Implementation guide

District Leaders as Science Champions

A guide to establishing and supporting high-quality teaching and learning

Amplify.

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The Lawrence Hall of Science
UNIVERSITY OF CALIFORNIA, BERKELEY

Table of contents

Introduction 4

Identifying high-quality instructional materials 5

How to evaluate and select high-quality instructional materials: Four important look-fors 7

Setting up the conditions for implementation success 10

It's time to make the shift! 13

Introduction

Deep science learning experiences in school have the power to reach beyond the classroom walls. These experiences cultivate students' curiosity, foster critical thinking and creativity, build generalizable knowledge about the world, and support students on their pathway to careers, college, and a variety of lifelong endeavors.

As the recent *Call to Action for Science Education* reminds us, "scientific thinking is essential for all people navigating the world, not just for scientists and other STEM professionals."[1]

The need to establish and support science teaching and learning is more urgent and critical than ever. States have spent the last decade adopting 21st century science standards and are now starting to include science assessments in their accountability measures.[2,3] However, according to national surveys, instructional time for science at the elementary level is still low compared to other subjects, there is unequal access to upper level science classes across districts, and science achievement has not been increasing over time.[4,5] It is clear that science still fights an uphill battle to be treated as a priority subject.

Helping science claim its spot next to ELA and mathematics will require leaders who champion science at the district leadership level. District leaders and leadership teams have a critical role to play in making the shift to teaching and learning with new standards, and in making high-quality science instruction in pre-K through grade 12 a centerpiece of their approach to equitable education.

How to lead through these shifts, including evaluating and selecting high-quality instructional materials (HQIM), and creating the conditions for implementation success, will be unpacked in the following pages.

1 National Academies of Sciences, Engineering, and Medicine. (2021). Call to Action for Science Education: Building Opportunity for the Future. Washington, DC: The National Academies Press. https://doi.org/10.17226/26152.

2 Achieve (2017) Science and STEM in ESSA

3 Education Week: Approved ESSA Plans: Explainer and Key Takeaways From Each State

4 Horizon Research, Inc. (2019). Highlights from the 2018 NSSME+

5 U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), various years, 2009–2019 Science Assessments.

Identifying high-quality instructional materials

Across all subject areas, whether it be math, language arts, social studies, or others, having the right instructional materials is critical for teacher and student success. High-quality instructional materials (HQIM) are defined as materials that meet rigorous criteria for being standards-based and easy to use by educators and systems.

Research shows strong evidence that the choice of instructional materials has large effects on student learning: The quality of the chosen curriculum can have as much impact as the quality of the teacher.[6] And materials are worth the investment; studies show that improving the quality of curriculum is 40 times more cost-effective than class size reduction.[7] We also know that teachers without access to great materials tend to piece together activities they find online, often leading to inconsistent quality that impacts low income and students of color the most.[8]

Studies show that improving the quality of curriculum is

40x

more cost-effective than class size.

6 Chingos, M. and Whitehurst, G. (2012) *Choosing Blindly: Instructional Materials, Teacher Effectiveness, and the Common Core*. Washington, DC: Brown Center on Education Policy.

7 Boser, U., Chingos, M., Straus, C. (2015). *The Hidden Value of Curriculum Reform: Do States and Districts Receive the Most Bang for Their Curriculum Buck?* Washington, DC: Center for American Progress

8 Opfer, V., Kaufman, J., Thompson, L. (2016). *Implementation of K–12 State Standards for Mathematics and English Language Arts and Literacy*. Santa Monica, CA: RAND Corporation.

HQIM in science

Many states are adopting new science standards or moving further in their implementation and assessment of new standards, making the selection of high-quality science instructional materials critical. HQIM can ensure that science grade level learning goals and standards are met, that educators have access to appropriate supports for all learners, and that a system of standards-based assessments are in place.[9]

HQIM in science classrooms go beyond laying out a course of study and activities for each grade level. They support educators by providing them with a clear vision and research-based pedagogy to implement new standards, and can ensure consistent and equitable learning experiences for students in every classroom. Prominent voices in the field caution against districts repurposing old materials or attempting to create their own curriculum, because this endeavor is extremely difficult and very time-consuming,[10] but perhaps more importantly, because homegrown or repurposed materials may not lead to the same learning gains as professionally designed materials that have proven effectiveness.[11]

9 EdReports.org and NextGenScience (2021). Critical Features of Instructional Materials Design for Today's Science Standards.

10 NextGenScience (2023) Key Takeaways from the Early Years of Transforming Science Education for the Next Generation: Stories From the Field. WestEd.

11 Harris, C. J., Feng, M., Murphy, R., & Rutstein, D. W. (2022). Curriculum materials designed for the Next Generation Science Standards show promise: Initial results from a randomized controlled trial in middle schools. WestEd.

How to evaluate and select high-quality instructional materials: Four important look-fors

Selecting materials to adopt is often a team-based, thoughtful process that involves various stakeholders in a district. A handful of tools exist that help educators select HQIM in science, with EdReports evaluations as the gold standard for which programs meet the rigorous criteria for high-quality instructional materials.[12] Because each context is unique, teams should also keep the following look-fors in mind during their selection process:

1 Do the materials align with and further your overall vision and goals?

Districts often determine their system improvement goals and put forth a particular emphasis for educators, such as a focus on deep learning, knowledge-building, or critical thinking. Look for science instructional materials that work towards supporting these goals. This will often be in the form of materials that integrate language and literacy, emphasize problem-solving and collaboration, and that build knowledge and technology skills.

2 Are the materials designed from the ground up for the current standards?

The instructional materials you choose should be designed from the ground up to meet Next Generation Science Standards (NGSS) or other three-dimensional state standards. Materials that have been retrofitted to meet the standards may not have the same three-dimensional design elements carefully and coherently woven together and may result in an instructional approach that looks more like teaching and learning looked in the past. This approach may not support students in reaching learning goals and achieving success on assessments designed to evaluate their understanding of all three dimensions of science and engineering.

12 EdReports.org

3 Are the materials research-based and proven effective?

Your curriculum materials should have a research-based approach to curriculum design. The curriculum developers might conduct their own pedagogical research or use current research from the field to inform their instructional approaches or assessment system design. You can find out if the publisher or developers have partnered with classroom educators and districts to inform their design process. Additionally, publishers and developers of high-quality materials should have evidence from independent, third-party evaluators who can verify that the completed instructional design of the program meets the intended learning goals.

4 Will these materials be highly usable and supportive of teachers and science leaders?

HQIM should be organized in a way that is immediately useful to teachers and have resources to support teachers' understanding and growth as they shift to new content and pedagogical approaches. This may include a robust integrated formative assessment system and educative features such as teacher notes, videos, and resources to support teachers at multiple points during their teaching. In addition, published materials should have a team of support professionals such as professional learning specialists, just-in-time help desk support personnel, and a district liaison who are available to help leaders and teachers in their implementation.

Table of contents

Resources for evaluating HQIM

While a handful of tools in the field support states and districts in reviewing, selecting, and evaluating instructional materials, **EdReports** provides educators with independent, evidence-based reviews of K–12 science instructional materials. Their reviews are designed to identify the most effective and appropriate instructional materials to support student learning.

Designed for NGSS

Materials are designed for three-dimensional learning and assessment and leverage science phenomena and engineering problems in the context of driving learning and student performance.

Coherence

Materials are coherent in design, scientifically accurate, and support grade-band endpoints of all three dimensions

Usability

Materials support teachers to fully utilize the curriculum, understand the skills and learning of their students, and support a range of learners.

Setting up the conditions for implementation success

The selection and adoption of high-quality instructional materials in science forms the basis for successful science teaching and learning. However, the right conditions must be established across the system in order to support buy-in and effective teaching with these materials.

1. **Establish a team of science champions.** The process of setting up the right conditions for HQIM implementation success may begin well in advance of when the new materials will be put into use. It starts by establishing a team of science champions—those key allies who can invigorate the implementation of science in your system using your selected HQIM. This could include teacher leaders, administrators, and district-level cross-subject leaders (ELA, math, etc.). It is important for this team to establish a shared vision for what high-quality instruction with your adopted HQIM entails.

2. **Engage in your own professional learning.** The report, Administrators Matter in NGSS Implementation, reminds us that instructional leaders "need learning opportunities if they are to adequately understand the substantial shifts of the Next Generation Science Standards (NGSS) and support teachers in implementing them."[13] Seek out HQIM authors and publishers who offer learning opportunities and communities of practice that support the science leadership in your system.

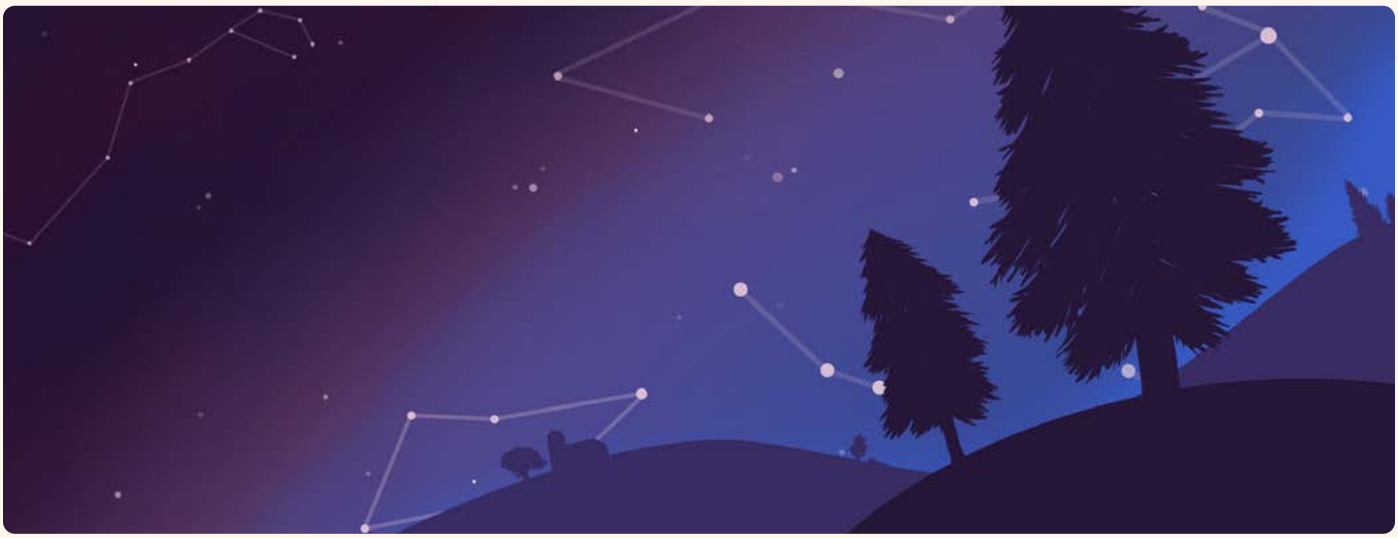
3. **Leverage alignment of science and district-wide initiatives.** Collaborate with leaders across subject areas to leverage the ways that science plays a role in advancing broader district goals, such as literacy development, cross-curricular integration, student engagement, or deeper learning.

4. **Allocate and protect instructional minutes for science.** Ensure that the time allotted for science in instructional schedules will meet the needs for teaching the HQIM. Utilize your team of science champions to determine rollout plans and realistic pacing guides. For self-contained classes (such as those in elementary schools), additional work may be needed to determine how to fit science minutes into each day or week that will allow the expected number of lessons to be taught in the designated time frame. This may involve integrating across content areas, adjusting pull-out and intervention times to avoid disrupting science, and other creative scheduling solutions.

13 Estrella, D., Tyler, B., Britton, T. Iveland, A., Nguyen, K., & Arnett, E. Administrators matter in NGSS implementation: Updated findings on how school and district leaders are making science happen. San Francisco, CA: WestEd.

5. **Plan for ongoing professional learning for teachers and administrators.** Published curriculum materials will often come with a set of professional learning (PL) experiences that can help jump-start HQIM implementation, but supporting ongoing learning over time is also crucial for implementation success. Encourage teachers to take advantage of curricular resources such as educative videos and educative notes. Consider how your system can provide additional forms of PL such as one-on-one coaching, grade-level team time (e.g. PLCs), school-based PL, and virtual learning across schools.

6. **Formulate your communication plan.** Teaching and learning that is based on the NRC Framework may be unfamiliar to families, administrators, teachers, and even to students. That's why it is important to be able to communicate the exciting changes that will be taking place. Find out which teachers have already been making the shift and share their lessons learned. Engage in conversations with teachers who haven't yet made the shift to learn about their strengths and take note of their concerns as well.



Less like this, more like this!

Often, explaining or describing NGSS-designed teaching and learning to families, teachers, students, and administrators feels abstract and vague. Consider engaging in conversations by sharing a vision of what teaching and learning might look like in a classroom that is implementing a new science program. Be sure to highlight the ways in which your new HQIM will support student engagement in science.

This table provides some examples of talking points for your community, and look fors for administrators as they go into classrooms using your selected HQIM.

Science teaching and learning will look less like this:	And more like this!
Using teachers or textbooks as the primary source of science information.	Students engaging in gathering evidence to answer questions through a variety of sources such as simulations, books, articles, modeling, and investigating.
Doing experiments or "labs" for most of science time.	Engaging in practices that reflect what scientists do—scientists argue, ask questions, analyze data, create models, communicate with other scientists, and yes, they sometimes engage with physical investigations.
Students learning about science topics or memorizing facts about the natural world.	Students figuring out phenomena, proposing solutions, and explaining how the natural world works using their science ideas.
Students memorizing lists of vocabulary words and their definitions.	Using a core set of science vocabulary and language in reading, writing, listening, and speaking about science.

It’s time to make the shift!

Having high-quality instructional materials, along with the right conditions in place for successful implementation, has the power to shift the mindsets and practices of both educators and students. Making science a priority in your school or district will boost students from in-class problem-solvers to real-world solution-seekers.

The journey to make these changes is, of course, easier said than done. We hope these tips will spark more ideas and further your work as a leader as you champion science!

Need more? Visit amplify.com/science to learn more about Amplify Science or talk to a product expert today!

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