self-knowledge about their own thoughts and practices that could impact the likelihood of them acquiring an infectious agent (Teacher Section, p. 5).
- **Day 1 Small-Group Activity**: Students summarize what they learned by responding to the following prompts: "The most important thing I learned today is _____. Three other important ideas from my research are _____, _____, and _____." (Teacher Section, p. 6).
- **Day 2 Small-Group Activity***: Students can choose to create an audiovisual aid to enhance their oral presentations on infectious disease as a way to encourage different forms of expression that

are culturally and linguistically relevant for students (Teacher Section, p. 7). *Materials indicate this part of the activity is a student choice, so some students may not choose to engage in this part of the activity.*

- **Day 3 Whole-Group Activity**: Students are given the opportunity to *shout out* their estimations of the reproduction rate of *E. Coli*. This strategy allows students the opportunity to share their thinking at the same time as their peers without the pressure of being "right" or "wrong" (Teacher Section, p. 8).

Rating for Criterion F: Building on Students' Prior Knowledge: ***Approaching***

The reviewers found inadequate evidence that the materials identify and build on students' prior learning in all three dimensions because the materials make little to no connection between expected prior learning in the SEPs and CCCs and learning in the unit. However, the materials clarify the expected level of proficiency students should have with the DCIs and CTE content learning in the unit. Alignment of materials to this criterion could be increased if the materials would provide explicit connections to students' prior learning with respect to SEPs and CCCs.

The following bulleted evidence supports the *approaching* rating for this criterion:

- **Day 2 Individual Activity**: Students are given 5 minutes to write a paragraph about what they think an infectious disease specialist does and generate questions they have about infectious disease specialists (Teacher Section, p. 7).
- **Day 5 Whole-Group Activity**: Students are provided time to reflect in their design journal to make connections between their initial thinking, what they learned, and their plans for their social media campaign project (Teacher Section, p. 15).

Futurelab+ Design Principles

Although several Futurelab+ design principles (Exhibit 4) overlap with the Lesson Screener criteria, especially concerning Principle 1 (Equity) and Principle 6 (Education Standards Aligned), AIR was asked to look for evidence of the design principles independent of NGSS. AIR cannot provide feedback about all principles because several principles relate more to how materials were designed; however, within this section, AIR provides feedback regarding the principles of Equity, Adaptability, and Industry Driven.

Feedback about the principle of Education Standards Aligned can be surmised from the CTE alignment matrix and summary evidence reports provided for each unit.

Feedback about the principle of California Focus can be surmised from the California Subject Matter D report prepared for each unit. No formal evaluation tool was created or used to provide this feedback.

Exhibit 4. Futurelab+ Principles

1. Equity | **Prioritize** meeting the needs of the most **underserved students** using socially responsible language.
2. Adaptability | Empower and equip teachers and students to **seamlessly move between virtual and in-person learning** environments.
3. Industry Driven | Reflect **in-demand biotech skills** and **career-laddering opportunities.**
4. Teacher Voice | Informed by **teacher input** and must be **teacher-demand driven.**
5. Teaching Breadth and Inclusivity | Build to engage a **broad set of teachers.**
6. Education Standards Aligned | Demonstrate **relevance** and **validity** with educators.

7. **Open Source** | Opt for **open frameworks** over proprietary approaches.
8. **California Focus** | Prioritize **California state standards and educational contexts** as a foundation for future scaling efforts nationwide.

Equity

Unit 2, Lesson 1, includes diverse representations of gender, ethnicities, and age groups throughout activities and visual media. This lesson incorporates several Protocols for Culturally Responsive Learning and Increased Student Engagement adapted from the work of Amy Coventry at the Center for Culturally Responsive Teaching and Learning. Materials also apply socially responsible language to include a teacher note that identifies potentially sensitive topics, such as topics that may have personally impacted students, for example, the COVID-19 pandemic .

Adaptability

Unit 2, Lesson 1, materials appear adaptable and allow teachers to move between virtual, in-person, or hybrid settings using different synchronous and asynchronous teaching methods. Futurelab+ may consider giving suggestions to teachers during professional learning activities or in notations on the website for where and how lessons could be moved between platforms.

Industry Driven

In Unit 2, Lesson 1, students engage in the discovery phase of the product life cycle as they conduct research to understand how an infectious disease spreads throughout a community. Students also engage in a 5-minute free-writing activity to consider what an infectious disease specialist does and generate questions they have about that career.

Resources

Achieve & National Science Teachers Association. (2016). *NGSS lesson screener*. https://www.nextgenscience.org/screener

California Department of Education. (2007). *Career technical education framework for California public schools: Grades seven through twelve*. https://www.cde.ca.gov/ci/ct/sf/documents/cteframework.pdf

California Department of Education. (2017). *California career technical education model curriculum standards*. https://www.cde.ca.gov/ci/ct/sf/documents/healthmedical.pdf

Sacramento City Unified School District. (n.d.). *Protocols for culturally responsive learning and increased student engagement*. Retrieved October 11, 2021, from https://www.scusd.edu/sites/main/files/file-attachments/protocols_0.pdf?1445031253.

Appendix A. Lesson Screener Criteria

	Criterion	Description
NGSS Shifts	**A. Explaining Phenomena or Designing Solutions**	The lesson focuses on supporting students to make sense of a phenomenon or design solutions to a problem.
	B. Three Dimensions	The lesson helps students develop and use multiple grade-appropriate elements of the SEPs, DCIs, and CCCs, which are deliberately selected to aid student sensemaking of phenomena or designing of solutions.
	C. Integrating the Three Dimensions for Instruction and Assessment	The lesson requires student performances that integrate elements of the SEPs, CCCs, and DCIs to make sense of phenomena or design solutions to problems, and the lesson elicits student artifacts that show direct, observable evidence of three-dimensional learning.
Features of Quality Design	**D. Relevance and Authenticity**	The lesson motivates student sensemaking or problem solving by taking advantage of student questions and prior experiences in the context of the students' homes, neighborhoods, and communities, as appropriate.
	E. Student Ideas	The lesson provides opportunities for students to express, clarify, justify, interpret, and represent their ideas (i.e., making thinking visible) and to respond to peer and teacher feedback.
	F. Building on Students' Prior Knowledge	The lesson identifies and builds on students' prior learning in all three dimensions in a way that is explicit to both the teacher and the students.

Note. DCI = disciplinary core ideas; SEP = science and engineering practices; CCC = cross-cutting concepts.

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