STEPS TO ENACT STATEWIDE SYSTEMS OF ASSESSMENTS IN SCIENCE: A GUIDE FOR STATE POLICYMAKERS

These resources are part of a series of reports about challenges facing statewide science assessments and innovative solutions states are enacting to meet those challenges.

Transforming Science Assessment: Systems for Innovation *is a series of resources designed to provide state education leaders with 1) information about* ***how states are currently pursuing statewide assessment systems in science****; 2)* ***analyses of what features influence different approaches****, with an eye to supporting state leaders as they make their own decisions regarding science assessment systems; 3)* ***detailed state profiles*** *that highlight how and why some states have made decisions regarding designing and enacting different examples of systems of assessment; and 4)* ***a how-to guide for policymakers*** *looking to enact systems of assessment in science. Some readers may find that it is helpful to review all the resources in this series; others might be particularly interested in a specific component of this report.*

The suite of resources is organized in the following sections:

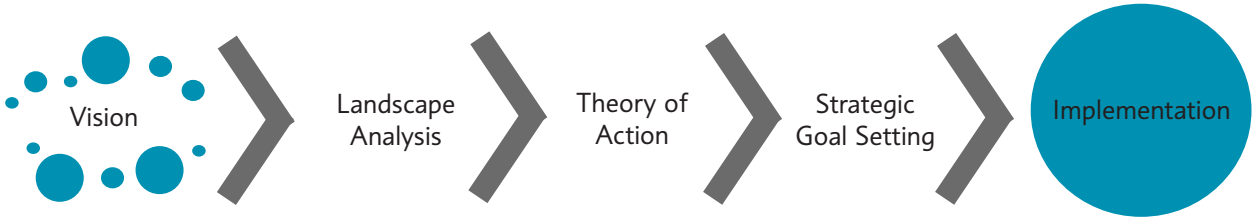
- *A high-level introduction to science standards and assessment, the need for systems of assessments in science, and two major styles of approaches that are emerging from state efforts to turn the vision for a system of assessments in science into a reality*
- *Deep dive into state-led assessment systems in science*
- *Deep dive into distributed assessment systems in science*
- *State Spotlights on systems of assessment in Nebraska, Kentucky, and Michigan*
- *A guide for policymakers to help consider how to develop and implement assessment systems* ***(you are here)***

Introduction

Deciding to implement a system of assessments is a critical step toward ensuring that all students are getting the high-quality science education they need—but it is also challenging terrain to navigate with several trade-offs and decisions to consider. This guide is designed to help state leaders—including science supervisors, assessment directors, and chief academic officers—design effective and strategic systems of assessment in science. This guide walks through five iterative steps all decisionmakers should consider when deciding on the nature and scope of their systems. For an analysis of how other states are currently approaching systems of assessments and state examples, please see the other resources in this series. For districts leaders interested in pursuing local systems of assessment in science, please see the District Implementation Workbook and Implementation Indicators.

State leaders looking to transform science education in their states know that assessment is an important piece of the puzzle; like it or not, what is tested is frequently taught, and high-quality and aligned assessments are an important signal and lever to support better science outcomes. Systems of assessment offer an opportunity to leverage the often-frustrating observation that tests influence instruction by creating and implementing assessments that are worth teaching to: assessments that signal, value, and support the kinds of teaching, learning, and performance that will lead to better student outcomes.

State contexts are complicated, and there is no "right" answer to how to go about implementing systems. There are, however, several ideas state leaders should consider as they settle on the approach that is right for them. These include the following, with regular stakeholder engagement and communication embedded in each step:



It should be noted that while these are discussed as linear "steps", state leaders should expect to revisit steps and ideas several times throughout the process as they iterate.

Step 1: Collaboratively Develop a Vision for Science Performance - and Subsequently Assessment - in Your State.

While the *Framework for K-12 Science Education* and standards like the NGSS pose an exciting vision for science teaching, learning, and performance, how this vision will be operationalized will be different from state to state depending on each state's unique context. Before planning a system of assessment in science, it will be important for state leaders to 1) determine who will be at the table to make these decisions, and 2) ensure that this core leadership team has a common vision for student performance. By the end of this phase, all members of the leadership group should be able to answer the question **"What is our vision for science teaching, learning, and performance in our state?"**

Framing questions for state leaders to consider:

- What knowledge and skills do we most value in student performance in science?
- How does science improvement support college- and career-ready goals for students?
- What are the biggest shifts we want to convey for science? How can assessments support that goal?
- What are our highest priority purposes and uses of assessments in science, given our three-dimensional science standards?

Activities to consider to support this step:

1. Form an **internal leadership team**, ideally comprised of SEA science teaching and learning expertise, assessment expertise, and decisionmakers. When forming this team, consider who is already prepared to be an advocate for meaningfully supporting science implementation via assessment as well as those whose buy-in is necessary but who might need some support to understand the vision. If the leadership team does not include a critical stakeholder (e.g., no decisionmaker; assessment director is not amenable), make note of this and plan accordingly in future steps.
2. Develop a **common vision for student performance in science** among the SEA leadership group. While science leads in states have often thought deeply about this, it is important that the entire leadership group have a strong vision and goal for science in the state that grounds future efforts. This should be collaboratively developed, reflecting both science priorities as well as how science influences student outcomes more generally as well.
3. **Engage stakeholders** both internally and externally. Consider regularly sharing the vision for science teaching, learning, and assessment at state and local board meetings, as well as with state chiefs and governors offices; securing time with other content areas and leadership within the state (e.g., chiefs' and governors' offices; STEM departments or initiatives) to discuss science goals; and hosting statewide stakeholder meetings that bring teachers, administrators, instructional coaches, district/regional leadership, higher education, and third-party partners into the process for vision and planning.

State Example

Nebraska formed a leadership team that includes the chief academic officer, science lead, and assessment leads that have a common vision for science teaching, learning, and assessment in the state. Soon after deciding that they were committed to improving science education for their students in part through a comprehensive systems of assessments in science, the leadership team strategically engaged stakeholders—this included regular discussions and meetings with other state leaders as well as a large-scale stakeholder visioning meeting that brought together educators, higher education, their assessment vendor, SEA staff, and others to identify high-priority targets and make recommendations for Nebraska's system. This not only gave the SEA opportunity to ensure their plans moving forward met the needs of the state, but also created a core set of advocates for the system that could be leveraged moving forward.

Step 2: Assess Your State Context.

There are a variety of ways states can approach systems of assessments in science, and the right decision for any state lies in its unique context. Before deciding on an approach, state leaders should assess their current state context to identify roadblocks, opportunities, and realities that need to be accounted for. By the end of this phase, state leaders should be able to answer the question **"What aspects of our state context can be leveraged most effectively, and which aspects of our state context need to be handled carefully?"**

Framing questions for state leaders to consider:

- What do our current assessments look like? Who gets and uses the information? How is that information being used?
- What information is being shared with parents, teachers, students, administrators, and policymakers? How does this help meet our state goals for students, and how do we want to change?
- What are the current non-negotiables that need to be taken into consideration? Consider federal requirements for testing, testing requirements in legislative statute, etc.
- What local efforts are currently in place in science? How widespread are they?
- What incentive structures are within our control?
- Who within the SEA needs to be at the table to determine this vision and make these decisions?
- What does the budget landscape look like? What money/resources are currently available, and what could be leveraged with some strategy?
- What is our current situation with our science assessments? Do we have vendors and contracts we need to contend with, or are we starting from scratch? What are the timelines and budgets associated? What are possible leverage points within these efforts?
- What is the current relationship like between the SEA and LEAs in the state?
- What local assessments are currently being used in LEAs?
- What does district capacity across the state look like?
- What higher education, informal education, philanthropic, nonprofit, and business partners do we have access to, and how can they support or hinder the work?
- What does student distribution and performance gaps currently look like?
- What regional and district support is available to teachers and schools? How can this be leveraged?
- What models or processes are other states using that might be useful for us to consider?

Activities to consider to support this step:

1. Conduct a **landscape analysis** of your state context. In this analysis, consider the people, the processes (including current assessment efforts), and the culture you will need to navigate to be successful.
2. Consider your **theory of action for science improvement and achievement** in your state. Based on your vision for science education and your landscape analysis, what levers will be most effective to drive that change? What is the role of assessments? Consider using a driver diagram to support this step.
3. **Connect assessment ideas to the rest of the standards implementation plan** to ensure that your systems of assessment are in sync with both goals and timing of other implementation efforts.
4. **Establish routines** to help the SEA leadership regularly check in on and update progress and goals.

State Examples

When assessing current state landscape, **Nebraska** identified the legislative requirement for *ACT as the high school science assessment*—and the accompanying attitudes about shifting instruction in high school—as a challenge their assessment efforts would need to navigate.

Michigan realized that there was limited internal capacity, buy-in, and funding to support a comprehensive assessment system vision that was entirely coordinated by the state—right now. They do have, however, a rich set of partners throughout the state, including high capacity districts and higher education groups that are deeply involved in NGSS implementation.

Step 3: Articulate a Specific Approach to a Science System of Assessment that Clearly Connects Your Vision for Student Performance in Science and Your State Context

With a vision, priority purposes and uses, and realistic understanding of the state context in hand, state leadership can determine an overall course of action that will strategically lead to that vision. During this process, the assessment system leadership group should articulate a high-level approach that the state can commit to. This should involve states deciding on what types of assessment efforts are going to be central to their vision; whether to take a state-led, distributed, or other approach to the system of assessments; and how these assessments will be used by educators throughout the state—for what purpose, who will receive the feedback, and what stakes and incentives will be in place. By the end of this phase, state leaders should be able to articulate the answer to the question **"What will our system of assessments in science look like, and how will this support our goals for student learning and performance in science?"**

Framing questions for state leaders to consider:

- Given our state context, do we have enough internal human capital and resource/budget supports?
- What can/should the state contribute to statewide systems of assessments in science? What should other parties—districts, regional units, and partners—contribute or take ownership of?
- What incentive structures are we able to employ?
- What supports can the SEA provide locally to design/implement systems of assessment?
- Given our vision, what information is needed for various stakeholders to make that vision a reality? What types of instruments, and at what frequency, would be needed to support that?
- Are there existing assessments we need or want to include? Or information stakeholders currently receive that needs to be supported?
- How does our new approach differ from what stakeholders have been used to in the past? How will we communicate this?

Activities to consider to support this step:

1. Convene the internal science assessment system leadership group and **connect the evidence from the driver diagram and landscape analysis to your vision to propose an approach to the system of assessments.** Consider what types of assessments you will employ, who will be responsible for creating and disseminating those assessments, and how they will connect to one another.
2. **Develop an engagement plan** to convey your ideas both internally within the SEA and externally across the state. Make sure your communications strategy connects the assessment system plan to the visioning information previously acquired from stakeholders, so that stakeholders can clearly see how their priorities and perspectives have shaped the approach—and what role they will play in this plan. Consider a communications plan that allows stakeholders to interact with the ideas; while newsletters and webinars are helpful, consider supplementing these with presentations at meetings, short convenings or focus groups, and surveys.
3. **Solicit feedback** from stakeholders, experts, and colleagues to fine tune your thinking. Consider thought partnerships.

State Example

When science leaders in **Michigan** assessed their landscape, it became clear that the combination of limited internal capacity and resources and strong partnerships across the state made *a distributed system of assessments* the most likely path toward meeting their goals for all students.

Step 4: Develop Strategic Short- and Long-Term Goals to Turn Vision Into Reality

Once high-level decisions about approach are made, state leaders should thoughtfully create a detailed plan for what the road getting there looks like. It is relatively easy to envision what an ideal comprehensive system of assessments might look like in ten or fifteen years, but what needs to be done now to get there? Short-term goals need to be chosen strategically—what is easiest to accomplish might not necessarily have the greatest returns over time. State leaders should also note that some of the next steps identified in this phase might have implications beyond assessment design, development, and implementation. By the end of this phase, state leaders should be able to articulate plans that answer the questions **"What milestones will we target in six months, one year, and five years? Why these milestones? How will what we target now set us up for success down the road?"**

Framing questions for state leaders to consider:

- Why doesn't a system of assessments exist right now? What is stopping us from implementing the full vision now? How do we address those barriers?
- What are our greatest needs in terms of science standards implementation, and how can the assessment system be leveraged to meet these needs? Consider professional learning communities, resource banks, etc.
- What grades are currently summatively tested in science? What do current mechanisms for feedback in the 'non-tested' grades look like across the state?
- What should the distribution of content and performance targets look like on various assessments in the system (e.g., distribution of SEPs, CCCs, DCIs), given the overall approach? How should we begin prioritizing what gets developed and implemented first?
- What are the needs of teachers and districts? How should we begin prioritizing among those needs for short-term goals for our assessment system? Consider whether there are content areas (e.g., earth and space science, engineering) or grades (e.g., high school science) that need particular support.
- Who should be part of each development effort? What are the roles of various stakeholders? How will this both make the system better and generate buy-in?
- What are our timelines for each component? Who is responsible for what, and how will we make sure we are meeting our goals?
- What are our capacity and resource opportunities and limitations, and how will we navigate these? Does this require any specific prioritizations?

Activities to consider to support this step:

1. Identify **how you will ensure coherence and consistency across assessment efforts while encouraging complementary and comprehensive information** across instruments. One of the reasons systems of assessment in science are so imperative is the expansive nature of *Framework*-based standards—not only are there comprehensive expectations around each of the three dimensions and their use together, but there is also a range of other targeted aspects of student performance such as degree of transfer, sophistication of the dimensions and their use together, use of multiple sets of the dimensions, complexity of the targeted phenomenon/problem, etc. State leaders will need to consider how to balance ensuring that all assessments stay true to the standards (features to maintain consistency) while allowing different tasks and tests to focus on different priorities for student performance (variable features).
2. Based on the vision for your system of assessments, **consider what are the "must haves" and "nice to haves,"** and establish detailed goals and plans for the must-haves. In these plans, include what success will look like, timelines, and who is responsible.
3. **Prioritize goals over time**—a comprehensive assessment vision will intentionally be designed to meet a range of needs, purposes, and intended uses. It will likely be difficult to tackle all of these at once, so leaders should strategically choose the first priorities that they will pursue. Make sure to consider how this will be viewed by a range of stakeholders, and how this might help (or hurt) future work down the road.
4. **Revisit and update your landscape analysis**, now including the specific opportunities and barriers connected to your short-term goals. Consider why the system of assessments you have envisioned doesn't exist right now, and what needs to be addressed to clear the path for both short- and long-term goals.

5. **Establish a plan for scaling**, both across the state and over time. Consider what a realistic starting point might be—this might involve focusing on one part of the system, small components of each part, full-scale approaches via small pilots in a small number of districts, or a combination of these approaches. An important consideration when thinking about scaling is considering capacity and resources—who is responsible for each goal? How will different lines of work be connected? What financial support is available? What partners will support this work?
6. **Set timelines and routines** to move the work forward, including a plan for communicating with internal and external stakeholders about what changes are coming and why they are being implemented.
7. **Engage critical stakeholders**—especially those whose buy-in you need, and who have a large role to play in the work—as you establish these goals. Invite their feedback and perspective, and use "diving in" as an opportunity to continue nudging the thinking of those important stakeholders who might not be on the same page as the state science assessment leadership—yet.

State Example

In **Nebraska**, the state leadership group knew that long term, they wanted to implement a comprehensive assessment system that could meet multiple stakeholder needs, including support for teachers/teaching and learning, local accountability, informing the statewide information about student progress in science. They recognized that they would need to identify a subset of those priorities to pursue short-term. By considering their state context, they decided that the right short-term goals were:

1. Pursuing statewide summative assessments in science in grades 5 and 8, focusing on the 5th and 8th grade standards rather than grade-banded standards because they would have an interim system to address the other grade-levels.
2. Within their interim system, focusing on tasks designed to support teaching and learning. By starting with tasks that are designed to help students and teachers understand what the three-dimensional expectations look like for students, the state can cultivate an environment that both creates buy-in from teachers for the assessment system as well as address a major need in science implementation in the state.
3. State leaders are currently considering more focused targets within the short-term goal of tasks to support teaching and learning—for example, they are considering whether there are content areas that need particular support, incentivizing science teaching and learning at 'non-tested' grades, and professional learning goals for educators that can be pursued through this aspect of the assessment system.

Step 5: Implement, Iterate, Communicate

Implementation will look different in every state, but there are some common considerations that state leaders should think about as they implement their systems of assessment in science. Remember that implementation, as a whole, is extremely complex; therefore it is important to regularly consult multiple metrics to monitor progress, and make sure that the approach is flexible enough to change as needed. This step doesn't end—but engaging in Step 5 should help state leaders answer the question **"How will we know we are being successful, and how will we change the system to react to new information?"**

Framing questions for state leaders to consider:

- What metrics will we be using? How will we acquire this information and how will we interpret it?
- What is our communication plan to stakeholders? How are we reaching different audiences with different priorities and needs?
- What is the rollout timeline?
- What quality control processes will we put in place?
- In what ways are our processes flexible enough to incorporate feedback and continuous improvement? How will this happen?
- How are we collecting information from schools and districts? How will we make sure that our efforts are supporting equity and access goals in science?
- How are we supporting districts, schools, and teachers as they implement the system?

Activities to consider to support this step:

1. **Develop quality and alignment guidance/specifications** for all assessment efforts, including RFPs, vendor-developed, state-led, and locally-developed assessments. Consider existing science alignment criteria, tools, and processes as the basis for your work.
2. **Communicate a timeline** for implementation of the system, showing how it will be phased in.
3. Embed **routines to monitor progress** that include student outcomes information, changes in attitudes of teachers and students, etc. Consider focus groups, teacher and administrator surveys, etc. to ensure open dialogue and communication with districts, schools, and teachers.
4. As you focus on implementing short-term goals, **make recommendations for the changes that need to be made to support the long-term goals**, using data from early efforts to support your claims.
5. **Emphasize professional learning** for educators that helps them understand the changes, why they are being implemented, and how this will influence their classroom experiences. Consider leveraging district- and regional-partners as ambassadors for this work.
6. **Make sure opportunities for continuous improvement** are intentionally built into implementation plans.
7. **Develop, monitor, and celebrate milestones along the way.** Systems of assessment are complex and will take time. This creates many opportunities for frustration and backpedaling. Consider intentionally developing and monitoring short term, achievable milestones, and celebrate those victories when they are met. This serves to help educators and policymakers acknowledge progress, keep the motivation and buy-in to pursue transformational systems strong, and allows manageable opportunities to course-correct as needed.

State Example

In **Kentucky**, an important component of implementing their assessment system is the use of through-course tasks in every classroom. Kentucky intentionally designed this part of the system to support professional learning for teachers; the teachers use professional learning communities (within their schools and districts, or networked across the state if needed) to come to a common understanding of the selected through-course tasks, how to implement them, and how to interpret student responses. Moreover, the SEA coordinates student work analysis with educators to more deeply understand student performance as well as points of improvement for the tasks themselves. The through-course tasks also provide a calibration point for educators and the SEA—calibration between classroom instruction and common understanding of end-of-year goals for students as well as calibration across tasks to support the improvement of the bank over time. This emphasis on continuous improvement supports a sustainable effort over time.