Amplify Science

Grades K–8

Science Change Management Playbook

Navigating the shift to three-dimensional science teaching and learning

Amplify.

The Lawrence Hall of Science
UNIVERSITY OF CALIFORNIA, BERKELEY

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Creating change that lasts in science

We're sure you've heard the news: In the U.S., only 22% of high school students are proficient in science,[1] and student performance across grades has fallen behind that of students from other countries in science and mathematics for at least a decade.[2] It's not hard to figure out why—K–5 students typically receive only 20 minutes of science per day, and students in grades 6–12 often experience a lack of access to upper-level science learning.[3]

That's the bad news. The good: K–12 leaders and educators across the nation recognize that science learning is essential for everyone. Regardless of their academic paths or career plans, all students must develop scientific knowledge and thinking in order to solve problems and make informed decisions about the world around them. That's why educators are calling for change.

We need a stronger drive to implement instruction that meets the latest science teaching and learning standards. Three-dimensional learning reflects what it means to be proficient in science in the 21st century. By centering learning around the student and emphasizing Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas, three-dimensional learning helps students develop and refine the skills needed to be engaged global citizens.

Science, engineering, and the technologies they influence permeate every aspect of modern life. Even if a student's interests or career path doesn't lead them to a traditional science-related field, three-dimensional thinking and learning prepares them for the real world by presenting phenomena-based lessons and examples, cultivating deeper conceptual understanding, and giving them the tools they need to make informed everyday decisions—all while opening new worlds and offering lifelong opportunities.[4]

How can you make this shift to three-dimensional learning?
Start with this playbook, where you'll find processes, checklists, and other resources to support your efforts at creating change that lasts.

1 National Center for Education Statistics, U.S. Department of Education. (2017). *The nation's report card: 2015 science at grades 4, 8 and 12*. NCES 2016162. **https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2016162**

2 National Science Board, National Science Foundation. (2024). *Science and engineering indicators 2024: The state of U.S. science and engineering.* NSB-2024-3. **https://ncses.nsf.gov/pubs/nsb20243**.

3 Horizon Research, Inc. (2019). *Highlights from the 2018 NSSME+ (National Survey of Science and Mathematics Education).* **https://horizon-research.com/NSSME**

4 National Academies of Sciences, Engineering, and Medicine. (2012). *A framework for K–12 science education: Practices, crosscutting concepts, and core ideas*. The National Academies Press. **https://doi.org/10.17226/13165**

Why science education is at a critical moment

We are in a new era of science education. Traditional instructional methods involve students *learning about* science—memorizing disconnected facts or working to confirm known science ideas. But in today's paradigm, teachers are called upon to help students *figure out* science the way scientists do. This way, students grow as critical thinkers and active learners and are well prepared to participate in a global society.

This paradigm shift began over a decade ago with the 2012 publication of *A Framework for K–12 Science Education* (known simply as the Framework), which laid out a bold new vision for science teaching and learning. The vision of three-dimensional teaching and learning is the basis for subsequent standards such as the Next Generation Science Standards (NGSS) and other state-adopted Framework-based standards. These standards lay the groundwork for three important shifts away from traditional science instruction:

1. Moving students from learning about science to figuring it out.
2. Teaching students to explain phenomena happening in the natural world.
3. Laying out expectations for three-dimensional learning.

These standards also intentionally call out the overlaps and convergences across disciplines, supporting students in meeting English language arts (ELA) and math goals in the context of learning science.

Change in your district

Your district may be engaged in change for several reasons, such as:

- Beginning the awareness and adoption of new science standards.
- Choosing instructional materials that align with these standards.
- Supporting teachers in implementing a new three-dimensional curriculum based on state standards.
- Refining practices or adjusting policies for ongoing academic improvement plans.

No matter what phase you're in, completing this shift is a worthy endeavor. You will make it possible for every student to develop a scientific mindset—and shape the future.

> "Science is an essential tool for solving the greatest problems of our time and understanding the world around us."
>
> **—The National Academies of Sciences, Engineering, and Medicine (NASEM),**
> ***Call to Action for Science Education***

Support systemic change: Process, practice, and people

Shifting to three-dimensional teaching and learning is a big deal, so it makes sense that shifting to teaching and learning with NGSS and other Framework-designed standards is a big deal, too. If you're taking steps to implement sustainable change in your district's science program, you'll need to think beyond just trying out new lessons or holding a single staff development day. You'll also need to rely on more than just one teacher or teacher leader to align science instruction to the standards and incorporate science time into the school day. This shift will involve fundamental cultural and practical changes at all levels—from the district office to the individual classroom. It's a systemic shift that requires time, effort, and routine maintenance, with all components working harmoniously toward a common goal.

When change is done deliberately and well, it is much more likely to stick—and drive real results. Supporting educational change requires focus on three key drivers: **Process**, **practice**, and **people**.

Process

There are three critical processes that help schools and systems bring pre-existing evidence to life with relevant and available resources and capabilities.

- *Problem*: Investigate science teaching and learning challenges across the district.
- *Plan*: Develop a focused plan that addresses one or more of those challenges, supports the prioritization of science, and aligns the science program with other district initiatives.
- *Progress*: Review progress to plan and adjust when needed.[5]

Practice

There are three dimensions of practice that help develop infrastructure to support and engage teachers.

- *Instruction*: Develop knowledge of phenomena-based, three-dimensional teaching and learning.
- *Behavior*: Implement the teaching and learning processes intended by the curriculum.[6]
- *Professional learning*: Implement professional growth opportunities for staff to acquire new skills and knowledge.

5 Hamilton, A., Reeves, D., Clinton, J., Hattie, J. (2002). *Building to Impact*. Corwin Press.

6 Fullan, Michael. (2016). *The New Meaning of Educational Change*, 5th Ed. Teachers College Press.

7 Deutschman, Alan. (2007). *Change or Die*. Harper Collins.

People

In the process of change, we need to develop strategies and plans to foster understanding and ongoing refinement.

- *Communication*: Determine the most effective way(s) to communicate the change to stakeholders.
- *Science champions*: Find, nurture, and highlight science champions already shifting toward best practices.
- *Coaching*: Create structures that allow for ongoing, long-term implementation support.[7]

Resources to start with:

- ***Call to Action for Science Education*** (National Academies of Sciences, Engineering, and Medicine)
- **Three-Dimensional Learning Practices** (NSTA)
- **District Leaders as Science Champions: A guide to high-quality teaching and learning** (Amplify)
- **Strengthening Reading and Improving Science Learning: The Benefits of Science and Literacy Integration** (Amplify)

> "With [a standards-aligned curriculum], students are talking the talk of science. They are thinking, doing, and talking like scientists. They are preparing for new standards, for shifts in science instruction, for opportunities to think at a higher level."
>
> **Educator, Grand Island Public Schools, NE**

Stages of implementation

Ready to go? The implementation of an instructional change can be broken down into the following five stages. When you're working to implement new practices or resources, a focus on key drivers of change—process, practice, and people—will be critical at every stage of the process.

- Stage 1: Exploration
- Stage 2: Adoption
- Stage 3: Initial implementation
- Stage 4: Full operation
- Stage 5: Innovation and sustainability

Stage 1: Exploration

The exploration stage is foundational and will take time, as it sets the groundwork for all subsequent efforts toward navigating and sustaining change. This phase involves leaders building and communicating a shared vision, gathering relevant data, and beginning to build consensus around the transition. It is essential to not only embrace a contemporary, standards-based approach to science education, but to also appreciate the fundamental impact it will have on the way teachers teach and students learn science. To build buy-in, leaders will need to clearly communicate their vision and the long-term benefits and improvements students will gain.

In this stage, you'll focus on setting a vision, exploring and building knowledge, and determining areas of prioritization.

Process

1. Establish a shared vision:

- [ ] **Collaborate with a diverse set of stakeholders.** Engage teachers, administrators, district and school staff, families, and community members to create a unified, compelling vision and promote a sense of shared ownership and commitment.
- [ ] **Align vision with goals and values.** Ensure that the vision reflects the collective goals, values, and mission of the school district.

2. Identify key issues:

- [ ] **Gather information.** Identify what science models are in use across grades and school sites (e.g., Are some or all schools using a science specialist model? Is the middle school model a math and science core model where math and science instruction are taught as a block?)
- [ ] **Conduct data analysis to better understand classroom realities.** Gather feedback at all levels to pinpoint the unique challenges and opportunities for improvement and growth in your district's science program.
- [ ] **Document specific assets and issues.** Record in detail what stakeholders say about existing strengths, capacities (e.g., staffing, time, skill building), and challenges.
- [ ] **Craft messaging.** Create clear communication for multiple stakeholder groups around key issues raised.

3. Develop a strategic plan:

- [ ] **Prioritize immediate and long-term areas of action.** Identify urgent priorities and develop a plan with a timeline for achieving long-term goals.
- [ ] **Manage competing initiatives.** Identify existing initiatives that conflict with new science education goals and develop a strategy to align them. This may mean deprioritizing other initiatives or goals, or rethinking their execution.

Resources

- Science Connections podcast, S3, E1: Science as the underdog, and the research behind it
- Key Takeaways From the Early Years of Transforming Science Education for the Next Generation: Stories From the Field (WestEd)
- Four Ways to Investigate Instructional Materials Under Consideration (EdReports.org)
- Critical Features of Instructional Materials Design for Today's Science Standards (EdReports.org and NextGenScience)
- "The power of phenomena in the science classroom" (Amplify)

Practice

1. Gather information:

- [ ] **Design surveys.** Create surveys to collect data and insights on staff's understanding of and openness to three-dimensional science instruction, identifying knowledge gaps and areas of resistance.

2. Create a digital science "backpack:"

- [ ] Curate a collection of digital resources, such as articles, research papers, and videos, that support understanding of three-dimensional teaching and learning.
- [ ] Organize resources for easy access and sharing with stakeholders.

3. Develop a science education learning network:

- [ ] **Facilitate peer collaboration.** Create opportunities for teachers and educators to collaborate and share best practices through professional learning communities, peer observation, online forums, and workshops.
- [ ] **Leverage expertise.** Identify and involve science champions in the district who will advocate for change, lead discussions, and provide mentorship on teaching strategies and program implementation.

People

1. Socialize the vision:

- [ ] **Communicate widely.** Share the district science vision through staff meetings, workshops, digital platforms, and district and site leader speaking engagements to ensure widespread understanding.
- [ ] **Encourage ongoing dialogue.** Foster a culture of open dialogue and feedback to ensure continuous improvement and stakeholder buy-in.

2. Build knowledge of three-dimensional learning:

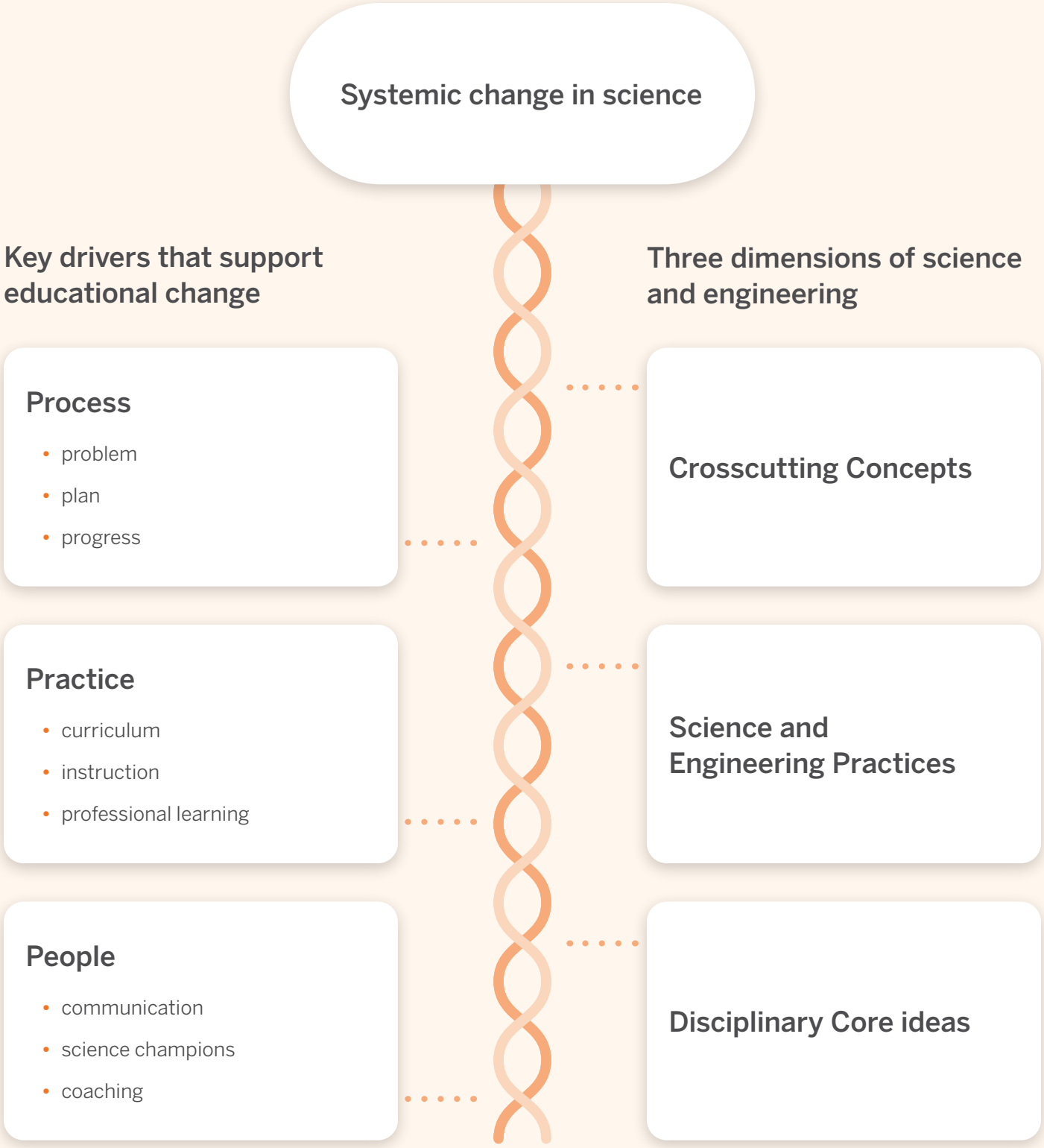
- [ ] **Design engaging professional learning sessions.** Give teachers hands-on practice with three-dimensional science materials and teaching strategies.
- [ ] **Facilitate ongoing learning and collaboration.** Implement a system that enables teachers to continue to collaborate and share insights through online forums, discussion boards, and/or coaching.

3. Share key resources:

- [ ] **Highlight the need for change.** Build your case by distributing articles, videos, and/or research papers that describe the need for and paths to change.
- [ ] **Encourage review and discussion.** Promote review and discussion among stakeholders to deepen understanding and commitment.

Questions to answer at Stage 1:

- Have we established a shared vision and communicated it widely?
  - What kinds of learners do we want to see matriculate from our schools?
  - What kinds of science teaching and learning experiences do we envision?
  - What kinds of science education do we want for our high-need student groups?
  - What are the expectations of each stakeholder to support the movement toward this vision?
- Have we used data analysis, feedback, and reflection to identify our unique assets and challenges?
- Have we established a plan for short- and longer-term priorities (while aligning with other district initiatives and priorities)?
- What capacities for three-dimensional teaching and learning do we want to build?
- Have we made available a collection of resources to help stakeholders build knowledge of three-dimensional learning?
- Have we provided enough opportunities for stakeholders to understand the shift to three-dimensional learning?



Supporting systemic change in science necessitates shifting to three-dimensional standards-based teaching and learning, while also involving fundamental cultural and practical changes at all levels.

Stage 2: Adoption

In the adoption phase, the primary question is: Which instructional materials will best facilitate your district's transition to three-dimensional science teaching and learning—and improve student outcomes? Research shows that this choice has a significant impact on student learning.[8] This stage also involves many time-sensitive elements, so a comprehensive adoption plan is essential. Understanding the principles of three-dimensional science instruction during this phase will prepare your team for a well-informed analysis of materials and ensure stakeholder success in the implementation stage.

When it comes to three-dimensional instructional materials, we're not looking just for the what, but also for the how. Teaching and learning with this approach requires more than exposure to grade-level science content—it also requires students to engage in classrooms as scientific thinkers.

Effective standards-based curriculum resources are:

1. **Three-dimensional.** NGSS-designed curriculum will consistently and authentically integrate the Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts in learning sequences and assessments.
2. **Phenomena-based.** Lessons and lesson sequences leverage science phenomena and engineering problems to drive learning and student performance.

These two aspects of standards-aligned instructional materials are closely tied— students use all three dimensions in their investigations and sensemaking to explain phenomena and solve problems.

To identify phenomena-based and three-dimensional materials, ask:

1. Are students engaging in the Science and Engineering Practices and applying Crosscutting Concepts to figure out science ideas?
2. Are students building understanding of natural phenomena?
3. Are students building understanding in a coherent sequence of learning over time?

8 Chingos, M. & Whitehurst, G. (2012). *Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core*. Brown Center on Education Policy at the Brookings Institution. **https://www.brookings.edu/articles/choosing-blindly-instructional-materials-teacher-effectiveness-and-the-common-core**

To ensure the selection of the most effective instructional materials and the greatest impact on your students, your team should evaluate each program against your district's criteria as well as the criteria set out in the field. We recommend tapping into a variety of sources of evidence in the adoption phase, including:

- **Evaluations**: Independent ratings based on trusted criteria (ex: EdReports).
- **Research**: Third-party/independent research exploring the effectiveness of the program.
- **Publisher resources**: Testimonials from other districts and walk-throughs of instructional materials.

Process

1. **Establish an adoption committee:**

- [ ] **Select a diverse group of teachers, coaches, and administrators** in the district—including skeptics who may have a large influence in their school communities.

2. **Establish criteria for selection:**

- [ ] **Determine criteria.** Ensure that the criteria align with all aspects of your science standards by using science-specific tools for evaluating instructional materials.
- [ ] **Align criteria to your vision.** Ensure that the criteria for selecting instructional materials aligns with the vision set out in the exploration phase.
- [ ] **Consider district-specific criteria.** Include criteria specific to your district needs and goals, for example, coherence across grades, cost, and usability.

3. **Reach out to publishers:**

- [ ] **Acquire sample materials.**
- [ ] **Request instructional demos or presentations.**
- [ ] **Keep a running list of questions for the publisher as you investigate materials.**

4. **Review and short-list materials:**

- [ ] **Conduct a thorough review and evaluation process.** Create a short list of materials for further consideration. (This can be done by a smaller group or by the whole adoption committee.)
- [ ] **Investigate short-list materials.** See the "Practice" section below for options on reviewing materials through pilots, with members of the adoption committee, or in grade-level teams.

5. **Involve the committee and stakeholders:**

- [ ] **Share materials with additional stakeholders.** Facilitate discussions, solicit feedback, and gather input on the suitability of each resource on your short list with the adoption committee and other relevant stakeholders.

6. **Make a purchase decision:**

- [ ] **Based on feedback and evaluation, decide which resources to purchase.**
- [ ] **Obtain all necessary approvals.**
- [ ] **Complete the procurement process.**

7. **Prepare for material delivery:**

- [ ] **Order the materials.**
- [ ] **Coordinate with schools and relevant staff.** Ensure readiness for delivery and distribution.

Practice

Employ one or more of the following strategies to investigate materials.[9]

1. **Conduct a pilot program:**

- [ ] **Implement the instructional materials** selected for evaluation in a few classrooms as a pilot.
- [ ] **Monitor and evaluate** the experiences of teachers and students using the new resources.
- [ ] **Collect data and results** that the adoption committee can use to inform the decision-making process.

2. **Engage small groups or individuals to review:**

- [ ] **Assign units or sections for individuals or teams to review.**
- [ ] **Provide questions or a rubric to guide investigations.**
- [ ] **Gather evidence in a common place to discuss.**

3. **Engage professional learning communities or grade-level teams for specific materials review:**

- [ ] **Set up time and guidance** for colleagues to plan lesson(s) together or teach lessons to one another.

People

1. **Support educators involved in the adoption committee or selection process:**

- [ ] **Provide all needed resources.** Ensure that teachers have all the components they need to review materials, collect data, and discuss findings.
- [ ] **Establish opportunities for teacher collaboration.** Allow for planning and internalizing lessons as teachers try new approaches.
- [ ] **Ensure sufficient time.** Look at the instructional schedule to allow enough time to implement pilot materials.
- [ ] **Build communication channels.** Provide support, coaching, and feedback during the pilot process.

2. **Continue to build understanding of three-dimensional learning:**

- [ ] **Educate and engage all stakeholders.** Share the *why* behind the shift with educators, administrators, and families who are not part of the adoption committee

Evaluating instructional materials

Although several tools help states and districts review, select, and evaluate instructional materials during the adoption phase, EdReports is widely regarded as the standard for identifying high-quality instructional materials. They consider the following criteria:

- **Design for the new paradigm.** Materials are designed for three-dimensional learning and assessment, using science phenomena and engineering problems to drive learning and enhance student performance.
- **Coherence.** Materials are coherent, scientifically accurate, and aligned with grade-band endpoints of all three dimensions.
- **Usability.** Materials support teachers in fully utilizing the curriculum, understand the skills and learning of their students, and support a range of learners.

9 EdReports. (2020). *4 Ways to Investigate Instructional Materials Under Consideration*. **https://edreports.org/resources/article/4-ways-to-investigate-instructional-materials-under-consideration**

Questions to answer at Stage 2:

- Have we established clear criteria for selecting high-quality instructional materials that meet our needs?
- Do our criteria align with the vision laid out in the exploration phase?
- Do we have the evidence we need from multiple sources to support our decision(s)?
- Do we have the information and research we need about what a three-dimensional approach to teaching science looks like?
- Do the materials we will evaluate include practices or resources that are not aligned to the principles of phenomena-based, three-dimensional learning?

"Phenomena-based science curriculum is important to us because we want students to engage with compelling or puzzling scenarios that make them want to know more, that ignite their curiosity."

Brooke Teller, STEM Coordinator, Portland Public Schools, Maine

"It is so encouraging to hear students engaged in conversation and building their ideas off of one another. [Them] finding the confidence to challenge one another and use evidence to support their thinking is so fun to watch, and listen to as well. Amplify Science has been a great resource to incorporate into my classroom."

Sarah Loessl, Big Hollow District 38, Illinois

Stage 3: Initial implementation

During the initial implementation stage, you'll put your newly adopted instructional materials into practice. The focus is on educators' understanding of the newly adopted materials and embedded approaches, providing ongoing support for implementation, and monitoring progress to inform real-time adjustments. Often educators find that teaching the materials with fidelity is helpful as they internalize and understand new approaches to science teaching.

Curriculum-based professional learning is a key component of this stage. Whether you're using vetted publisher-provided offerings or providing your own resources, you'll want to focus on helping teachers use the instructional materials effectively and understand their role in supporting the transition to phenomena-based, three-dimensional instruction.

Often, early success in implementation and excitement about new materials are mixed with hesitation or fear of change. In this phase of implementation, it's important to recognize and remind teachers that this level of change will take time. It requires responsiveness to teachers' ongoing needs and readiness to adjust your support as needed.

At this stage, it is important to help teachers move away from traditional science instruction and start making the shift to three-dimensional, phenomena-based science teaching and learning. Individual change is a critical component of organizational change.

Process

1. **Make comprehensive professional learning (PL) plans:**

- [ ] **Determine immediate and longer-term learning plans for teachers.**
- [ ] **Determine how you will conduct your sessions** (for example, through internal district staff or publisher-provided sessions).
- [ ] **Create roll-out schedules and observation checklists.**
- [ ] **Schedule additional PL opportunities and coaching throughout the year.**

2. **Make plans for collecting and using data:**

- [ ] **Establish your team's key measures of student success** and how you will collect data to track these measures.
- [ ] **Determine how you will monitor and track fidelity of implementation,** including program usage.

3. **Make plans for community engagement:**

- [ ] **Create resources to support engagement** from families, community leaders, local businesses, and other community members/stakeholders.

Practice

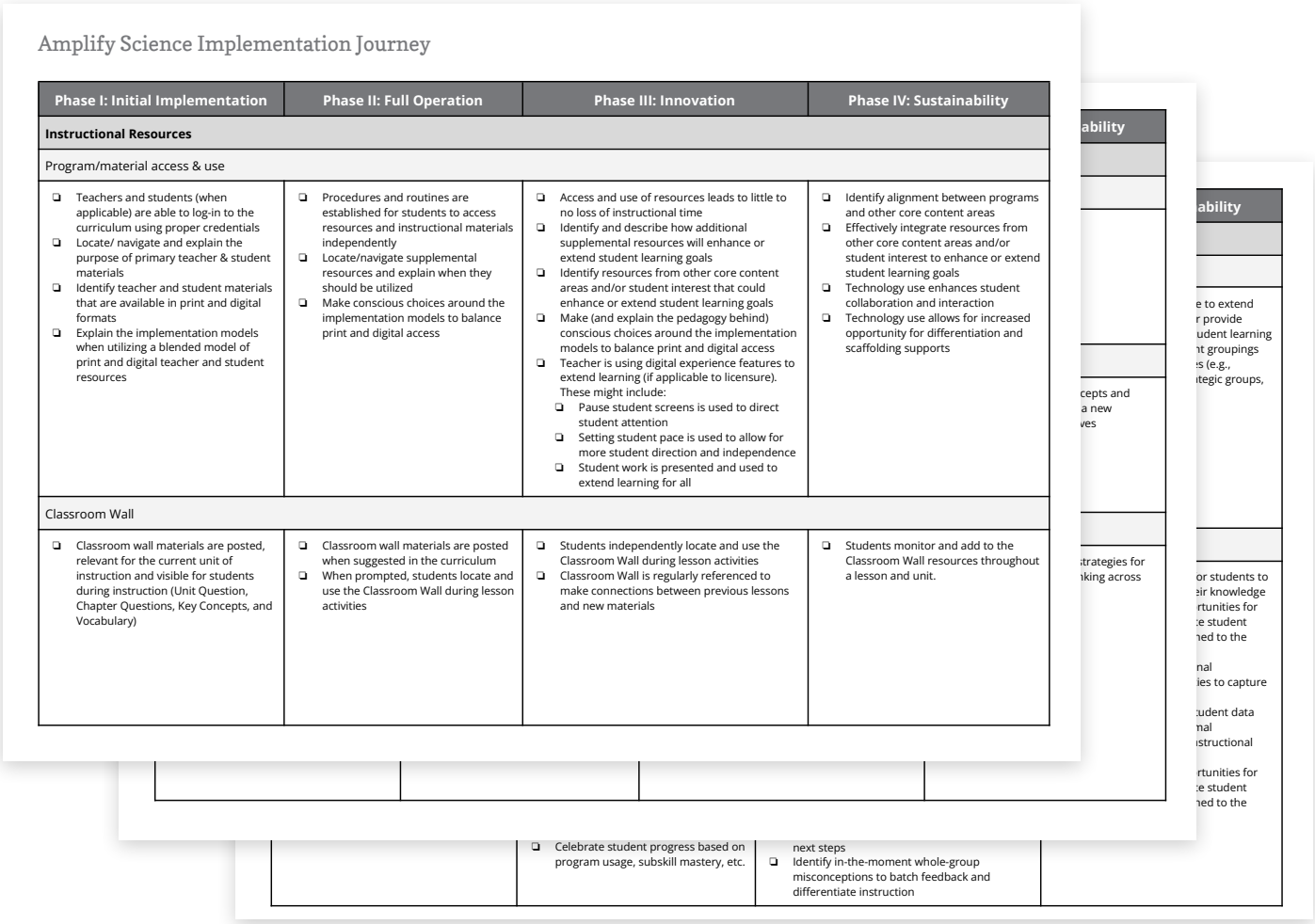
- [ ] **Engage teachers in PL.** Prioritize understanding of the program material to ensure effective adoption of new instructional practices. Consider if/how publisher PL will figure into your plans.
- [ ] **Allow for planning time.** Teachers will need time to engage in intentional planning, unit unpacking, instructional practice rehearsals, and ongoing coaching.
- [ ] **Provide collaboration tools.** Common resources such as shared planning templates or rubrics for looking at student work can support grade-level teams' collaborative work.

People

- [ ] **Acknowledge that change can be challenging.** This stage will involve a range of emotions, including anxiety and frustration.
- [ ] **Celebrate successes.** Recognize the hard work of individuals, highlight student growth, and showcase how the instructional materials are helping classrooms make the shift.
- [ ] **Maintain effective communication channels.** Ensure that communication established in Stage 1 continues so expectations, support tools, and positive stories are shared with all stakeholders.

Questions to answer at Stage 3:

- What continuous professional learning will be implemented, how, and for whom?
- How can we support educators in the first school year of implementation?
- How are we measuring success for individual teachers, students, and principals in year one?
- How will we collect and monitor data to ensure changes are resulting in positive outcomes for students?
- How will we collect and monitor data to ensure that teachers are building an understanding of the new instructional materials and the shift to phenomena-based, three-dimensional teaching and learning?



Amplify Science Implementation Journey

Phase I: Initial Implementation	Phase II: Full Operation	Phase III: Innovation	Phase IV: Sustainability
Instructional Resources			
Program/material access & use			
❑ Teachers and students (when applicable) are able to log-in to the curriculum using proper credentials ❑ Locate/ navigate and explain the purpose of primary teacher & student materials ❑ Identify teacher and student materials that are available in print and digital formats ❑ Explain the implementation models when utilizing a blended model of print and digital teacher and student resources	❑ Procedures and routines are established for students to access resources and instructional materials independently ❑ Locate/navigate supplemental resources and explain when they should be utilized ❑ Make conscious choices around the implementation models to balance print and digital access	❑ Access and use of resources leads to little to no loss of instructional time ❑ Identify and describe how additional supplemental resources will enhance or extend student learning goals ❑ Identify resources from other core content areas and/or student interest that could enhance or extend student learning goals ❑ Make (and explain the pedagogy behind) conscious choices around the implementation models to balance print and digital access ❑ Teacher is using digital experience features to extend learning (if applicable to licensure). These might include: ❑ Pause student screens is used to direct student attention ❑ Setting student pace is used to allow for more student direction and independence ❑ Student work is presented and used to extend learning for all	❑ Identify alignment between programs and other core content areas ❑ Effectively integrate resources from other core content areas and/or student interest to enhance or extend student learning goals ❑ Technology use enhances student collaboration and interaction ❑ Technology use allows for increased opportunity for differentiation and scaffolding supports
Classroom Wall			
❑ Classroom wall materials are posted, relevant for the current unit of instruction and visible for students during instruction (Unit Question, Chapter Questions, Key Concepts, and Vocabulary)	❑ Classroom wall materials are posted when suggested in the curriculum ❑ When prompted, students locate and use the Classroom Wall during lesson activities	❑ Students independently locate and use the Classroom Wall during lesson activities ❑ Classroom Wall is regularly referenced to make connections between previous lessons and new materials	❑ Students monitor and add to the Classroom Wall resources throughout a lesson and unit.

This example shows a checklist to help monitor progress in initial implementation and beyond.

Explore more examples of tools that can be used for both initial and ongoing implementation (Stages 3–5):

- Amplify Science Implementation Journey
- Observation tool for leaders
- Classroom self-assessment or observation tool

Stage 4: Full implementation

At this stage, both the quantity and quality of science education have significantly improved, with best practices almost fully integrated into your system. The focus now shifts to maintaining these practices and continuously improving through data and feedback. A shared understanding across sites and classrooms is essential, as is a commitment from leaders to uphold high standards while adapting to challenges and opportunities. Leaders play a crucial role in supporting staff, fostering a culture of growth, and ensuring that changes lead to measurable improvements in student outcomes. This phase emphasizes the ongoing benefits of three-dimensional science teaching and the importance of strengthening external partnerships and allocating resources to sustain momentum.

Process

- [ ] **Establish routine observation and feedback.** Integrate regular classroom observations of science teaching and learning (example: instructional rounds and walkthroughs), feedback sessions, and collaborative reflection to encourage implementation of best practices for science instruction.
- [ ] **Monitor student progress.** Conduct regular data analysis to monitor student progress in science and identify areas needing improvement.
- [ ] **Uncover roadblocks.** Use a variety of data collection strategies (example: informal interviews and conversations) to better understand the conditions supporting and hindering improvement; adjust strategies as needed.

Practice

- [ ] **Implement comprehensive coaching programs.** Broaden coaching programs to provide teachers with ongoing, personalized support in implementing effective science teaching strategies.
- [ ] **Expand the focus on three-dimensional instructional practice.** Ensure that all learners are being supported, including diverse student populations, multilingual learners, and those needing additional support. Support learning outside of the classroom through activities such as school gardens, walking excursions trips, and STEM-related field trips.
- [ ] **Encourage reflective practice.** Implement support structures for teachers to engage in reflective practice, helping them analyze their instruction, identify opportunities for growth, and develop strategies for improving student engagement and learning outcomes.
- [ ] **Foster a culture of continuous improvement.** Provide ongoing professional learning, coaching, and mentoring.

People

- [ ] **Plan onboarding for new staff.** Develop and implement thorough onboarding processes for new teachers and administrators.
- [ ] **Grow instructional leaders.** Support and empower instructional leaders at the district office and across sites to mentor teachers, facilitate professional learning communities, and promote best practices in science education.
- [ ] **Collaborate and leverage external partners.** Establish connections with local community-based organizations, higher education institutions, and STEM-related industries to support access to science education resources and enhance student understanding and interest in STEM and STEM-related careers.

Questions to answer at Stage 4:

- How has the integration of evidence-based practices and resources affected science education? What barriers have you uncovered that need to be removed?
- What progress monitoring strategies and metrics are in place to track the effectiveness of science education practices and progress toward the district science vision?
- How do we prepare new staff to enter the system?
- How are we leveraging external partners and organizations to support the full implementation of the district vision for science?
- What ongoing professional learning opportunities will maintain—and improve—instructional quality for science?

"I came in with the mindset that a lot of the materials would be above my first graders' heads, and I did not have much hope that it would be successful. I am so glad I was proven wrong. They are learning so much and are able to apply that learning across different subjects. The biggest things they are learning are how to be a problem solver, and how to work with a group to deepen their knowledge. The skills of problem-solving and collaboration are showing up in their everyday lives, and I am so thankful I get to watch their learning journey unfold."

Lauren Norton, Classroom Teacher, Richland Parish School Board, Louisiana

Stage 5: Innovation and sustainability

To promote ongoing growth for leaders, educators, and students, this is the time to implement and sustain innovative best practices in science education. Districts now have an opportunity to continue to build knowledge and advance instructional practices, invest in the resources needed to ensure continued progress, and deepen understanding of the conditions that support change.

At this stage, it is important to continuously foster and nurture the conditions that support innovation and ongoing growth in the capacity of the district's science program.

Process

- ☐ **Align with emerging research.** Regularly update and innovate teaching practices based on the latest peer-reviewed science education research.
- ☐ **Continue to evaluate and prioritize.** Revisit initiatives ongoingly and evaluate, as needed, where energy is focused across grade levels.
- ☐ **Engage in vertical articulation.** Align curriculum, instructional strategies, and assessment practices across grade levels to foster deeper student engagement and understanding of science.
- ☐ **Protect science instructional time.** Even as instructional time and focus evolve in other subjects, work to protect time spent on science.

Practice

- ☐ **Use current research and data.** Ensure that instructional decisions are informed by the latest research and data, continuously deepening the knowledge base of leaders and teachers.
- ☐ **Support collaborative learning systems.** Implement systems such as the study of problems of practice, data-driven discussions, and peer instructional rounds to foster implementation of innovative resources and practices.
- ☐ **Provide flexible, integrated professional development.** Create ongoing professional learning programs that evolve with new, research-based instructional methods, such as content integration (for example, science-math-English language arts and/or science-math-computational thinking).

People

- [ ] **Encourage shared ownership.** Foster a culture of collaboration and shared ownership among teachers, administrators, and students to build a community of practice around improving the district science program.
- [ ] **Focus on student growth.** Center discussions and efforts on student engagement, growth, and development, rather than on instructional resources and tools.
- [ ] **Develop pathways for science champions.** Build leadership pathways for science champions and master science teachers to lead initiatives, mentor peers, and drive ongoing, continuous improvement in science education across the district.

Questions to answer at Stage 5:

- How has the integration of evidence-based practices and resources affected student engagement with science?
- What new strategies and processes do we need to encourage innovation while remaining true to the core principles of three-dimensional science education and the district science vision?
- How can we integrate science content across grade levels to promote continuity and coherence across the district?
- What conditions and systems are in place to ensure continuous improvement for science in the long term?

"I am currently implementing Amplify Science in my 8th-grade classroom and am so excited about how it is strengthening not only the science concepts, but also literacy and writing skills! I am working closely with the School of Education through California State University, Chico, to help elementary teachers implement the Amplify program. I hold monthly professional development sessions that familiarize teachers with the Amplify platform and help them customize and implement Amplify units. Over the past two years, I have acted as the unofficial science curriculum specialist as we piloted [and] adopted, and now implement our [Amplify] curriculum."

Educator, Chico Unified School District, California

Your timeline for successful change management

Now that you know what it will take to create change that lasts when implementing a coherent science curriculum and program, it's time to start.

The timeline for your version of this action plan depends on the needs of your district. Sometimes, the exploration stage takes multiple years while the adoption stage is completed over a few months; other times, the exploration stage is brief and the adoption stage takes longer. Although the timeline may be variable, creating change that lasts is always a long-term plan.

	3-year plan	5-year plan	8-year plan
Exploration stage	6 months	1 year	2 years
Adoption stage	6 months	1 year	1 year
Initial implementation stage	9 months	1 year	1 year
Full operation stage	5 months	1 year	2 years
Innovation and sustainability stage	6 months+	1 year	2 years

Let's get started

You now have the tools, the plan, and the motivation to improve science learning outcomes for all of your students—and drive life-changing results by bringing change to your own school or district. We're happy to be part of that change. And we'd love to hear how it goes!

To get started with your transformation and begin driving real results, visit **amplify.com/science/change-management**.

> "This innovative program has not only transformed the way I teach science to my students, but has also enriched their learning experiences. My students were encouraged to ask questions, explore concepts, and collaborate with their peers, fostering a deeper understanding of scientific principles."
>
> **Diamond Carson, Classroom Teacher, Clark County School District, Nevada**

Visit us online to get started with your transformation and start driving real results.

amplify.com/science

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