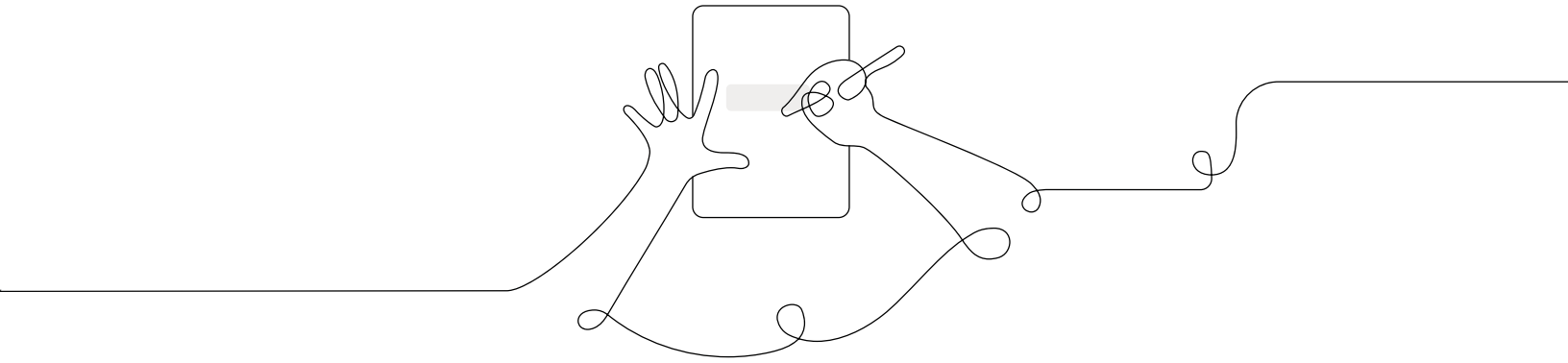
AmplifyScience

Participant Notebook

Exploring the Amplify Science K-5 Curriculum: Digging Deeper



Amplify Science

Amplify Science Professional Learning Workshop

Title: Exploring the Amplify Science K-5 Curriculum: Digging Deeper

Workshop series: Two, 90-minute sessions

Description: Participants will explore the tools and activities that tap into students' prior knowledge and cultural experiences. They will dig deeper into formative assessment data and how that data can be used to inform instruction to meet the needs of all learners. This series is intended for teachers experienced with the Amplify Science program and will be delivered in grade band sessions (K-2 & 3-5).

Session # 1

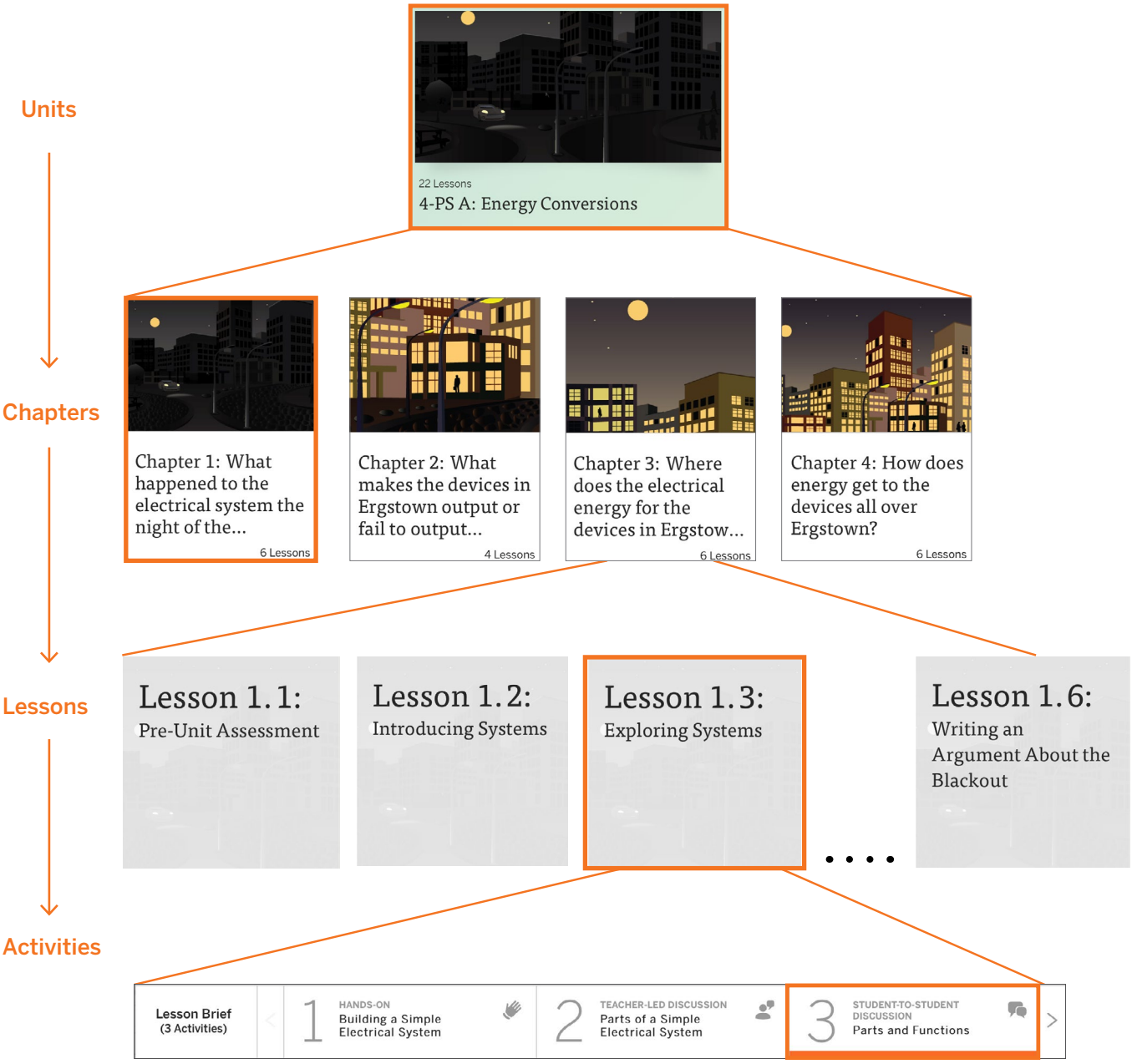
- Introduction
- Navigation
- Comparing @Home resources to the standard curriculum
- Guidance for a responsive relaunch part 1
    - NYSSLS-designed
    - Figuring out phenomena
    - Formative assessment
- Closing

Session #2

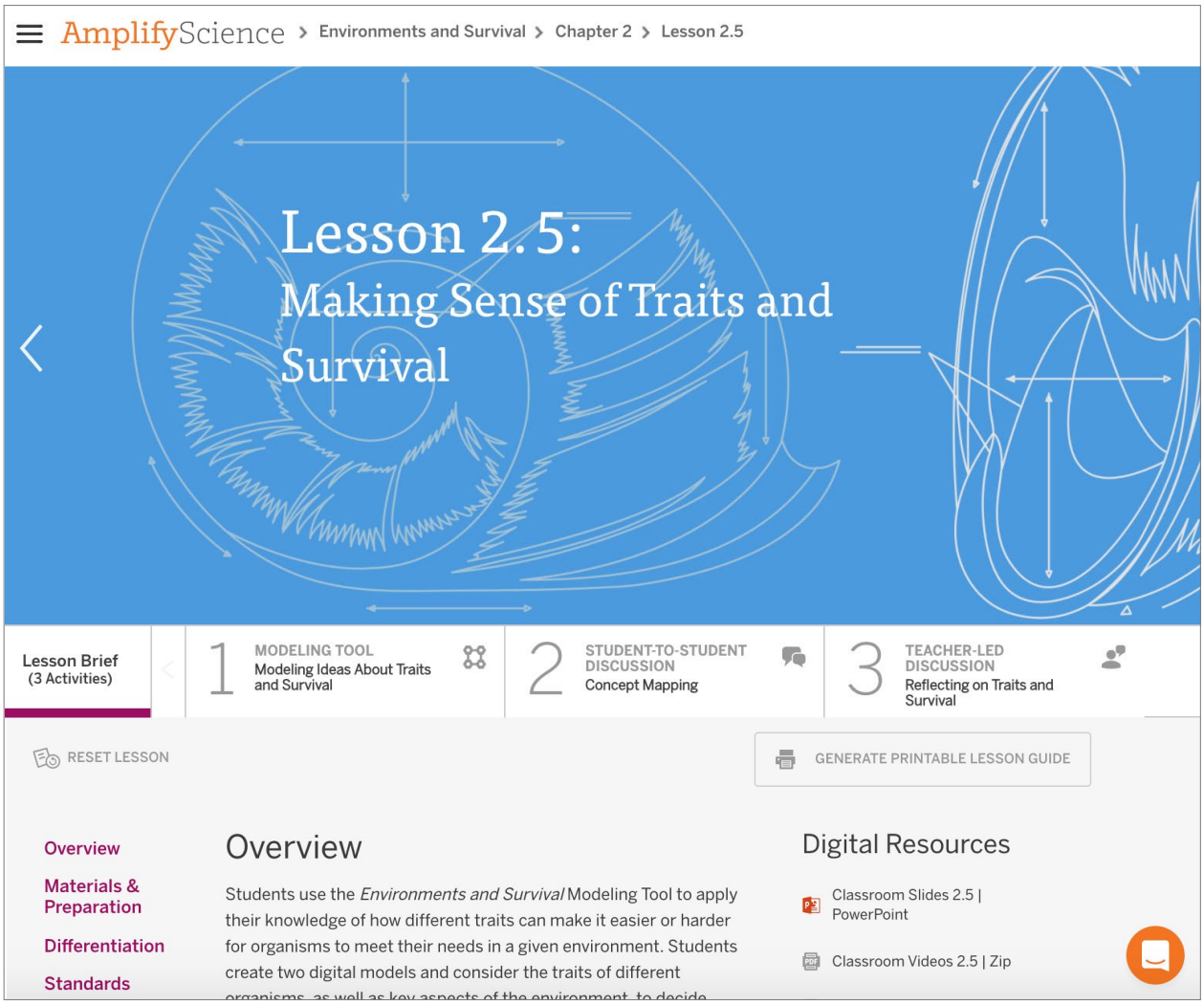
- Welcome back
- Guidance for a responsive relaunch part 2
    - Supporting diverse learners
    - CR-SE
    - SEL
- Sensemaking
- Closing

Amplify Science unit structure

Each unit in the Amplify Science elementary curriculum is structured as a series of chapters. Each chapter contains lessons, and each lesson contains activities.

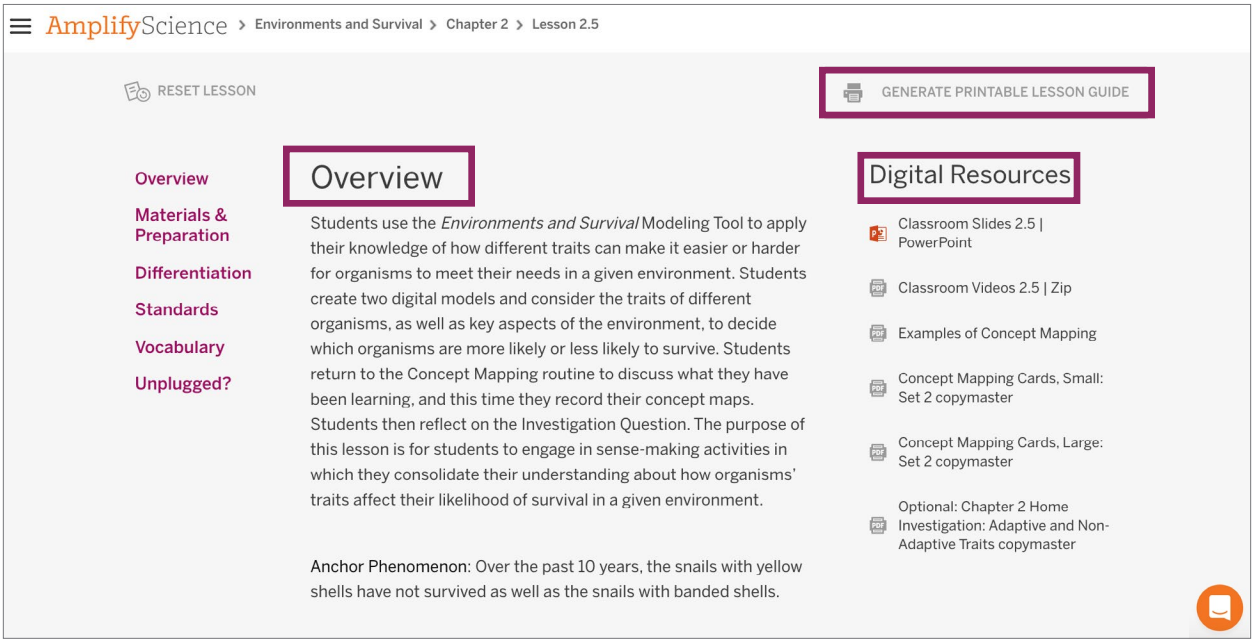


Navigation within a lesson

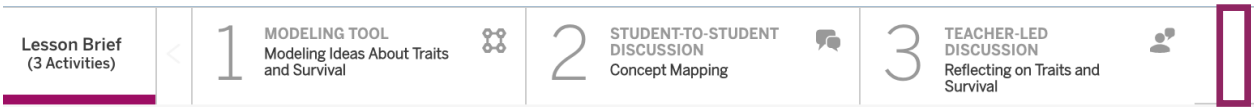


1. The lesson's landing page is referred to as the **Lesson Brief**. Above is an example from a lesson in the grade 3 Environments and Survival unit. The Lesson Brief provides valuable information to support teachers, including an overview of the content that will be covered in the lesson.

Navigation within a lesson (cont.)

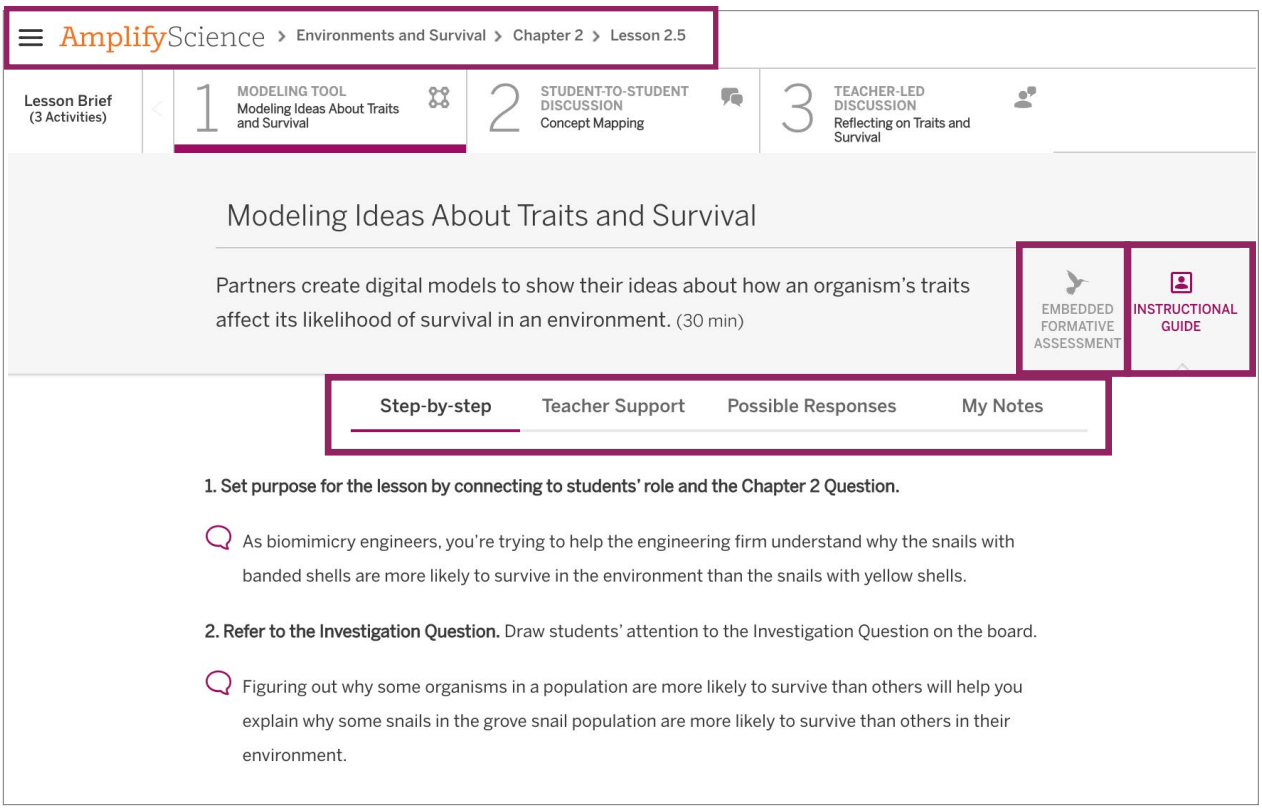


2. Navigate between each section on the page by either scrolling or clicking the index in the left column. You can always return to the top by clicking on the "Back to Top" button in the bottom left corner.
   - The **Overview** includes a summary of the lesson, describes what students will learn, and provides activity summaries and timing.
   - **Materials and Preparation** provides a list of materials for the lesson, and how to prepare for teaching.
   - **Differentiation** describes supports and strategies for differentiation.
   - **Standards** details which standards the lesson is aligned to.
   - **Vocabulary** lists focal vocabulary emphasized in the lesson.
   - **Unplugged** lists recommendations for working offline.
3. Select **GENERATE PRINTABLE LESSON GUIDE** to access a downloadable PDF that includes all of the content in digital format, including teacher supports, possible responses, and assessments.
4. **Digital Resources** provide all of the resources for a lesson, which may include Classroom Slides, projections, copymasters, videos, and reference illustrations for teacher reference. Each resource can be downloaded before each lesson.



5. The **Lesson Map**, shown above, displays the sequence of the activity titles which, once selected, access each activity's instructional guide. An arrow > at the right end of the lesson map lets you know that there are more activities in a lesson than what's shown.
6. **Activity titles** in the Lesson Map are numbered to help teachers navigate through the lesson.

Navigation within a lesson (cont.)



7. Once in an activity, you will see the **INSTRUCTIONAL GUIDE**, within which are the following tabs:

   STEP-BY-STEP lists all of the steps for teaching the activity. This will be open by default when you first navigate to the activity.

   - **Bold lead-ins** summarize what happens in each instructional step.
   - Purple speech bubbles indicate **teacher talk**, suggestions for what you should say as you teach.
   - Text in brackets [ ] indicates an expected student response.

   TEACHER SUPPORT provides suggestions, rationale, and background information.

   POSSIBLE RESPONSES indicate possible student responses for independent or small group activities.

   MY NOTES provides a space to record thoughts and observations about each activity.

   Note: If there are no Teacher Support notes for the activity, the Teacher Support tab will not appear. Likewise, if there are no possible responses for the activity, the Possible Responses tab will not appear.

8. The **grey hummingbird** indicates there is an **embedded formative assessment** in this activity. Click on the hummingbird to view the assessment (the icon turns orange to indicate selection).

9. The **breadcrumb trail** (Unit-Chapter-Lesson) (top left) can be used to navigate to different parts of the unit.

Unit Guide resources

Once a unit is selected, select **JUMP DOWN TO UNIT GUIDE** in order to access all unit-level resources in an Amplify Science unit.

Planning for the unit

Unit Overview	Describes what's in each unit, the rationale, and how students learn across chapters
Unit Map	Provides an overview of what students figure out in each chapter, and how they figure it out
Progress Build	Explains the learning progression of ideas students figure out in the unit
Getting Ready to Teach	Provides tips for effectively preparing to teach and teaching the unit in your classroom
Materials and Preparation	Lists materials included in the unit's kit, items to be provided by the teacher, and briefly outlines preparation requirements for each lesson
Science Background	Adult-level primer on the science content students figure out in the unit
Standards at a Glance	Lists NGSS (Performance Expectations, Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts) and CCSS (English Language Arts and Mathematics).

Teacher references

Lesson Overview Compilation	Lesson Overview of each lesson in the unit, including lesson summary, activity purposes, and timing
Standards and Goals	Lists NGSS and CCSS in the unit, explains how the standards are reached
3-D Statements	Describes 3-D learning across the unit, chapters, and in individual lessons
Assessment System	Describes components of the Amplify Science assessment system, identifies each 3-D assessment opportunity in the unit
Embedded Formative Assessments	Includes full text of formative assessments in the unit
Books in This Unit	K-5: Summarizes each unit text and explains how the text supports instruction
Articles in This Unit	6-8: Summarizes each unit text and explains how the text supports instruction
Apps in This Unit	2-8: Outlines functionality of digital tools and how students use them
Flextensions in This Unit	Summarizes information about the Hands-On Flextension lesson(s) in the unit

Unit Guide resources cont.

Printable resources	
3-D Assessment Objectives	K-5: Identifies where each dimension of the target Performance Expectations are assessed in the unit, in the grade, or in the grade-band
Article Compilation	6-8: Compilation of all the articles in the unit for the teacher to print and copy throughout the unit
Coherence Flowcharts	Visual representation of the storyline of the unit
Copymaster Compilation	Compilation of all copymasters for the teacher to print and copy throughout the unit
Flextension Compilation	Compilation of all copymasters for Hands-on Flextension lessons throughout the unit
Investigation Notebook	Digital version of the Investigation Notebook, for copying and projecting. The PDFs are fillable, so students can also complete their work digitally.
Multi-Language Glossary	Glossary of unit vocabulary in multiple languages
NGSS Information for Parents and Guardians	Information for parents about the NGSS and the shifts for teaching and learning
Print Materials (8.5" x 11")	Digital compilation of printed cards (i.e. vocabulary cards, student card sets) provided in the kit
Print Materials (11" x 17")	Digital compilation of printed Chapter Questions and Key Concepts provided in the kit

Capitalizing on Amplify Science in a responsive relaunch

Guidance for instructional leaders and teachers

The learning disruptions of the past year due to COVID-19 have created wide disparities in the amount and quality of science teaching and learning that has taken place in schools. The resulting unfinished learning in science will vary in each school and classroom, and for each individual student. This document highlights five key features of Amplify Science that can be leveraged in responsive relaunch plans:

1. **Amplify Science is NGSS-designed.**
2. **In Amplify Science units, students are figuring out phenomena.**
3. **Amplify Science has a robust system of formative assessment.**
4. **Amplify Science has a strong emphasis on literacy development.**
5. **Amplify Science is for all students.**

The recommendations outlined in the following pages are intended to support instructional leaders and teachers as they envision what science teaching and learning will look like in the upcoming back-to-school season and beyond.

1. Amplify Science is NGSS-designed.

The Next Generation Science Standards (NGSS) are not a list of discrete pieces of knowledge for students to acquire; rather, the **three dimensional structure of the NGSS** supports students in deepening their understanding of disciplinary core ideas across grade bands, by engaging in science and engineering practices and using Crosscutting Concepts. Thus, our systems of relaunch should emphasize helping students continue to progress in their ability to figure out, like a scientist, using all three dimensions.

How can this feature of Amplify Science support our responsive relaunch plans?

- Amplify Science learning experiences are three dimensional.
- The Science and Engineering Practices (SEP) and Crosscutting Concepts (CCC) are not specified at each grade level but rather defined with increasing sophistication in each grade band (K–2, 3–5, 6–8). Therefore there is no "loss" of these dimensions, only opportunities to strengthen them in the upcoming year.
- The content in the Disciplinary Core Ideas (DCI) spirals and is not taught in each grade level, but rather in each grade band (K–2, 3–5, 6–8). This means there are no direct dependencies in teaching one grade level's content from the grade level prior.
- Each Amplify Science unit can be taught independently and includes supports to make sure all students can succeed regardless of their prior instruction. For unit-specific information, see the Standards and Goals Unit Guide document in the section called, "How This Unit Fits into the Amplify Science Curriculum." This section provides useful information about where a unit's ideas fit in the trajectory of core ideas, as well as guidance around prerequisite knowledge for accessing the unit.

What are recommendations for capitalizing on this feature of Amplify Science?

- Move forward with this year. Focus on the current grade level standards and units rather than working to identify "missing" content or trying to backfill discreet science ideas from the previous year.
- Continue strengthening the use of the Science and Engineering Practices and Crosscutting Concepts. Authentic engagement and development of these scientific critical thinking skills is what allows students to apply their knowledge to real-world situations in and out of the classroom.
- Use a system of formative assessment to monitor student understanding (see more details in the next feature).

Can I continue to use the Amplify Science @Home Units in my responsive relaunch plans?

As you transition back to in-person learning, it's time to shift back to the standard Amplify Science curriculum to fully meet the NGSS. The @Home Units were designed only for use in remote and hybrid teaching settings. During the year of disrupted schooling, they provided a way for all students, regardless of time constraints or materials access, to be exposed to activities related to figuring out phenomena. To create these instructional materials, about 50% of activities were cut, resulting in learning experiences that do not fully engage students using all three dimensions. Examples include: less explicit instruction in disciplinary literacy practices, modifications to hands-on investigations, limited opportunities for student-to-student discourse, and a reduction of opportunities to apply and reflect. Because these are core components of students' engagement in deep learning towards figuring out phenomena, we do not recommend using the @Home Units for in-person instruction. As needed, the materials can be used in instances where a student is absent, as they can be completed asynchronously.

2. In Amplify Science units, students are figuring out phenomena.

Figuring out phenomena can be a source of motivation, relevance, and deep learning for all students. When students explore real-world issues and work to explain those using authentic scientific reasoning, they simultaneously gain an understanding of scientific concepts and develop skills to take that knowledge with them, positioning them for college and career readiness. A phenomena-based approach supports a shift to figuring out (like a scientist) rather than learning about topics (like a student).

How can this feature of Amplify Science support our responsive relaunch plans?

- In each Amplify Science unit, students take on the role of a scientist or engineer as they figure out a real-world phenomenon and solve a related problem.
- Each Amplify Science unit is designed to be a coherent sequence of instruction. Students build an understanding of the anchor phenomenon bit by bit over the course of each chapter to reach a cumulative understanding of the science ideas by the end of the unit, then are able to apply their understanding to a new context.

What are recommendations for capitalizing on this feature of Amplify Science?

- Focus on quality teaching of full Amplify Science units, even if it means fewer units will be taught.
- Protect science time, particularly in elementary school. In a situation where science time is not adequately protected in instructional schedules students are denied the opportunity to become curious, skeptical, critical thinkers who are ready to tackle more complex scientific ideas in the years to come.

If pacing needs to slow down, particularly at the beginning of the year, it is best to teach an entire unit well rather than teaching parts of units. If you need to make choices for units you could consider the following:

- There are no "power standards" or "priority content" identified for science; all standards are important.
- In Amplify Science Grades K–5, we suggest following the Amplify Science scope and sequence to start with the first unit in the year. This is particularly important in grades K–1 where the units represent a developmental progression throughout the year.
- In Amplify Science Grades 6–8, you will likely want to begin with a launch unit. Launch units introduce students to norms, routines, and practices that will be built on throughout the year, such as argumentation and Active Reading, as well as the use of Amplify Science technology. If you are using an integrated course sequence you may want to make sure you teach at least one Earth, one life, and physical science unit over the course of the year.

3. Amplify Science has a robust system of formative assessment.

Monitoring student progress via formative assessments is always an essential practice in science instruction to ensure that all students are making progress towards learning goals, regardless of an individual's background knowledge, the time they've spent learning science, and their language proficiency. With the prospect of unfinished learning from the year prior, it will be necessary to elevate the practice of formative assessment to closely monitor student understanding, track student progress, and be able to offer just-in-time support.

How can this feature of Amplify Science support our responsive relaunch plans?

The Amplify Science Assessment System:

- is part of a system that offers many types of views of student learning.
- is embedded in the curriculum, which can help maximize learning time instead of setting aside additional time for testing.
- includes assessment of all three dimensions.
- allows students to demonstrate understanding in multiple ways (e.g. modeling, talking, writing).
- provides guidance for the teacher so they can both gain insight into student understanding and be able to offer just-in-time support.

What are recommendations for capitalizing on this feature of Amplify Science?

- Get to know the formative Assessment System and plan for how to use it to provide targeted feedback and support.
- Keep moving forward with instruction, but allow time as needed to gather data and respond to student progress via the system of embedded formative assessments.

Getting to know the Amplify Science Assessment System

- A good first step in preparing to implement the Amplify Science Assessment System is reading the Progress Build Unit Guide document for the unit. This document clearly spells out the learning progression that the assessment system is built around.
- Next, open and review the Assessment System Unit Guide document. This provides a full list of the assessments across the unit with information on placement, evaluation guidance, and the connection to the standards.
- Another resource in the Unit Guide is the Embedded Formative Assessment document. This resource details the specific concepts and practices to look for or listen for as students engage with the learning experiences, followed by suggestions to the teacher of what to do, based on what was observed.
    - This resource points out the different NGSS connections for each assessment opportunity which can help teachers make principled choices about which assessments to use. This can be supportive if teachers are specifically looking for which opportunities assess student conceptual understanding, reflected in the DCIs.
- In planning for monitoring student progress across a unit, teachers should consider what tools can be used to track data that meet the needs of their classroom.
    - Sample Tracker (**template**)
    - Sample Tracker for Grade 3: Balancing Forces, lesson 2.5 (**completed**)
- K–1 teachers can use provided Clipboard Assessment Tools (K–1, located in the Digital Resources at the lesson level).
    - Sample Clipboard Assessment Tool from Grade 1: Spinning Earth, Chapter 2 (**template**)
    - Sample Clipboard Assessment Tool from Grade 1: Spinning Earth, Chapter 2 (**completed**)
- Tracking progress based on the "look for" and "now what" guidance provided in the Embedded Formative Assessment Unit Guide document and at the lesson level will support teachers in using data to inform instruction.

4. Amplify Science has a strong emphasis on literacy development.

Reading, writing, listening and speaking are fundamental aspects of students' work to figure out complex ideas in science. Engaging in these core practices through science can be leveraged to accelerate learning in English Language Arts (ELA) and address a variety of priority instructional content related to building content knowledge through reading, writing and engaging in discourse about topics across content areas, building content-specific vocabulary, and keeping complex text at the center of literacy instruction.

How can this feature of Amplify Science support our responsive relaunch plans?

- Amplify Science can be considered a **supplementary literacy program** because it addresses the Common Core Standards for ELA related to disciplinary literacy.
- The focus of literacy instruction in Amplify Science is on increasing students' facility with reading informational text, engaging in scientific discussions, and writing scientific explanations and arguments.
- The program includes content-rich books (K–5) and articles (6–8), both formal and informal writing opportunities, all of which is supported by explicit instruction as well as a variety of developmentally-appropriate scaffolds, supports and routines for engaging in robust literacy and language development.

What are recommendations for capitalizing on this feature of Amplify Science?

- Teach full units with integrity to provide students with the explicit instruction and practice opportunities with developing disciplinary literacy.
- Be aware of CCSS-ELA standards addressed in Amplify Science to see where there are opportunities for overlap and to strengthen practices in Language Arts. Capitalizing on these synergies can also help to protect science time.
- Leverage opportunities to have students engage in scientific discourse.

5. Amplify Science is for all students.

Amplify Science was designed with the goal of developing high-quality instructional materials that will help create the next generation of scientific innovators and members of the global community who are skeptical, curious, evidence-based thinkers capable of making decisions that improve their own lives and the lives of those living in their communities. An essential element of this goal is to support ALL learners through a focus on equitable teaching and learning, as mirrored in the NGSS's vision for "all standards, all students." Because diversity in the science and engineering classroom is an asset, we must all strive to support students in developing identities as builders and active users of science knowledge, promote cultural and linguistic inclusion, and provide access to deep learning.

How can this feature of Amplify Science support our responsive relaunch plans?

- A phenomena-based approach puts students at the center; they are the ones doing the figuring out.
- The phenomena-based storylines of each unit provide opportunities to have students' voices matter. The class gathers student questions and elicits students' experiences and ideas at the beginning of the unit, and then revisits these funds of knowledge at key points in each chapter. (In K-5, see the Eliciting and Leveraging Students' Prior Knowledge, Personal Experiences, and Cultural Backgrounds routine).
- Amplify Science media, books, and articles represent the diversity of scientists, engineers, and others involved in the creation and use of scientific knowledge.
- Amplify Science lessons are designed with a variety of rich opportunities to acquire and use scientific language. These embedded supports benefit all learners but are particularly supportive for English learners. The teacher support materials such as the differentiation briefs include additional ideas for supporting English learners and diverse learners.
- In Amplify Science, students engage in learning through multiple modalities. This provides multiple entry points to the same complex science ideas and multiple ways for students to express their understanding.

What are recommendations for capitalizing on this feature of Amplify Science?

- Take time to **establish a culture of figuring out**. This means providing students the space to make connections, ask questions, and become curious about the phenomena as they figure out more and more. This supports students to feel empowered, to develop their identity as a scientific thinker, and feel like they have agency over their own learning. A culture of figuring out:
  - Values student questions.
  - Leverages students' prior knowledge, personal experiences, and cultural backgrounds
  - Connects the unit phenomena to local and relevant phenomena.
  - Allows for a variety of sensemaking types and paces
  - Has the teacher take on the role of an interested skeptic.
- Utilize the differentiation notes in the Lesson Brief of each lesson to adapt instruction for students who need more challenge, students who need more support, and for emerging multilingual learners.

References

1. Council of Chief State School Officers, 2020. Restart and Recovery: Considerations for Teaching and Learning **https://ccsso.org/sites/default/files/2020-07/CCSSO_RR_Consider_Teach-v3.pdf**

2. Learning Policy Institute. 2020. Restarting and reinventing school: Learning in the time of COVID and beyond. **https://restart-reinvent.learningpolicyinstitute.org**

3. National Academies of Sciences, Engineering, and Medicine. 2020. Teaching K-12 Science and Engineering During a Crisis. Washington, DC: The National Academies Press. **http://nap.edu/25909**

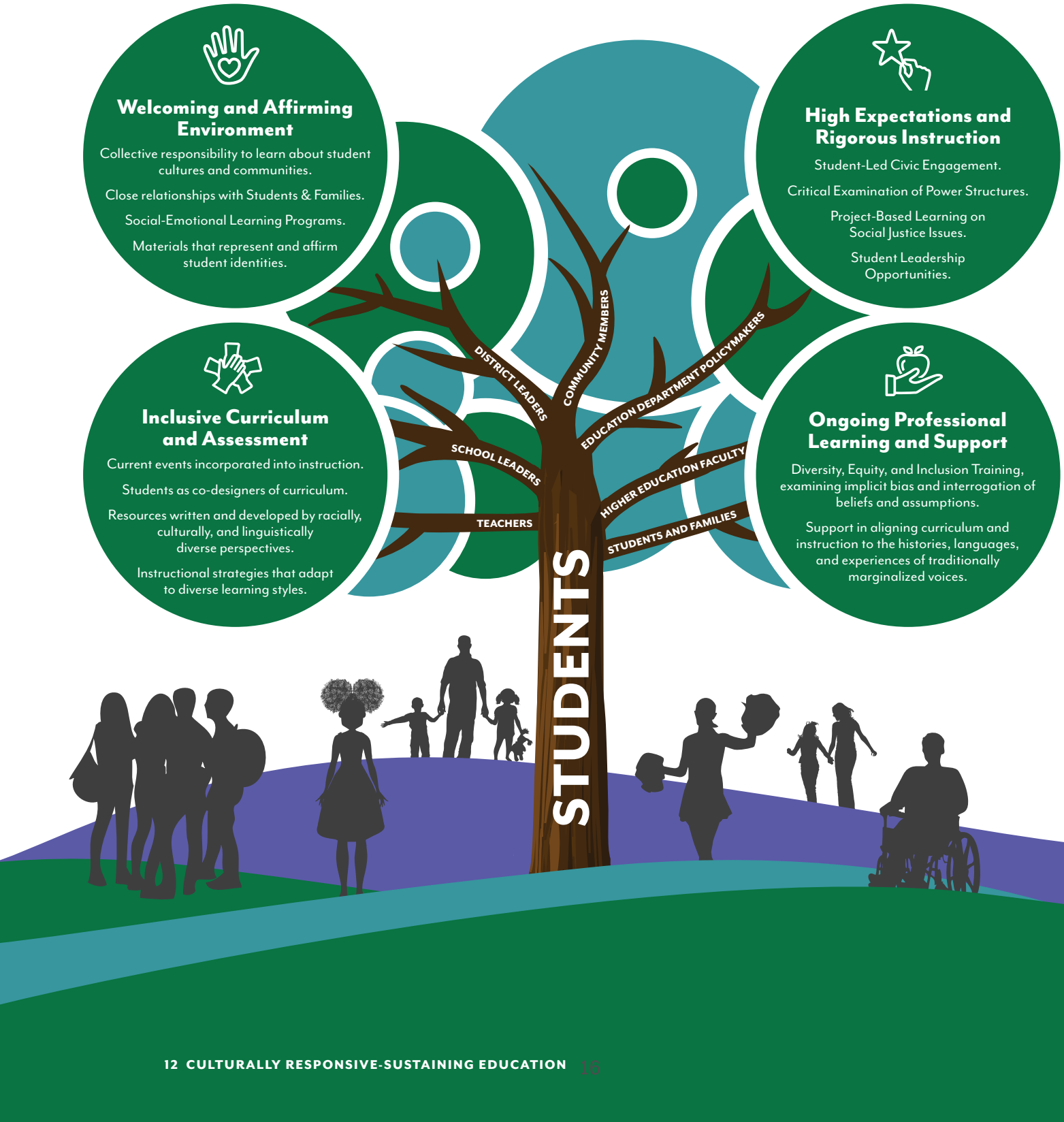
4. Student Achievement Partners, 2020-2021 Priority Instructional Content for ELA/Literacy and Mathematics **https://achievethecore.org/page/3267/priority-instructional-content-in-english-language-arts-literacy-and-mathematics**

Tips for establishing a culture of figuring out
To promote equity, relevance, and engagement

- Elicit and leverage **students' prior knowledge, personal experiences, and cultural backgrounds**
    - Find space and time where students can share their experiences and ideas related to the unit phenomenon or problem that they will be seeking to explain or solve.
    - Have students return to their funds of knowledge at key moments of the figuring out process for the purpose of building on their ideas, using their connections as a source of evidence, or to notice if their ideas have changed over time.
    - Think about how to attribute ideas from students who might not see themselves as contributors to the conversation.
- Value **student questions**
    - Utilize the embedded question-asking opportunities in the unit to elicit questions from students.
    - Document, return to, and sort student questions at key moments, such as the beginning of the unit when the unit phenomenon is introduced and at the beginning and end of each chapter.
- Connect to **local and relevant phenomena**
    - Welcome in students' interest in and experience with local and everyday phenomena, and help draw connections to what they're figuring out throughout the year about the unit phenomena.
    - Compare and contrast the unit phenomenon to local phenomena.
    - Encourage students' explorations and observations of everyday phenomena at home or in their communities.
    - Identify community resources that can help students explore phenomena in their community.
- Allow for a **variety of sensemaking** types and paces
    - Attend to how different students thrive with different modalities, or need less or more time with them.
    - Use the storyline in the unit to teach sequentially but allow for flexibility based on student need.
- Take on the role of an **interested skeptic**[1]
    - Students might not be intrigued by a phenomenon right away because they believe they already know how or why it happens. Help students become dissatisfied with what they can explain.[2]
    - Ask questions such as: "Is that how a scientist would do it?", "Is that consistent with what we read about?", or "Do you agree with your partner's idea?"

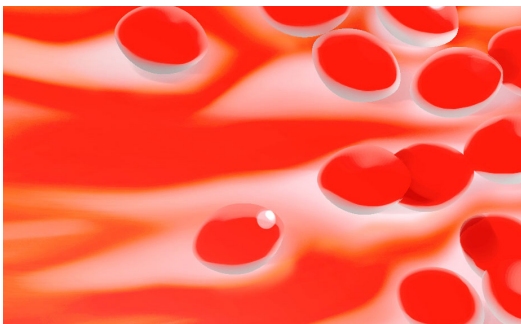
[1] Sara Goodman, knowatom.com
[2] Using Phenomena in NGSS-Designed Lessons and Units

The CR-S framework helps educators create student-centered learning environments that: affirm racial, linguistic and cultural identities; prepare students for rigor and independent learning; develop students' abilities to connect across lines of difference; elevate historically marginalized voices; and empower students as agents of social change.



Amplify Science

Culturally and Linguistically Responsive Teaching in Amplify Science



Our goal in developing Amplify Science is to create high-quality instructional materials that will help create the next generation of scientific innovators as well as citizens who are skeptical, curious, evidence-based thinkers capable of making decisions that improve their lives and the lives of those living in their communities. An essential element of this goal is to support all learners through a focus on equitable teaching and learning.

Creating materials that support culturally and linguistically responsive teaching (CLRT) is one element of supporting all learners. Culturally responsive teaching (Hammond) and culturally and linguistically responsive teaching (Hollie) are part of a family of related pedagogical frameworks that includes culturally relevant pedagogy (Ladson-Billings), culturally relevant teaching (Gay), culturally sustaining pedagogy (Paris & Alim), instructional congruence (Lee & Fradd), linguistically responsive teaching (Lucas & Villegas), historically responsive literacy (Muhammad), and culturally responsive-sustaining education (NYU Metro Center). While there is variation in how these different frameworks characterize equitable teaching and learning, what follows are some common elements, a summary of a few ways we support these in Amplify Science, and areas where we are continuing the work to revise and improve our materials.

1 Identity and representation

Students should see themselves represented in the materials and be supported in developing identities as builders and active users of science knowledge.

Across Amplify Science in media, books, and articles we actively represent the diversity of scientists, engineers, and others involved in the creation and use of scientific knowledge. Working closely with the Our Family Coalition we sought to respectfully and appropriately represent diversity in terms of race, ethnicity, national background, disability, gender, and sexual orientation. An audit of our middle school program estimated that 84% of featured scientists/engineers in articles and videos are in a non-dominant group (including non-white; female; disability; and/or LBGTQ). (Such an audit has not yet been completed for our K–5 program but we expect the results to be similar).

A key element of every Amplify Science unit is that students take on an explicit role as a scientist, engineer, or other professional as they work to figure out a phenomenon and solve a related problem. For example, first graders become aquarium scientists to explain how a sea turtle will be able to survive in the wild; fourth graders take on the role of systems engineers to help a town solve its persistent blackout problems; and seventh graders work as planetary geologists trying to identify whether a channel on Mars might have been formed by running water. In this design, our goal is that students don't just see scientists that they identify with; we want them to identify as scientists themselves.

2 Access to deep learning

Instructional materials should provide all students with access to deep learning. Amplify Science is built around a number of research-based approaches toward this goal and just a few are summarized briefly here.

- Ambitious learning goals. Consistent with the vision presented in the National Research Council Framework, Amplify Science units support students to build complex, causal explanations of phenomena, and to apply their learning to new contexts.
- Explicit support for literacy development. Teachers and students are given explicit support for learning to use discipline-specific ways of reading, writing, and talking in science. In addition, through both instruction and practice, all students are encouraged to engage with complex science text by making connections while reading, asking questions, and discussing these ideas with their peers. Ample support for student-to-student discussion, including the use of discourse routines, helps students refine their thinking and communicate their ideas.

- Multimodal approach to science learning. Students are offered different ways of acquiring knowledge and a variety of resources through which to engage with the content. Multiple entry points to the same complex science ideas provide opportunities for students to connect with content in ways that leverage their unique prior knowledge and experiences. Students are also offered multiple means of expressing their understanding.

- Robust system of formative assessment and support for differentiation. Every lesson includes differentiation suggestions for students who need more support or more challenge. In addition, a robust assessment system, including On-the-Fly Assessments and Critical Junctures, provides tools for assessing student progress as well as "Now what?" guidance about how to use that information.

3 Cultural and linguistic inclusion

This category includes "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them (Gay, 2010, p. 31)" as well as supporting students to leverage multiple meaning-making resources, including everyday language, home language, and translanguaging. (Lee & Stephens, 2020, p. 5). Elements of Amplify Science that support these goals include:

- For Grades K–5, routines around the "Our Experiences" and "What We Think We Know" charts (see the "Eliciting and Leveraging Students' Prior Knowledge, Personal Experiences, and Cultural Backgrounds" document in the Digital Resources for the first lesson in each unit)
- Support for connecting school science to family experiences and expertise, including the Family Connection letters (K–5) and Family Home Experiences (6–8)
- Differentiation supports (found in the Differentiation Briefs) that encourage teachers to leverage students' native languages
- Additional support resources including multilingual glossaries, high-quality Spanish translations for all student-facing materials, and read-aloud tools for books and articles

4 Teaching for social justice.

A fourth category that appears as an element in some of the frameworks above relates to "teaching for social justice" (Barton), "criticality" (Muhammad), or "anti-racist teaching" (Darling-Hammond). The Amplify Science focus on solving real-world problems by figuring out phenomena provides a powerful starting point for efforts to incorporate a social justice focus in the science classroom. In our ongoing work collaborating with districts who are implementing Amplify Science we are both supporting and learning from teachers and instructional leaders as we explore ways to build social justice and anti-racist teaching into Amplify Science.

References

Gay, G. (2002). Preparing for culturally responsive teaching. Journal of teacher education, 53(2), 106-116.

Gay, G. (2010). Acting on beliefs in teacher education for cultural diversity. Journal of teacher education, 61(1-2), 143-152.

Hammond, Z. (2014). Culturally responsive teaching and the brain: Promoting authentic engagement and rigor among culturally and linguistically diverse students. Corwin Press.

Hollie, S. (2017). Culturally and linguistically responsive teaching and learning: Classroom practices for student success. Teacher Created Materials.

Ladson-Billings, G. (2014). Culturally relevant pedagogy 2.0: aka the remix. Harvard Educational Review, 84(1), 74-84.

Lee, O., & Fradd, S. H. (2001). Instructional congruence to promote science learning and literacy development for linguistically diverse students. In Models of science teacher preparation (pp. 109-126). Springer, Dordrecht.

Lee, O., & Stephens, A. (2020). English learners in STEM subjects: Contemporary views on STEM subjects and language with English learners. Educational Researcher, 49(6), 426-432.

Muhammad, G. (2020). Cultivating genius: An equity framework for culturally and historically responsive literacy. Scholastic Incorporated.

NYU Metro Center (2020, October 26). The New York State's Culturally Responsive-Sustaining Education Framework. https://steinhardt.nyu.edu/metrocenter/perspectives/journey-forward-new-york-states-culturally-responsive-sustaining-education.

Paris, D., & Alim, H. S. (2014). What are we seeking to sustain through culturally sustaining pedagogy? A loving critique forward. Harvard Educational Review, 84(1), 85-100.

For more information, visit amplify.com/science.

Amplify.

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Unit Name:
Lesson & Activity #:

Look for 1:

Look for 2: .

Student Name	Look for 1	Look for 2	Notes

Using an Embedded Formative Assessment

Use this graphic organizer to plan for an upcoming assessment in the unit you're currently teaching.

<table>
<tr><td colspan="5">Situating the assessment in the Progress Build: Which level of the Progress Build are students working on during this assessment opportunity?</td></tr>
<tr><td colspan="5">❏ Level 1 Notes:
❏ Level 2
❏ Level 3</td></tr>
<tr><td colspan="2">Planning to collect data</td><td colspan="2">Analyzing student data</td><td>Taking action based on student data</td></tr>
<tr><td>How will I collect data?</td><td colspan="2">Which misconception? What will evidence look like?</td><td>Which students?</td><td>When?</td><td>How?</td></tr>
<tr><td rowspan="2"></td><td colspan="2">❏ Key Concept
❏ Practice
❏ Crosscutting Concept

Notes:</td><td></td><td>❏ In the moment
❏ In upcoming activity
❏ Outside of lesson

Notes:</td><td>❏ Keep an eye on certain students
❏ Provide additional instruction
❏ Revisit an activity

Notes:</td></tr>
<tr><td colspan="2">❏ Key Concept
❏ Practice
❏ Crosscutting Concept

Notes:</td><td></td><td>❏ In the moment
❏ In upcoming activity
❏ Outside of lesson
Notes:</td><td>❏ Keep an eye on certain students
❏ Provide additional instruction
❏ Revisit an activity

Notes:</td></tr>
</table>

SOCIAL EMOTIONAL LEARNING'S FIVE CORE COMPETENCIES

There are many frameworks and ways to talk about social emotional competence and skills. For simplicity and clarity, this document uses a set of five competencies identified by the Collaborative for Academic, Social, and Emotional Learning (CASEL) that all young people and adults need to learn to be successful in school and in life. This framework has been widely accepted across the country. New York State has endorsed these five core competencies.

Figure 1: Framework for Systemic Social and Emotional Learning. ©CASEL 2017

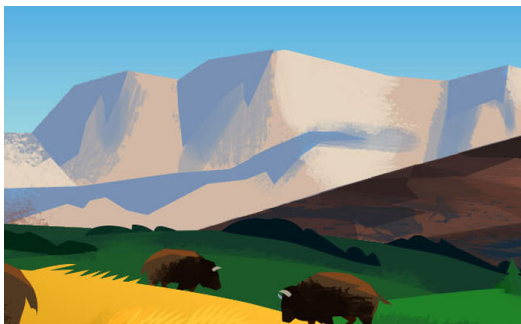
Five Core Social Emotional Competencies

Competency	Description
Self-Awareness	Competence in the self-awareness domain involves understanding one's emotions, personal goals, and values. This includes accurately assessing one's strengths and limitations, having a positive mindset, and possessing a well-grounded sense of self-efficacy and optimism. High levels of self-awareness require the ability to recognize how thoughts, feelings, and actions are interconnected.
Self-Management	Competence in the self-management domain requires skills and attitudes that facilitate the ability to regulate emotions and behaviors. This includes skills necessary to achieve goals, such as the ability to delay gratification, manage stress, control impulses, and persevere through challenges.
Social Awareness	Competence in the social awareness domain involves the ability to take the perspective of and have respect for those with different backgrounds or cultures, and to empathize and feel compassion. It also involves understanding social norms for behavior and recognizing family, school and community resources and supports.
Relationship Skills	Competence in this domain involves communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking help when needed. Relationship skills provide individuals with the tools they need to establish and maintain healthy and rewarding relationships, and to act in accordance with social norms.
Responsible Decision-Making	Competence in this domain requires the ability to consider ethical standards, safety concerns, and make accurate behavioral assessments to make realistic evaluations of the consequences of various actions, and to take the health and well-being of self and others into consideration. Responsible decision-making requires the knowledge, skills, and attitudes needed to make constructive choices about personal behavior and social interactions across diverse settings.

Derived from NYS Education Department's "Social Emotional Learning: A Guide to System Whole-School Implementation" March 2019

Amplify Science

Social and Emotional Learning in Amplify Science



Social and emotional learning (SEL) as defined by the Collaborative for Academic, Social, and Emotional Learning (CASEL) is "the process through which children and adults understand and manage emotions, set and achieve positive goals, feel and show empathy for others, establish and maintain positive relationships, and make responsible decisions". CASEL has identified five core competencies that support social emotional learning. Below we describe examples of how each competency is supported in Amplify Science.

1 Self-awareness

Students in Amplify Science have opportunities to build their self-awareness as they **identify personal, cultural, and linguistic assets**. For example, when the anchor phenomenon and question of each unit is introduced, students are asked to consider and share their initial ideas. In elementary units, a routine and an **overview document** guide teachers to draw out and record students' prior knowledge (including culturally specific knowledge) in these moments. Students are also asked to make connections to their prior knowledge and personal experiences as they preview and read books and articles. In the Differentiation section of the Lesson Brief, Specific Differentiation Strategies for English Learners include suggestions in some lessons to leverage students' native languages. In addition, the Pre-Unit Assessment Guide provided with each unit helps teachers identify and build on relevant prior knowledge students demonstrate in this formative assessment.

Students also have opportunities to build their self-awareness as they develop their interests and a sense of purpose. The anchor phenomenon and question for each unit are designed to help students experience a wide range of the purposes that science can serve, such as answering an intrinsically mysterious question (for example, what caused a liquid lake on a moon of Saturn to disappear?), understanding a problem affecting people (for example, a water shortage in a town) or animals (for example, fewer geckos surviving in a changed environment), or designing a solution for people in crisis (for example, designing nutritional bars for injured patients or rescue workers after a natural disaster). Engaging with these real and diverse contexts in which science is useful can be an opportunity for students to develop their own interests related to science and decide which purposes they most connect with. The books and articles in the program augment this range of contexts and purposes of science. Many also feature real scientists—with intentional diversity in terms of race, ethnicity, gender, age, ability, and sexuality—which may serve as role models for students.

2 Self-management

Students in Amplify Science have opportunities to develop their self-management as they **set personal and collective goals**. The self-assessments provided at the end of each chapter are an opportunity for students to reflect on what they have learned and what they still want to know more about. In middle school Engineering Internships, and in elementary units that highlight the practice of designing solutions, groups of students engage in setting design goals as they develop and improve their designed solutions. In some elementary units, students are taught the strategy of setting a purpose for reading and for investigating. To further highlight this aspect of Competency 2, teachers can guide students to set learning goals at the beginning of each unit, and return regularly to reflect on those goals.

Students also have opportunities to develop their self-management as they **demonstrate personal and collective agency**. Students have many opportunities to make meaningful choices. For example, middle school students decide on their own connections and questions to annotate (on their own) and discuss (in pairs) during Active Reading, they decide which evidence to use and how and which claim to support during Science Seminars, and they decide on goals and design strategies with their team during Engineering Internships. Elementary students decide on design strategies in engineering-focused units, and plan their own investigations in the final chapter of many investigation-focused units. As students work to explain the anchor phenomenon of each unit, they demonstrate agency as they develop their own explanations and try to come to agreement on an explanation as a class.

3 Social awareness

Students in Amplify Science have opportunities to develop their social awareness as they **recognize family, school, and community resources and supports**. Every middle school unit includes Home Investigations and every elementary unit has Family Homework Experiences in which students discuss what they are learning with family members and/or work with family members to investigate related phenomena around their home or neighborhood. Each elementary unit also includes a Family Connections Letter or Family Connections Homework in which students find out what experiences, ideas, and skills family members have related to the unit. Teachers invite students to share what they learned from their families during a class discussion of prior knowledge and experiences related to the unit.

Students also have opportunities to develop their social awareness as they take **others' perspectives**. Student-to student discussion is a key component of lessons throughout the program, and students are taught to listen carefully to their peers, and remain open to changing their minds based on evidence.

4 Relationship skills

Students in Amplify Science have opportunities to develop their relationship skills as they work to **communicate effectively**. Student-to student discussion is a key component of lessons throughout the program, and students are taught to listen carefully to their peers, share evidence for their ideas, and help involve their peers in discussions. Discourse routines, such as Think-Pair-Share, Shared Listening, and Science Seminars structure and support pair and small group discussions. During whole-class discussions, teachers are encouraged to invite students to agree or disagree with one another and use evidence to explain why. Discussion norms and sentence starters help support students in communicating clearly. Students also write explanations and arguments to communicate their ideas, with the idea of writing for an audience emphasized and modeled. To further highlight this aspect of Competency 4, teachers can work with the class to generate a set of discussion norms early in the year and help students reflect on how well the class is meeting those norms throughout the year.

Students also have opportunities to develop their relationship skills as they **practice teamwork and collaborative problem-solving**. Students work in pairs and groups throughout the program, for example as they investigate using physical models or digital simulations, during structured pair and group discussions, in group reflection routines such as Word Relationships and Write and Share. In addition, over the course of each unit, the class collaborates to solve the central problem of the unit, gathering and making sense of evidence and discussing and writing to arrive at conclusions. To further highlight this aspect of Competency 4, teachers can have students reflect on how well their group worked together and identify strengths and areas for growth at the conclusion of significant instances of group work.

5 Responsible decision-making

Students in Amplify Science have opportunities to develop their responsible decision-making skills as they **identify solutions for personal and social problems**. In many units, the central question or engineering challenge involves solving a social problem. Students work to solve problems including monarch butterflies disappearing from a school garden, a playground being too hot or too cold, frequent blackouts in a city, a town's water shortage, climate change, the need for tsunami warning systems, and elevated risk for skin cancer in certain parts of the world. There are also opportunities for students to decide on their own problems they want to address, for example in Day 10 of each Engineering Internship. To further highlight this aspect of Competency 5, teachers can have students regularly reflect on what problems in their own lives or communities could be addressed using the concepts or practices students are learning.

Students also have opportunities to develop their responsible decision-making skills as they **learn to make a reasoned judgment after analyzing information, data, and facts**. This is central to the practice of making arguments from evidence, which is a key part of every unit. Beginning in kindergarten, students learn what evidence is and how it can be used to answer questions, and they have multiple opportunities to gather evidence. Over the course of the grades, students engage with this practice with more complexity, including using evidence to decide between multiple possible claims, using reasoning to make connections between evidence and claims, evaluating the quality of evidence, and using evidence to refute possible claims. Students are supported to communicate their arguments in writing and orally through explicit teaching and guidelines, teacher modeling, models of arguments in books and articles, sentence starters, and more. To further highlight this aspect of Competency 5, teachers can have students reflect on ways this practice can be useful outside the contexts of science and engineering.

Additional Amplify resources

Program Guide

Additional insight into the program's structure, intent, philosophies, supports, and flexibility.

my.amplify.com/programguide

California Edition:
http://amplify.com/science/california/review

Louisiana Edition:
https://my.amplify.com/programguide/content/louisiana/welcome/elementary-school/

Amplify Help

Frequently updated compilation of articles with advice and answers from the Amplify team.

my.amplify.com/help

Family Resources Site

https://amplify.com/amplify-science-family-resource-intro/

Amplify Support

Contact the Amplify support team for information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-10PM EST and weekends 10AM-6PM EST.

Email: help@amplify.com

Email: edsupport@amplify.com (pedagogical questions)

Phone: 800-823-1969

Or, reach Amplify Chat by clicking the  icon at the bottom right of the digital Teacher's Guide.

When contacting the support team:

- Identify yourself as an Amplify Science user.
- Note the unit you are teaching.
- Note the type of device you are using (Chromebook, iPad, Windows, laptop).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible. Copy your district or site IT contact on emails.

Notes

Amplify Science