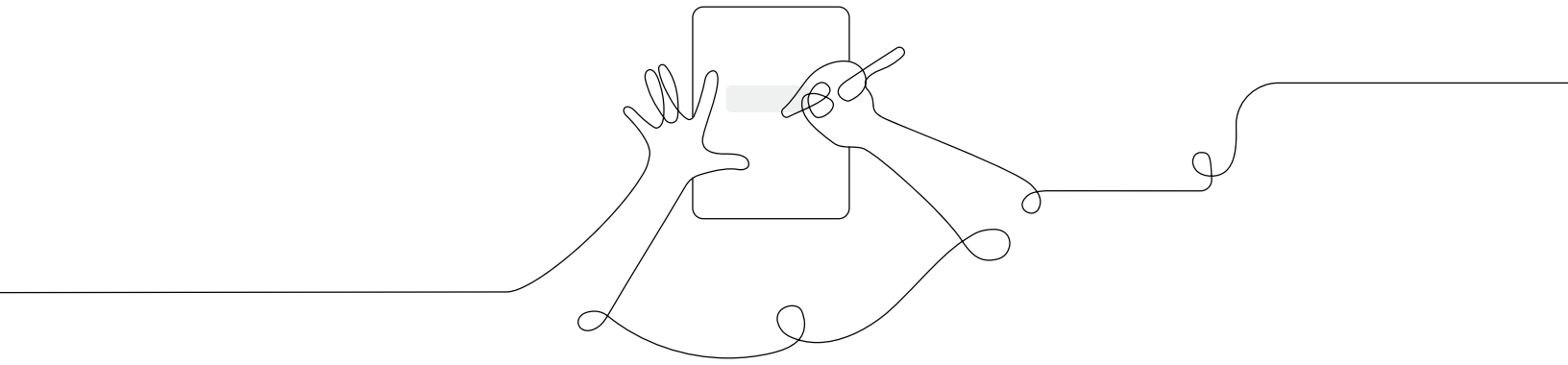
AmplifyScience

Professional Learning Workshop

Amplify Science for Dual Language Teachers

Grades K–5



Elementary school course curriculum structure

Grade K

- Needs of Plants and Animals
- Pushes and Pulls
- Sunlight and Weather

Grade 1

- Animal and Plant Defenses
- Light and Sound
- Spinning Earth

Grade 2

- Plant and Animal Relationships
- Properties of Materials
- Changing Landforms

Grade 3

- Balancing Forces
- Inheritance and Traits
- Environments and Survival
- Weather and Climate

Grade 4

- Energy Conversions
- Vision and Light
- Earth's Features
- Waves, Energy, and Information

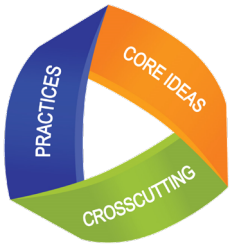
Grade 5

- Patterns of Earth and Sky
- Modeling Matter
- The Earth System
- Ecosystem Restoration

AmplifyScience

authored by THE LAWRENCE HALL OF SCIENCE UNIVERSITY OF CALIFORNIA, BERKELEY

Three dimensions of NGSS reference



3-D learning engages students in using scientific and engineering practices and applying crosscutting concepts as tools to develop understanding of and solve challenging problems related to disciplinary core ideas.

Science and Engineering Practices

1. **Asking Questions and Defining Problems**
2. **Developing and Using Models**
3. **Planning and Carrying Out Investigations**
4. **Analyzing and Interpreting Data**
5. **Using Mathematics and Computational Thinking**
6. **Constructing Explanations and Designing Solutions**
7. **Engaging in Argument from Evidence**
8. **Obtaining, Evaluating, and Communicating Information**

Disciplinary Core Ideas

Earth and Space Sciences:
ESS1: Earth's Place in the Universe
ESS2: Earth's Systems
ESS3: Earth and Human Activity

Life Sciences:
LS1: From Molecules to Organisms
LS2: Ecosystems
LS3: Heredity
LS4: Biological Evolution

Physical Sciences:
PS1: Matter and its Interactions
PS2: Motion and Stability
PS3: Energy
PS4: Waves and their Applications

Engineering, Technology and the Applications of Science:
ETS1: Engineering Design
ETS2: Links among Engineering Technology, Science and Society

Crosscutting Concepts

1. **Patterns**
2. **Cause and Effect**
3. **Scale, Proportion, and Quantity**
4. **Systems and System Models**
5. **Energy and Matter**
6. **Structure and Function**
7. **Stability and Change**

Spanish-language supports

Amplify Science is committed to providing support to meet the needs of all learners, and includes multiple access points for Spanish-speaking students. Developed in conjunction with Spanish-language experts and classroom teachers, multiple components are available in Spanish across the Amplify Science curriculum.

Print resources

(available now)

Component

- Student Investigation Notebooks
- Student Books
- Big Books (Grades K–1)
- Assessments and copymasters (Included in the unit materials notebook)
- Printed classroom materials (Unit and chapter questions, key concepts, vocabulary cards, etc.)

Digital resources

(available for back-to-school 2020)

Component

- Student Books with Spanish audio (delivered as part of the digital classroom library add-on license)
- Unit Materials notebook, which is located on the Unit Guide and contains all copymasters, print assessments, app guides (i.e. instructions), and video transcripts.
- Projections
- All model teacher talk
- Downloadable PDFs of all print materials in Spanish.
- Copymasters (including Flextensions)
- Videos, including closed captions
- Digital Apps (i.e. Sims, Modeling Tools, etc.)
- Completed Argumentation Wall Diagram

Amplify Science's five principles for supporting English learners

Five principles helped the Lawrence Hall of Science's curriculum developers design instructional sequences to meet the goals of bolstering students to develop deep understanding of science content, decreasing language demands without diluting science content, and allowing students to more fully engage in disciplinary literacy practices. The five principles are based on research on best practices in the field and have been reviewed by the Hall's English learner advisors.

Principle 1: Leverage and build students' informational background knowledge.

Principle 2: Capitalize on students' knowledge of language.

Principle 3: Provide explicit instruction about the language of science.

Principle 4: Provide opportunities for scaffolded practice.

Principle 5: Provide multimodal means of accessing science content and expressing science knowledge.

Enacting the five principles in the curriculum

Many of the best practices for supporting English learners are also helpful for all students (for example: providing clear directions, building the curriculum as a coherent set of ideas that build on one another, allowing time for reflection, and providing explicit instruction in the practices of the discipline). These best practices form the foundation of the Amplify Science curriculum. For students who need additional support, specialized instructional approaches, activities, and resources that take into account English learners' level of language proficiency are provided to help them develop academic language skills. Thus, language support for English learners is included throughout the program in two ways:

1. **Embedded instructional design**: Many scaffolds are embedded within the instructional plan and are presented to teachers through the teacher materials and to all students as activities within the unit. Throughout the process of designing the curriculum, these scaffolds and supports were planned, tested, and refined to provide rigorous yet accessible science instruction.

2. **Additional support**: Additional activities and specific methods for supporting English learners are provided for use as needed, especially in the Teacher Support notes within the lessons.

The following is a list of all instructional supports for English learners that are included in the curriculum. Supports are classified according to their main instructional purpose, but many supports can be said to address more than one principle.

Principle 1: Leverage and build students' background knowledge

Because of diverse cultural and linguistic backgrounds, informational background knowledge of English learner students can vary greatly. The activation and use of background knowledge is integral to students' development of science ideas, and supporting students in using what they already know helps them make connections to what they are learning. In the Amplify Science curriculum, students are asked to think through and discuss what they already know at strategic points within the instruction.

Embedded instructional design

- **Partner discourse routines**: Throughout the program, students often discuss ideas with a partner. The purpose of this is to allow for more student-to-student talk and allow the space to practice using science vocabulary. Often, these discussions are designed to allow students to share their initial ideas about a topic or discuss experiences they have had related to a topic or idea.

- **Warm-Ups and Daily Written Reflections**: The brief written Warm-Up at the beginning of each session (in Grades 6-8) often allows students to reflect on what they already know or have just learned in order to prepare them for what they will learn in the coming session, and is designed to be accessible for all students. In Grades K-5, the Daily Written Reflections serve a similar purpose.
- **Active reading**: Active reading encourages students to ask their own questions and make connections between what they read and what they already know. This process helps students use their background knowledge to understand what they are reading and generate questions that can lead to new understanding.
- **Anticipation guides**: With an anticipation guide, students learn how to activate their background knowledge, focus their reading, and support statements with textual evidence. An anticipation guide may help English learners engage with and reflect on key ideas before, during, and after reading.

Additional support

- **Additional discussions of prior knowledge**: Sometimes teachers have the option to provide an additional activity that helps students activate prior knowledge.

Principle 2: Capitalize on students' knowledge of language

By virtue of knowing more than one language, English learners are equipped with linguistic resources. They know that language can be used to describe, argue, explain, and persuade — and these are similar to the linguistic tools necessary for understanding science concepts and engaging in science practices. By building on this awareness of the use and function of language, students are able to learn the language of science and feel less anxious about their language abilities. The curriculum focuses on the transferable skills that English learners already possess in order to support their science language development. Related to this is the use of students' native languages in the classroom. Research shows that the use of native language helps students access relevant background knowledge and make sense of ideas. In addition to promoting culture and community in the classroom, use of native language helps English learners to transfer language skills from their home language to English.

Embedded instructional design

Science/Everyday Word Chart: The teacher leads the class in associating a science vocabulary term with an everyday approximation that students already know. The class discusses how the everyday term and the scientific term are similar but not exactly the same, and the teacher highlights the need for using more precise and specialized language in science to explain ideas. The running list in the classroom serves as a quick reminder for students to use scientific terms in place of everyday ones in their talk and writing.

Additional support

- **Leveraging native language**: At strategic points in the instruction, a Teacher Support note to the teacher suggests they invite students to share observations in English or their native language during informal conversation.
- **Cognates**: The teacher provides instructions about cognates, and students are prompted to look for these as they read and use them to help understand the text.
- **Multilingual glossary**: A glossary is provided with content-area vocabulary available in ten languages (Spanish, Haitian-Creole, Portuguese, Vietnamese, French, Arabic, Mandarin, Russian, Tagalog, and Urdu).

Principle 3: Provide explicit instruction about the language of science

The study of science provides an authentic purpose for using academic language to describe, explain, and argue. When provided with explicit instruction and models of scientific language (from both teachers and peers), students gain constant exposure to it, and thus take up the language in their speech and writing. However, students do not tend to learn the academic language of science from immersion alone. Therefore, the curriculum includes explicit instruction on reading, talking, and writing like a scientist. Science vocabulary is emphasized throughout the program, as this is an area that is often difficult for English learners and native English speakers alike. Repeated contextualized exposure to, and work with, a small set of high-utility science vocabulary words helps English learners become proficient. The program also includes vocabulary routines that provide them with greater access to target words.

Embedded instructional design

- **Language frames/sentence starters**: Students are provided with questions they can ask each other or ways they can begin their sentences in a discussion. Providing this language helps students get started in expressing their ideas, yet leaves cognitive work for them to do as they complete the language frame.
- **Argumentation**: The emphasis of argumentation is on meaning-making, hearing and understanding the contributions of others, and communicating ideas to build understanding. Argumentation provides rich science language learning opportunities when students are required to obtain, evaluate, and communicate information to refine their ideas and reach conclusions.
- **Modeling active reading**: Students are provided with examples of the types of annotations that they are expected to make during active reading. These come from fellow students and/or are demonstrated by the teacher using a think-aloud. Both help students understand the nature of the task of annotation and provide models of the type of language that they should use to make comments about and ask questions of the text.
- **Word relationships**: Students demonstrate how different vocabulary terms relate to one another, allowing English learners to understand the relationships between specific vocabulary and content.

Additional support

- **Word banks**: Students may be provided with word banks to help them engage in discussions or express their ideas in writing. These range from key science words that students have been learning, to descriptive words and phrases for students to use when explaining their observations, to comparative language, and to transition words to include in a scientific argument.
- **Multiple-meaning words**: English has a large percentage of words that have more than one meaning. Terms in science often have meanings that are different from how they are used colloquially (examples: plate, energy, mold, property). Teachers are provided with information on words that have more than one meaning, in order to clarify which meaning is meant in science texts.

Principle 4: Provide opportunities for scaffolded practice

Contextualized practice with science content and the language of science can help English learners feel more comfortable participating in class. Lessons provide strategic experiences as well as opportunities for additional practice. When the class is engaged in independent work, teachers have opportunities to check in with English learners' progress, meet with small groups, and reinforce science concepts. In addition, teachers may be prompted to find time for English learners to extend discussions or spend more time engaged in reading and writing activities. This can be done through teacher modification of the instructional schedule or through homework.

Embedded instructional design

- **Gradual release**: Units are designed so that there is an emphasis on teacher modeling and direction at the beginning of the unit, with students gaining more independence as the unit progresses. This also applies to the program as a whole: In Grades K-5, the units are designed and sequenced to provide a progression across the year. In Grades 6-8, the first launch unit provides a great deal of scaffolded instruction on reading, argumentation, and other scientific practices, while subsequent units provide deeper forays into these practices.
- **Graphic organizers**: Graphic organizers help students collect their ideas and make connections between their background knowledge and new science concepts in order to synthesize information. These are used throughout the program as students collect data and make observations, organize arguments, and respond to questions.
- **Argumentation**: Argumentation instruction is designed so that students consider various aspects of making an argument throughout the course of the unit before composing oral and/or written arguments at the end of the unit.
- **Reflective writing**: Throughout the lessons students may be called upon to reflect on their understanding of the science content in a short writing activity. This allows students to reflect on, as well as pose, questions that will help them clarify their understanding of the content.
- **Clear and concise instructions**: Instructions are tailored to students' learning needs so that they can understand the expectations quickly, and easily clarify what is expected of them at any point during an activity. This includes the use of icons or illustrations for procedural directions when needed.
- **Language practice**: Before sharing in a group of four or with the whole class, students discuss their ideas with a partner. This provides students an opportunity to practice expressing their ideas and use the language of science in a low-stakes way before sharing their ideas with a larger group.
- **Creating and using models**: Scientific models require language use that builds conceptual understanding and refines student thinking. Models also provide a non-verbal way to express initial understanding and can support the development of student explanations.
- **Modeling tools (Grades 2-8)**: Modeling tools allow students to use visuals to make sense of science content in a low-stakes environment. Modeling tool uses are often embedded as students construct or apply their understanding of science concepts to build a new explanation. These opportunities can help students build confidence with science concepts.
- **Differentiated lessons (Grades 6-8)**: Based on the Critical Juncture Assessment results, students have the opportunity for extra practice in making sense of the key content they most need support with.

Additional support

- **Strategic grouping**: Strategies for strategic partnering are essential for English learners as they interact and develop their understanding of new content. Opportunities for them to engage in conversations that are slightly above their language proficiency level can accelerate second-language learning and increase students' confidence engaging in science discourse. However, both homogeneous and heterogeneous partners can lend themselves to supportive and productive discourse opportunities. At times, it may be helpful to allow students with similar native language proficiency to talk together. At other times, it will be helpful to allow students with varied linguistic proficiencies to talk together.
- **Promoting inclusion in discussions**: Many English learners may be hesitant to contribute to class or small-group discussions. There are several steps you can take to help English learners feel comfortable contributing and increase their participation in class discussions:
    - Before a whole-class discussion, give students an opportunity to practice telling a partner something they might want to share with the whole class.

  - Give students a heads-up about the topic of an upcoming discussion well ahead of time so that English learners have more time to consider and prepare for their contributions.
  - Make a suggestion about what a particular student might share in a coming discussion, saying something like, "I see that you and your partner observed _____. Would you be willing to share about that with the class?"
- **Extended modeling**: In this support, the teacher works with a small group of English learners while the rest of the class is engaged in reading. The teacher provides additional, more explicit modeling with the same text and gives students opportunities to practice with small sections of the text under their guidance. Teacher Support notes sometimes direct teachers to provide brief individual coaching to English learners about strategies for active reading. These include engaging with the visual representations in a text first, chunking the text, previewing the text, and providing additional modeling of annotation.
- **Partner reading**: ELs may benefit from partner reading, rather than individual reading, during reading-focused lessons.

Principle 5: Provide multimodal means of accessing science content and expressing science knowledge

Students are provided with multiple pathways to access science content. Lessons are designed with varied access points for English learners so that they are able to understand instruction, use visual representations, and participate in and contribute to collaborative groups. Language-level appropriate student work products help ELs express their understanding of science concepts. They also provide English learners with accountability measures at their level of language acquisition that are not only multimodal, but engaging. This allows them to accurately demonstrate their acquired science knowledge. For example, if students are asked to write an explanation of a science concept, students might also be able to create an annotated visual representation to show their understanding of the same idea.

Embedded instructional design

- **Multimodal instruction**: For each key concept, students Do, Talk, Read, Write, and/or Visualize the important ideas in at least three modalities. Each chapter includes multiple exposures to and activities designed around the same concept. In units, a small set of key ideas are addressed in multiple ways, rather than covering a lot of territory without allowing for deeper understanding to develop.
- **Use of visual representations and images**: The visual nature of science is supportive for English learners (and all students) in learning the language of science. The program capitalizes on this by strategically providing visual representations for vocabulary words, ideas, and concepts when needed.
- **Interpreting and creating visual representations**: The program includes instruction on interpreting and analyzing visual representations, and does not assume that just because they are visual that students will know how to interpret them. Students can express their understanding of science content through explaining or creating visual representations.
- **Use of physical and digital models**: Visually rich models, including Sims, modeling tools, and physical models, allow students to show their thinking or make a visual claim. These are often embedded before discussion or writing.

Additional support

- **Additional practice in other modalities**: Engaging in more extensive whole-class discussions about relevant ideas can support English learners before they write. Whole-class discussions can help less certain students finalize ideas as they listen to the ideas of their peers. Posting key vocabulary words or providing a word bank enables students to draw from discipline-specific vocabulary as they write.
- **Additional visual representations**: English learners can access science content through visual representations. They can build on this visual understanding by then engaging in the text.
- **Optional graphic organizers**: Because graphic organizers provide a visual framework for English learners to express their thinking, it allows them more time to focus on their understanding of essential science content. English learners may be provided with optional graphic organizers to help them collect, organize, and/or synthesize their ideas. Or, a graphic organizer that is provided to English learners may have some language included or may be partially completed to reduce the language demands of the task.
- **Response options**: When an extended written response is called for, it may be more appropriate for some English learners to express their understanding by using a combination of drawings/diagrams and words, rather than a purely written response.
- **Increase wait time for student responses**: English learners often need more time to process oral questions than teachers typically allow before calling on students. In addition to considering the content of a question, English learners are likely to need time to make sense of unfamiliar words or phrases and/or to mentally translate questions into their native language. Increasing your wait time to ten seconds before calling on students will likely increase the participation of English learners in class discussions.
- **Students summarize**: Extended discussions or complicated instructions may be challenging for some English learners to understand. Hearing a summary in students' words can help them in these situations. After giving a set of instructions or after a period of class discussion, invite a student or several students to summarize the main ideas of the discussion or the steps of the instructions. If many of your English learners speak the same native language, you might invite students to summarize in their native language.

Support for engaging in extended discussions

Discussions are essential for English learners to develop critical science knowledge and the language of science. Frequent student-to-student discussions are built into every unit, and students have ample opportunities to explain their ideas, justify claims, and build on or critique one another's ideas. To promote inclusion in extended science discussions, guidance is provided to teachers on discussion routines and structures (such as paired discussions or Science Seminars), providing adequate think time, using provided sentence stems, and partnering students strategically to promote equitable discussion. To support students in using new science language, teachers are encouraged to highlight and explain science vocabulary words students can use in their discussions. Additional guidance to teachers includes when and how to access prior knowledge, how to use visual and kinesthetic support, and when to observe students closely during discussions in order to provide timely scaffolding. For newcomer English learners, guidance is provided for students to have the support of a "language mentor," a student who is bilingual in the newcomer's language and in English, and who can serve as a bridge between the two languages to help to ensure that the student has the opportunity to participate in discussions.

Support for academic writing

English learners benefit from many opportunities to write in order to learn, and from explicit scaffolding for academic writing. To provide support for them in their writing development, each Amplify Science unit provides students with many opportunities to write for authentic science purposes. For example, in the K–5 units, students take notes on their investigations, use anticipation guides, and engage in shared writing activities, which encourage them to think more deeply about science concepts and apply their growing knowledge of science language. By middle school, students write explanations and arguments more independently, but are still provided many scaffolds such as dedicated pre-writing time, word banks, and sentence starters. Students also receive multiple exposures to key science vocabulary words, encountering them through multiple modalities, which also supports their integration of the words into their writing. In addition, throughout the units, students have access to resources to support their science writing, including a glossary in the Amplify Library that includes Spanish definitions for primary Spanish speakers.

Planning for differentiated supports

Lesson #	Type of support	Instructional suggestion	For whom? When?
How would you use or modify the suggestion?			

Lesson #	Type of support	Instructional suggestion	For whom? When?
How would you use or modify the suggestion?			

Lesson #	Type of support	Instructional suggestion	For whom? When?
How would you use or modify the suggestion?			

Lesson #	Type of support	Instructional suggestion	For whom? When?
How would you use or modify the suggestion?			

Lesson #	Type of support	Instructional suggestion	For whom? When?
How would you use or modify the suggestion?			

Lesson #	Type of support	Instructional suggestion	For whom? When?
How would you use or modify the suggestion?			

Amplify Science help

Program Guide

Glean additional insight into the program's structure, intent, philosophies, supports, and flexibility.
my.amplify.com/programguide

Amplify Help

Find lots OF advice and answers from the Amplify team.
my.amplify.com/help

Customer care

Seek information specific to enrollment and rosters, technical support, materials and kits, and teaching support, weekdays 7AM-7PM EST.

scihelp@amplify.com

800-823-1969

Amplify Chat

When contacting customer care, be sure to:

- 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, etc.).
- Note the web browser you are using (Chrome or Safari).
- Include a screenshot of the problem, if possible.
- Cc: your district or site IT contact.

Notes

Notes