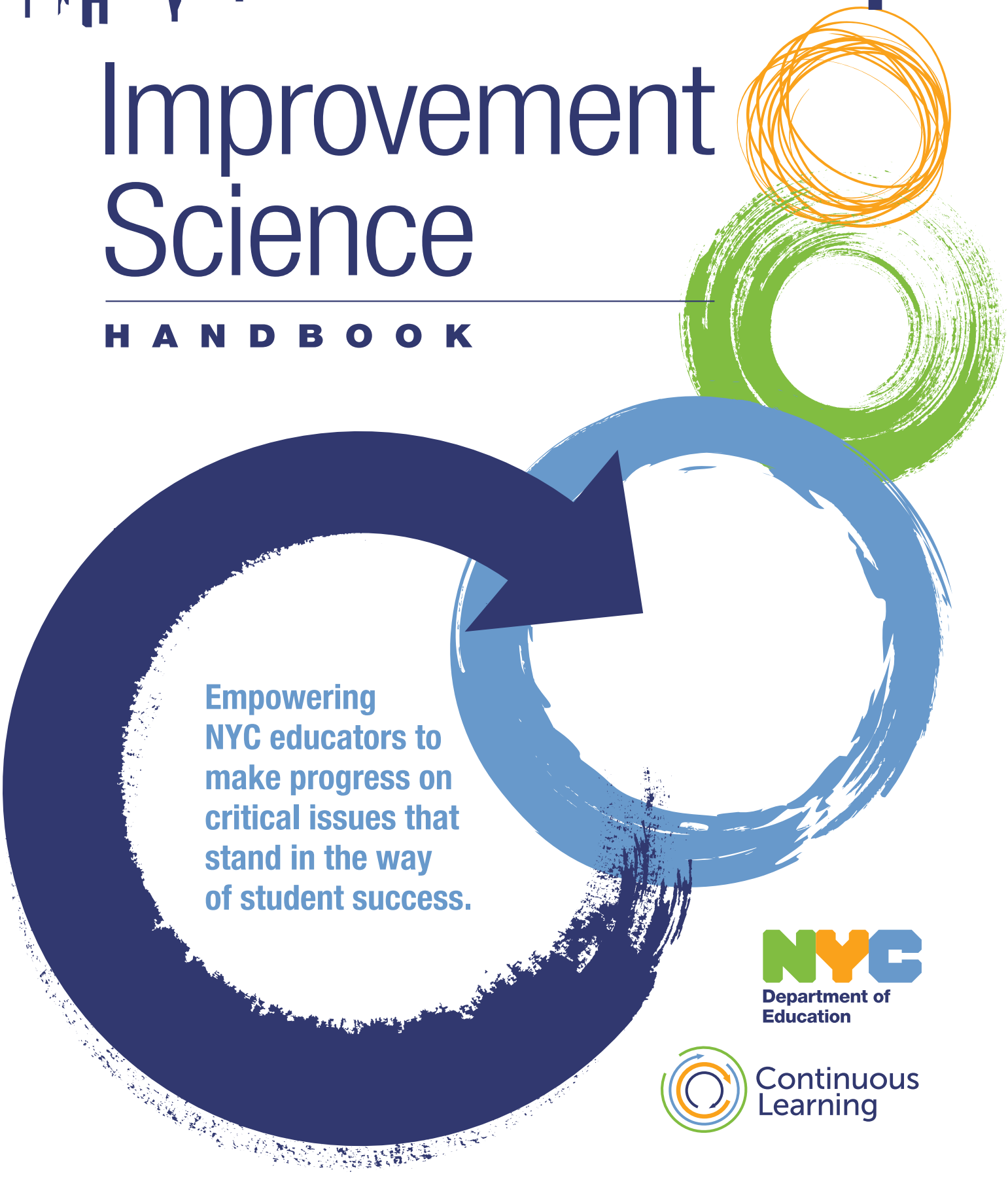
Improvement Science

HANDBOOK



Empowering NYC educators to make progress on critical issues that stand in the way of student success.

NYC Department of Education

Continuous Learning

NYC Department of Education

Richard A. Carranza
Chancellor

Phil Weinberg
Deputy Chief Academic Officer
Division of Teaching & Learning

Marina Cofield
Senior Executive Director
Office of Leadership

Julie Leopold
Executive Director
Continuous Learning Team

This handbook is a tool for schools to support professional learning for pedagogical staff. The handbook contains suggestions and best practices for schools and does not represent DOE policy or contractual obligations. Principals and other supervisors may utilize this handbook at their discretion. The department reserves the right to make changes to this handbook at any point in time.

Acknowledgments

This handbook is a publication of the Division of Teaching & Learning, under the leadership of Phil Weinberg; the Office of Leadership, under the leadership of Marina Cofield; and the Continuous Learning team, under the leadership of Julie Leopold.

Lead Author:
Sam Milder

Contributing Author:
Benjamin Lorr

Editors:
Courtney Smith, Julie Leopold, and Laurel LeFebvre

Key Contributors:
Natalie Pennington, Marilyn Stotts, Lainey Collins, Rhena Jasey, and Alida Maravi

A very special thanks to:

**The Carnegie Foundation for the Advancement of Teaching
for its leading role in spreading improvement science to the field of education
and for granting permission to adapt its tools.**

**Eskolta School Research and Design for its partnership through the development
of this handbook and for granting permission to adapt its tools.**
Benjamin Lorr, Emily Klein, Michael Rothman, and Jessica Furer

The School for Global Leaders (M.S. M378):
Carry Chan, Keri Ricks, Cheryl Campos, Erin Gamoran, Paige Wehren, Erica Abramson, Magdalen Beiting, Ednalyn Bragin, Joyce Chen, Regan Dimenna, Brittany Dimura, Christopher Grenier, Tiffany Huang, Catherine Killeen, Ivanna Matura, Erica O'Conner, Geoffrey Pasco, and Nicole Rhoads

The Eileen E. Zeglin School (P.S. K225):
Dr. Barbara Pelegrinis, Alla Cherny, Katie Cunningham, Meghan Maguire, Stephanie Mazzaro, and Lauren Sweeney

Letter from the Deputy Chief Academic Officer

Dear Educators,

I am thrilled to know the ***Improvement Science Handbook*** is in your hands.

That is because our school system's ability to learn, grow, and improve to better serve our 1.1 million students is also in your hands. By working together, we can do the hard work necessary to ensure that all of our classrooms are wonderful places in which our young people will learn and thrive.

Every single period, day, or week of the year is a rich opportunity to examine what works—and, just as important, what doesn't work—in our classrooms and our schools. Improvement science can help us to discern levers for improvement, dig into root causes, and engage in the kind of iterative thinking and learning that allows us to make smarter and much more informed choices about the direction of our work. In so doing, we learn from mistakes, become more efficient, and track everything we discover along the way so our colleagues can learn from us.

Think of it this way: instead of jumping to unproven "solutions," as we often do in our profession, improvement science gives us the tools necessary to embrace good questions. As educators, we know that questions lead to understanding; ultimately, questions are what will lead us to experiment, to make changes, and to find ways to improve. When I was principal at the High School of Telecommunication Arts and Technology, I learned early on that making classroom improvements required a true partnership among staff and the larger school community. Any change we implemented was more successful when we committed to an investigation—as a community—and incorporated as many voices as possible to that query. Positive change happened when we came together to embrace questions, not when I (or anyone else) dictated solutions.

As you explore improvement science, I ask you to remember that educators across the city must rely on each other to grow. You are our school system's greatest resource; it is our ability to work together, our desire to keep learning that will make the New York City Department of Education the best school system it can possibly be for our students. We are not 1,800 separate entities; we are a community of practitioners. Please continue to share your learning with other schools, because we know that sharing our challenges and successes will help all schools improve.

Thank you all for the intelligence, energy, and commitment you bring to our 1.1 million students every day of the year.

Sincerely,

Phil Weinberg
Deputy Chief Academic Officer for Teaching and Learning

Table of Contents

Chapter 3: Testing Changes

75

The purpose of this chapter is to provide guidance on using Plan-Do-Study-Act (PDSA) cycles to test, reflect on, and refine changes to practice. Testing changes should begin once the team has mapped out a working theory of improvement.

Chapter 4: Measuring Your Progress

109

The purpose of this chapter is to identify the types of measurement and data that best inform and support your improvement work. It should be used after gaining experience running a few initial tests, unless your improvement project can't proceed without defining measures first.

Chapter 5: Scaling and Sharing

137

The purpose of this chapter is to understand when and how to scale a successful change. It should be used after you have run two or more PDSA cycles and you have a change idea you are confident is ready to be tested across broader contexts.

Introduction: Why We Believe in Improvement Science for New York City Schools

Problem-Solving Approaches by NYC Teachers

Imagine a school where teachers are fully empowered and trained to effectively identify and address the most complex and challenging problems that stand in the way of improving student achievement in their community. Through working toward this vision, New York City schools can build an environment where teachers are meeting students' needs and making real progress on student outcomes every day.

For the past 10 years, teachers in New York City have engaged in inquiry work, concentrating on classroom practice and student work to authentically problem-solve in honest, rigorous ways. Inquiry is research based and posits that teachers should try something, examine the results, and then decide whether to revise or adopt the new practice. It is deeply rooted in the idea that when educators work together, student evidence should guide their instructional work. We applaud schools for engaging in this challenging approach.

Improvement science is a way to problem-solve that is a natural extension of the overall inquiry process and builds upon its strong history and tradition. While it is related to inquiry, we believe it has unique features that make it a compelling approach for NYC schools right now. Improvement science is not "the next big thing," and is not promising a one-time cure—it is a process that asks teachers to identify the problems they want to solve and gives them the tools for disciplined and structured problem-solving. Some unique features of improvement science include:

- Improvement science asks teachers to truly understand the exact problem to be solved before looking for solutions. Teachers are asked not to jump to the quick conclusions they naturally jump to, that is, to avoid "solutionitis."
- Improvement science asks us to start looking at small changes—sometimes tiny changes—instead of large-scale shifts in practice. For example, the small change could be an interaction between one teacher and one student. Then, based on the data the teacher collects, the teacher may want to try a change with three students, then six, and so on.
- Improvement science asks teachers to be researchers and engage in very rapid cycles of learning. Often, the changes can be implemented within a few days, reviewed and improved, and tried again within one or two weeks.
- Improvement science favors learning from doing and trying, rather than relying exclusively on outside research or prepackaged solutions.
- Teachers are encouraged to look for embedded evidence. They are asked to observe real-time formative data all around them and not wait for summative data. The check for a change in improvement science is "how," not "if." The question we engage in is not "if" the change worked or did not work, but "how" the change worked and what we learned from it.

- Teachers are engaged in leading real change in their schools. Outside expertise is useful, but teachers know best about the context of their school community and students. Improvement science honors the idea that problems need to be solved locally, in context, by teachers working individually and collaboratively with their peers.
- Anyone engaged in improvement science is encouraged to question their practice, make mistakes, and sometimes fail. Learning from missteps is fundamental to improvement science.

Improvement Science in Networked Improvement Communities

Improvement science happens locally through the work of teacher teams, but it comes to life in Networked Improvement Communities (NICs). NICs are intentionally designed social organizations where educators from multiple schools and levels of the school system come together to work on a common problem. Like professional learning communities, where each participant comes together to learn alongside like-minded professionals, NIC participants learn from each other and with each other. A distinct feature of the NIC is that participants are working toward a shared aim. This work is critically important because we know that school systems are complex and good practices aren't easily adaptable to local contexts. Without a focus on the necessary local adaptations and adoption, successfully moving a practice to scale becomes impossible.

Through sharing and collaboration, NIC members marry the improvement science problem-solving approach and the power of testing with learning across multiple school contexts. NICs treat variation in outcomes and contexts as learning opportunities, not obstacles. Through the NIC, teachers gain expertise in how to make practices work reliably and build relationships to spread and sustain the work.

While the goal of the NIC is to innovate solutions that work for all our students, the heart of the work is the educators bringing their experience, their drive, and their openness to learning from each other when facing a complex, seemingly intractable problem.

South Brooklyn's English Language Learner Networked Improvement Community

In the 2017–18 school year, New York City is building a NIC with 10 initial schools in Districts 21 and 22 in South Brooklyn to find ways to improve English Language Learner (ELL) achievement. This focus area was chosen by school and district leadership as one of the most pressing and challenging issues schools face in these districts. As schools use improvement science to develop solutions that work with all students and teachers in their unique contexts, they will become experts and share this work with every school facing the challenge of how to serve nonnative speakers of English. We believe this work has the potential to make systemic change for ELL student achievement in every classroom in each of the 10 schools, throughout Brooklyn, New York City, and the country.

Conclusion

By harnessing teachers' natural problem-solving abilities and curiosity, we ultimately believe improvement science can help address overall student achievement. Improvement science is a local approach to improving student outcomes to prepare students for success in their primary and secondary schooling and eventually in their college and careers. Equally important, improvement science honors teachers for their professionalism and agency as leaders in their schools and communities.

How to Use This Handbook

Intended Audience for the Handbook

The ***Improvement Science Handbook*** is intended for schools looking to embed improvement science as the problem-solving approach in their school. We recommend that this work happen in conjunction with a coach who is versed in improvement science methodologies and can help guide your school team. A regularly scheduled teacher team meeting with the improvement team is necessary every 1–2 weeks.

The handbook suggests that the work be set up so that:

1. there is an improvement team leader who leads meetings and keeps the work moving forward, and
2. improvement team members participate in the meetings, learn the tools, provide input, and test changes with students in their classrooms.

Principals and school administrators can use the ***Improvement Science Handbook*** as a reference to inform their support of the improvement team and leader.

How the *Improvement Science Handbook* Is Organized

The ***Improvement Science Handbook*** is divided into five chapters. Each chapter focuses on a discrete part of the improvement science process and the tools associated with it.

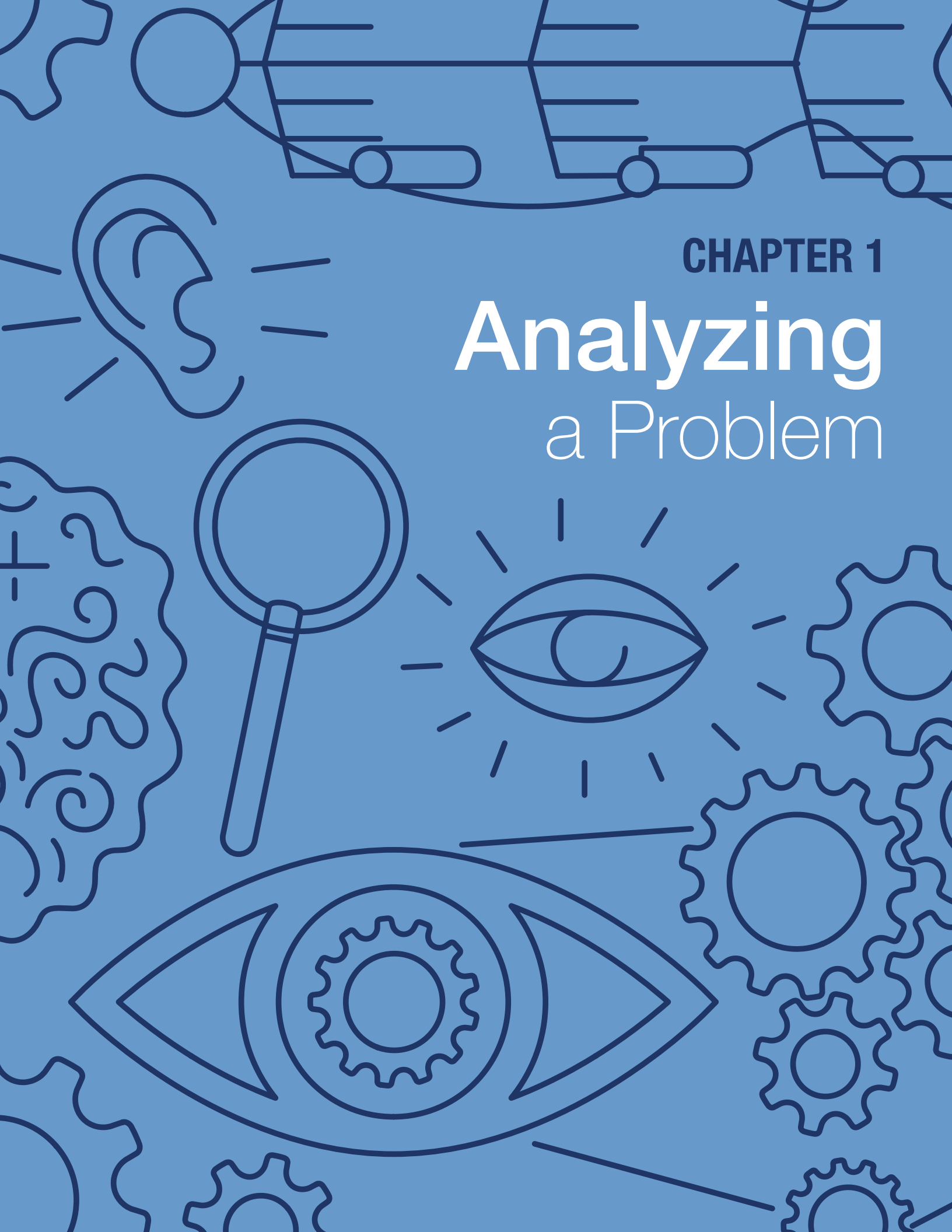
How Each Chapter Is Organized

Each chapter consists of the following sections:

1. **Overview:** This section consists of an introduction to the theoretical concepts and the various tools your team will use in improvement science. It is written with the improvement team leader in mind so that the leader is able to communicate with the rest of the improvement team about the work they will be engaging in together.
2. **Orientation/Self-Assessment:** This section helps you and your team answer the question: Where is your team in the improvement process?
3. **Coaching Steps:** This section is intended for the improvement team leader to guide the actions they need to take and the tools they will use to gain an understanding of the improvement science process.
4. **Frequently Asked Questions:** The questions in this section represent common issues that come up during each phase of the improvement science process.
5. **Facilitator Step-by-Step Guides**

    a. **Activities:** These are self-contained activities the improvement team leader leads the team through. Each is designed to take 45–90 minutes, or the length of a teacher team meeting. Each activity includes detailed facilitation notes to help the improvement team leader present it.

    b. **Tools:** These sections provide guidance on tasks in the improvement science process that do not require the participation of the whole team. They can be done individually by the improvement team leader or together with team members or other members of the school community.



CHAPTER 1

Analyzing a Problem

Activity:

> Fishbone Diagram

Work with your team to turn their experiences and expertise into a visual map of the problem you are trying to tackle.

Tools:

> Community Pulse

Provides guidance on how to “take the pulse” of a school community through short, targeted surveys.

> Empathy Mapping

Provides guidance on this technique for deeply understanding the problem from the perspective of a “user”—usually a student—and using the insights that come from it to drive your work.

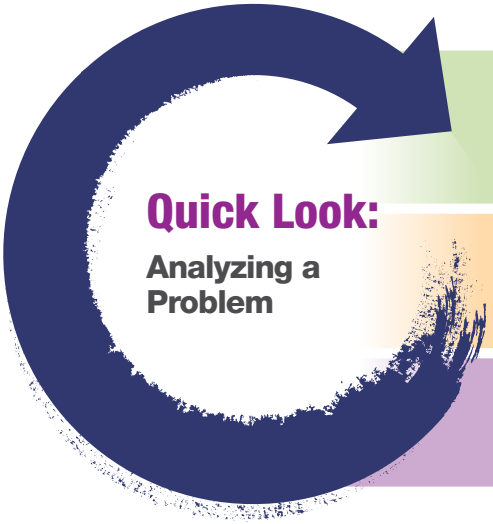
> Problem Statement Readiness Check

Provides support for deciding when you are ready to transition from analyzing a problem to solving it, and for capturing key findings from your analysis for later use.

The purpose of the chapter is to investigate a critical problem that stands in the way of student achievement and develop a deeper understanding of the complexity and nuance of the problem. Through analyzing the problem from multiple perspectives, you will define the objective of your improvement work. It should be used at the start of your improvement work.

CHAPTER 1

Analyzing a Problem



What is the purpose of this chapter?	To investigate and define a specific problem statement that describes the improvement work you will be doing
When should it be used?	At the start of your improvement work
Who should be involved at this stage?	• Improvement team leader • Improvement team members

I. Chapter Overview: See the System

Introduction

When confronted with a problem, there is a human tendency to leap immediately toward solutions rather than exploring the problem's context and complexity. In *Learning to Improve,* Bryk *et al*. emphasize the importance of resisting this temptation and instead doing three things:

1. Carefully locating your problem within the larger system of people, policies, attitudes, and the physical environment in which it resides.
2. Teasing out the interconnected factors contributing to the problem.
3. Defining the problem from the perspective of the "users": the kids and adults directly affected by it.

PROBLEM STATEMENT VS. PROBLEM FOCUS AREA:

Your problem focus area is a broad problem you have chosen to explore and learn more about. Your problem statement is a specific manifestation of that problem that you can influence and which you have chosen to solve.

With these three principles in mind, improvement science leads us to seek more thoughtful solutions that reflect the complexity inherent in the educational system rather than quick fixes.

This chapter is designed to help you thoroughly analyze your **problem focus area**, showcasing tools that allow you to understand it from multiple perspectives, and how it manifests itself in ways you can influence. This type of analysis should help you make sense of the complexity to "see the system" more clearly while also focusing the conversation around a common vision that motivates

your team toward a solution. Most importantly, it will give you a deeper understanding of your problem that will allow your team to discover unconventional and previously unimagined strategies by avoiding the quick solutions emerging from haphazard approaches that often typify problem-solving in education. Ultimately, this process will help you identify a clear and actionable **problem statement** that you will work to solve.

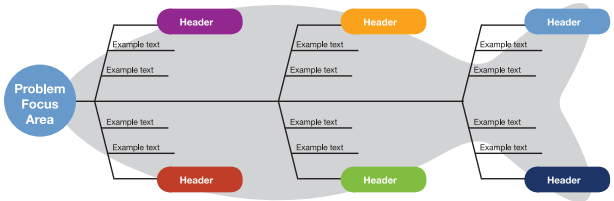
The Tools

This chapter features three tools designed to engage in this type of analysis. Each tool helps make visible the structures, policies, and people that define the work within our schools. **Your choice of which tool—or tools—to use during this phase will depend on the nature of your team's problem, the types of perspectives you want to learn from, and the amount of time you have to analyze your problem.** Teams may choose to use a combination of tools to deepen their understanding of the problem or decide that a single tool gives them the insight required. However, you should not limit yourself to these tools; you should feel free to supplement them with other forms of investigation, including interviews with outside experts, informal conversations with colleagues, and reading articles or books on the topic.

A **fishbone diagram** helps dissect a problem by visually representing the details to show how they fit together within a system. For each problem, five or six major "bones"—the primary causes of the problem—are identified, with three to five smaller bones, or underlying causes, extending from each.

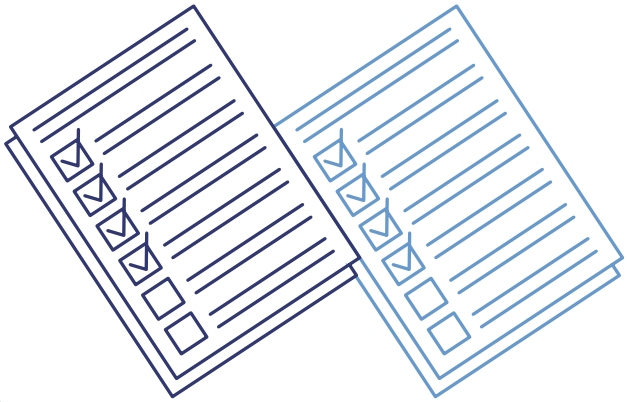
A fishbone is a great tool to capture the experiences of *a team of people who know a problem well.* It typically takes only *60–90 minutes* of meeting time to fishbone a problem and requires no outside expertise.

Fishbone Diagram



Community pulse is a systematic attempt to "take the pulse" of a school community through short, targeted surveys. It is designed to gather important, useful, and widely held ideas on how other members of the school community understand the problem and its causes. Surveys allow the relatively quick gathering of a wide range of feedback, which should complement the knowledge of your team. This requires existing hypotheses about your problem and sufficient time to prepare the survey and analyze the data.

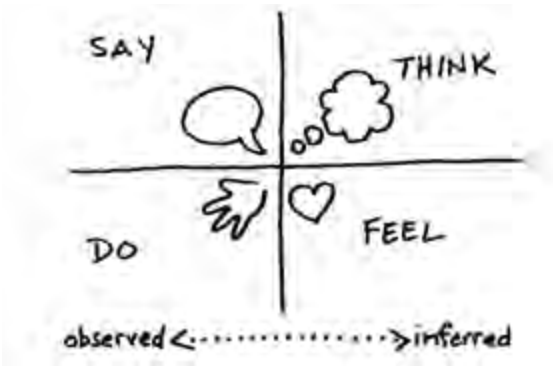
Community Pulse



Community pulse is a great tool to gather insights from a large group within your school community, but it does not organize those findings. Depending on the number of questions being asked, initial preparation can take anywhere from 15–90 minutes. In between, it requires time to actually conduct five to 10 20-minute interviews or collect about 20–30 surveys.

Empathy mapping is a targeted anthropological study. It involves spending time getting close to your team's "users"—usually students; these are the people on the frontlines of a system—and listening to them by gathering observational notes, interviews, photos, and internal documents. This process allows your team to get new insights into "big picture" problems: the difficult ones that feel so large and stubborn they are almost impossible to wrap our minds around, and typically feel resistant to change.

Empathy Mapping



Empathy mapping is a great tool for stepping into the experience of your students, understanding otherwise hidden factors that affect them, but it emphasizes depth over breadth. It involves multiple team members spending a *significant chunk of a day following around a carefully chosen user or group of users* (often students)—observing what they do, what they say, how they feel, and how their environment affects their behavior—*as well 60–90 minutes for follow-up* to analyze and debrief those results.

II. Orientation: Self-Assess to Stay on Target

Where Are You in the Improvement Process?

Improvement science moves through several distinct phases. While the process is not always linear—often shifting back and forth between phases as your learning evolves and sparks new questions—identifying where you are within the work is critical to taking effective action.

Before you begin analyzing a problem, we recommend you complete the following four steps to ensure you get meaningful results.

You will know you are prepared for this chapter when you have:

- ☑ **selected a problem focus area** to bound your investigation;
- ☑ thoughtfully **identified a team of individuals** to work on this problem;
- ☑ **scheduled at least one meeting a week** or a longer meeting every two weeks for your team to meet, and **laid out a general roadmap** for these meetings; and
- ☑ **introduced** your team members to the **principles and process of improvement science**.

You will know it is time to proceed to *Chapter Two: Creating a Theory of Improvement* when you have:

- ☑ **arrived at a more defined, specific problem statement** within your problem focus area that you want to work to address;
- ☑ **gained new insight and understanding about the problem**, identifying specific causes and underlying issues that you as a team have not explicitly focused on deeply before;
- ☑ **generated ideas of possible actions** you predict will have some influence on these; and
- ☑ **recorded these insights** using the *Problem Statement Readiness Check* (see page 37).

III. Coaching Steps

As the leader of your improvement team, you have several options for leading your team through this stage. The following coaching steps should help frame the steps you can take, and orient you to tools and activities that will help you.

Actions:

Select

Select a tool to analyze and understand your problem focus area more deeply

Analyze

Analyze your problem focus area

Concretize

Review the insights and deeper understandings coming out of your analysis to arrive at a specific problem statement

Consult

Ask experts in the field to shed light on the problem you are facing. Find outside experts, other practitioners, or written research. Work with school leadership to identify the right support.

Tools:

Analysis Tool Selector (see page 14)

Fishbone Diagram (see page 19)

Community Pulse (see page 27)

Empathy Mapping (see page 31)

Problem Statement Readiness Check (see page 37)

IV. Frequently Asked Questions

The questions below represent common issues that come up during the problem-analysis phase.

Q1 What is the first step in analyzing a problem? Are there certain essential starting points?

A Before the full group begins to analyze a problem, leadership will have identified a problem focus area, an urgent and important area of need confronting the school. These are the kinds of issues that fall in the zone of being "big enough to matter, but small enough to win," according to Jonathan Kozol. Once leadership has zeroed in on this balance, the next step for the whole group is to identify a specific problem within the focus area to target. This should emerge from the research and analysis, and will eventually be crafted into a much more tightly defined problem statement. See examples below.

Examples of Good Problems to Analyze

PROBLEM FOCUS AREA:	PROBLEM STATEMENT:
Persistently low scores on math assessments.	Students do not attempt or persist through challenging word problems in math class.
English Language Learners (ELLs) at our school score well below the citywide average in the writing section of the NYSESLAT.	When asked to provide a textual analysis in their writing, ELLs typically only summarize an author's main idea and struggle with academic language.
Instruction at a school is too teacher-centered and efforts to engage student voice have stumbled.	The quality of student-to-student discussion is low.

Q2 People on the team disagree on what the problem really is. What should we do?

A There should be little to no disagreement on what the problem focus area is—that should be decided by leadership before the group has fully assembled. However, expect plenty of disagreement about the factors affecting the specific problem, the wording of your problem statement, and the specific action steps the group will pursue. These are natural points for discussion, often arising from the complexity of the entire system the problem is embedded within, and lack of debate would be more worrisome than occasional disagreement. Rather than seeing disagreement as an obstacle, the group should dive into these areas of disagreement, using them as launching points for more research and analysis and thinking about the people and places within the system who need to be consulted to answer them.

Q3 How do I know when I've arrived at a problem statement that is specific enough?

A Once you have a firm grasp on the system and key features affecting the problem focus area, you will be able to identify the specific manifestation of the problem that you can influence. Begin by exploring a range of different factors that influence your problem focus area, eventually homing in on one which has both measurable outcomes and is a key obstacle for your school's ability to boost student achievement. Keep in mind that your ultimate goal is to identify high-leverage changes that will have a large impact. You can feel confident that you are prepared to move on when you have identified between two and five causal factors that are both within your control to change and highly influential on the problem itself. However, if you experience any of the following concerns, consider doing more research before proceeding:

- You don't feel confident the factors you have identified are highly influential on the problem itself.
- You have trouble imagining a specific picture of what success could look like, in terms of student behaviors or skills. If the image in your head is vague, you may still need to clarify your understanding of the problem.
- There are parts of your problem focus area that still feel mysterious or unclear.
- There are important stakeholders whose perspectives you have yet to consider.

Q4 What do I do if I can't decide on which tool(s) to use?

A Determining the right tool(s) to use at the right time depends on a few key factors: What are your time constraints? Whose perspectives are important to gather at this stage? What experience or expertise can you draw on from your team? The following six questions in the *Analysis Tool Selector* below can help you meet your needs. Consider where your team's needs fall along the spectrum and circle the tool that best answers the question for you. Once you have answered all six questions, tally your marks and select the tool that you've circled the most.

Analysis Tool Selector

Time Constraints

How much time are you willing and able to wait before getting this stage completed?

Fishbone Analysis — Empathy Mapping — Community Pulse

AN HOUR — A WEEK — A MONTH

Team Perspectives

What is the array of diverse perspectives you have on your team? How much are people coming from a mix of different backgrounds, roles, and multiple diverse experiences in relation to the problem at hand?

Fishbone Analysis — Empathy Mapping — Community Pulse

VARIED MIX — MOSTLY IN SAME ROLE

The Student Perspective

In solving the particular problem at hand, how important is it to understand more about what students are thinking and experiencing?

Fishbone Analysis — Community Pulse — Empathy Mapping

UNDERSTANDING STUDENT EXPERIENCES IS NOT CRITICAL — UNDERSTANDING STUDENT EXPERIENCES IS CRITICAL

continued on next page

Visualizing the Problem

Ask yourself, "Why is this problem occurring?" What do you answer?

Fishbone Analysis — Community Pulse — Empathy Mapping

I HAVE SOME WELL-FOUNDED THEORIES | I NEED TO HEAR MORE PERSPECTIVES | I WANT TO GAIN DEEPER INSIGHT

Experience with Research Questions

How much experience is there on your team with designing research questions to get honest and accurate responses from others?

Community Pulse — Fishbone Analysis — Empathy Mapping

A LOT — A LITTLE

Gathering Multiple Voices

Do you prefer to get more people involved in analyzing the problem so that they become aware of and connected to the work you are doing, or keep the discussion focused on your team for now so that you get to make more headway before other voices are involved?

Fishbone Analysis — Empathy Mapping — Community Pulse

STAY FOCUSED — MORE VOICES

Tool Count:

Fishbone Analysis ☐

Empathy Mapping ☐

Community Pulse ☐

Q5 We've arrived at explanations nice and quickly. Is it possible we did something wrong or that our findings are too simple?

A This is a common sentiment, and typically due to rushing through some of the research, data gathering, and investigative steps. Make sure that you:

- considered all angles and stakeholders within the system where your problem is located. Have you drilled down deep and asked the "5 Whys"[1] to get past areas of comfort into less familiar areas?
- grasped the experience of "ground floor" users affected by the problem, be they students or teachers. Consider getting out of your typical routine and seeing things from new perspectives, whether through surveys, interviews, or shadowing.
- investigated specific cases rather than averages. Zoom in on outliers and anomalies—that is, experiences that look surprising or unusual—trying to figure out why they occur.
- approached the problem with fresh eyes. Sometimes we attack a problem with a solution already in mind, and then, even with a well-grounded approach, we are unlikely to truly explore the problem and consider all root causes.

Q6 How long does this stage—analyzing a problem—typically take?

A While there is no firm timeline for analyzing a problem, the work is fairly linear. It begins once you have a *problem focus area*, peaks when you have a tightly defined *problem statement* that provides clear avenues for research and investigation, and ends when you have started to identify *actionable steps* you think will effect change that you can measure. In the end, the exact timing will depend on the individual tool you use, but don't spend too long on this step—more than a month is excessive. One common mistake is aiming for the perfect analysis. Be ready to move even if you are not certain your action will lead to success—taking small, initial actions almost always means leaving the comfort zone of research. Your team won't stop learning about the problem when you move on to action; some of the best learning occurs when we try to affect change. Your team will continue analyzing and rethinking as you move on to the next steps.

1 http://schoolreforminitiative.org/doc/5_whys.pdf

V. Facilitator Step-by-Step Guides

On the following pages of the handbook you will find facilitator guides for the following tools and activities:

- Activity: Fishbone Diagram
- Tool: Community Pulse
- Tool: Empathy Mapping
- Tool: Problem Statement Readiness Check

Use the guidance from the preceding pages alongside the facilitation notes to lead your team through the use of each.

Activity: Fishbone Diagram

(60 minutes)

Overview

A fishbone diagram is a visual map of the problem you are trying to tackle. By combining the experiences and different perspectives of participants, you first uncover the complexity of the problem focus area, and then lay out its different features as distinct areas of study. This process will help your team generate a shared understanding of the causes and sub-causes of the problem focus area, thereby creating a smaller, more targeted focus as you begin to think about the best places to seed improvement work.

Objective

Through a guided session of brainstorming and sharing, participants will create a map of the root causes of their identified problem focus area.

Number of Participants

- Groups of approximately six to eight participants. This should include everyone on your team, but may also include other stakeholders—such as administrators, fellow teachers, or parents—whose perspectives may be helpful for creating a holistic understanding of the problem.
- You should select one facilitator and one recorder from among the participants.

Prerequisites

- You must have both a team and a problem focus area selected.
- You should explore the possibility of including other stakeholders (see above) in this session if they offer experience and perspectives that can contribute to your team's thinking. If there are stakeholders who are unable to contribute to the team on a regular basis but whose experience and input should be honored, this is a good activity to include them in.

Materials

- Markers
- Sticky notes
- *Solutions Parking Lot* (see page 25)
- Space for sorting ideas (chart paper, a white board, or six blank sheets of paper; see the *Fishbone Brainstorming Template* below for ideas about how to help team members structure their brainstorm)

continued on next page

Guiding Questions

- What are the different causes of the problem focus area my team is aiming to address together?
- How can we break down larger problems into more manageable pieces?
- How do the causes of the problem focus area connect to our school context?

Facilitation Notes

1. Introduction and Framing (3 minutes)

- Welcome participants and review the objective and guiding questions of the activity.
- Remind participants that this activity is built around open discussion of a problem they all face, and that trust is a key ingredient in the process. To get the most from the activity, everyone must feel safe to express his or her opinion.
- (Optional) Explain that this activity is part of a larger process that leaves deciding on solutions to the problem to a later step. Benefiting from this activity requires sustained focus on the problem before solutions are introduced. It is natural and unavoidable that when insights into a problem occur, ideas for solutions will arise. Tell them that when they begin to experience what improvement scientists refer to as "solutionitis"—the tendency to jump ahead to quick solutions—the ideas will be written down by the recorder in the *Solutions Parking Lot* (on page 25) so that they can be revisited later. Alternately, you might nominate one person to be a "solutions editor" to flag suggestions which only offer solutions, and then help the group rephrase them into questions that identify the assumptions and causes behind them.

2. Framing of Problem (5 minutes)

- Start by giving all participants a summary of the problem focus area the team will be working on. Be sure to include the reasons for focusing on this problem.
- Tell participants that they are there because they have something to contribute to the team's understanding of the problem and its causes.

3. Brainstorm Causes (10 minutes)

- Tell participants they are going to brainstorm all the possible causes for this problem focus area. The goal of this part of the activity is to write down at least three to five thoughts about why this problem exists.
- Remind them that they will be describing the problem focus area as well as the system of causes that create it. They should focus on describing these as they actually exist, rather than an idealized view of how the system ought to work.
  - Hand out sticky notes to each participant, including the facilitator and recorder.
  - Have participants write each cause on an individual sticky note.

continued on next page

4. Share (25 minutes)

- Tell participants that they are going to share their brainstormed causes with the group.
- Remind them that the focus of this part of the discussion is the causes of the problem, not solutions, and when they hear a solution they should call it out for the recorder to write down in the *Solutions Parking Lot* (see page 25).
- Ask for a volunteer to read a single cause out loud and hand the note to the recorder, who will place it on the diagram. Ask if other participants wrote similar causes, and have them read their causes aloud and give the notes to the recorder to create a cluster of similar ideas. When a cluster is complete, ask another participant to share another cause and repeat the process.

  NOTE: *As participants continue to share in this manner, allow the recorder to lead participants as they relate similar ideas and sort the causes into clusters on the diagram. Naming factors outside of a school's locus of control is a common occurrence; listen for this, and if it occurs, ask them to rephrase so that the cause is connected to something you can influence. For example, if a participant mentions that "word problems are written in language that is simply beyond my ELLs' understanding," you might ask them to rephrase it to directly connect it to the problem. Changing the cause to "ELLs struggle to identify the task in word problems," or "providing adequate scaffolding for ELLs to access grade-level word problems takes too much planning and class time" are more specific and more actionable because they are now within the locus of control of the school.*
- Continue until all causes are charted.

5. Refine Diagram (15 minutes)

- Remind participants that the fishbone is a living document that can and should be revised over time as they continue to deepen their understanding of the systemic causes of the problem. It is expected that the first iteration of the fishbone will be incomplete, and participants should feel comfortable questioning and adding to it as they learn. However, to summarize the work of this session and to enable the team to use the fishbone diagram in its work, the next step of the process is to look over the ideas and collectively settle on a working version of the diagram.
- Ask participants to look over the clusters and lead them through a naming of each category. As they work to attach names to each a cluster, they may find that some causes may need to be split into pieces or consolidated. Use the following questions to guide you:
  - Will breaking this cause into components further clarify how the system behind the problem functions?
  - Are these separate concepts? If we combine them, is any understanding lost?
  - Is this cause within the focus area that we can influence? If not, how does it connect to a school practice we can control?

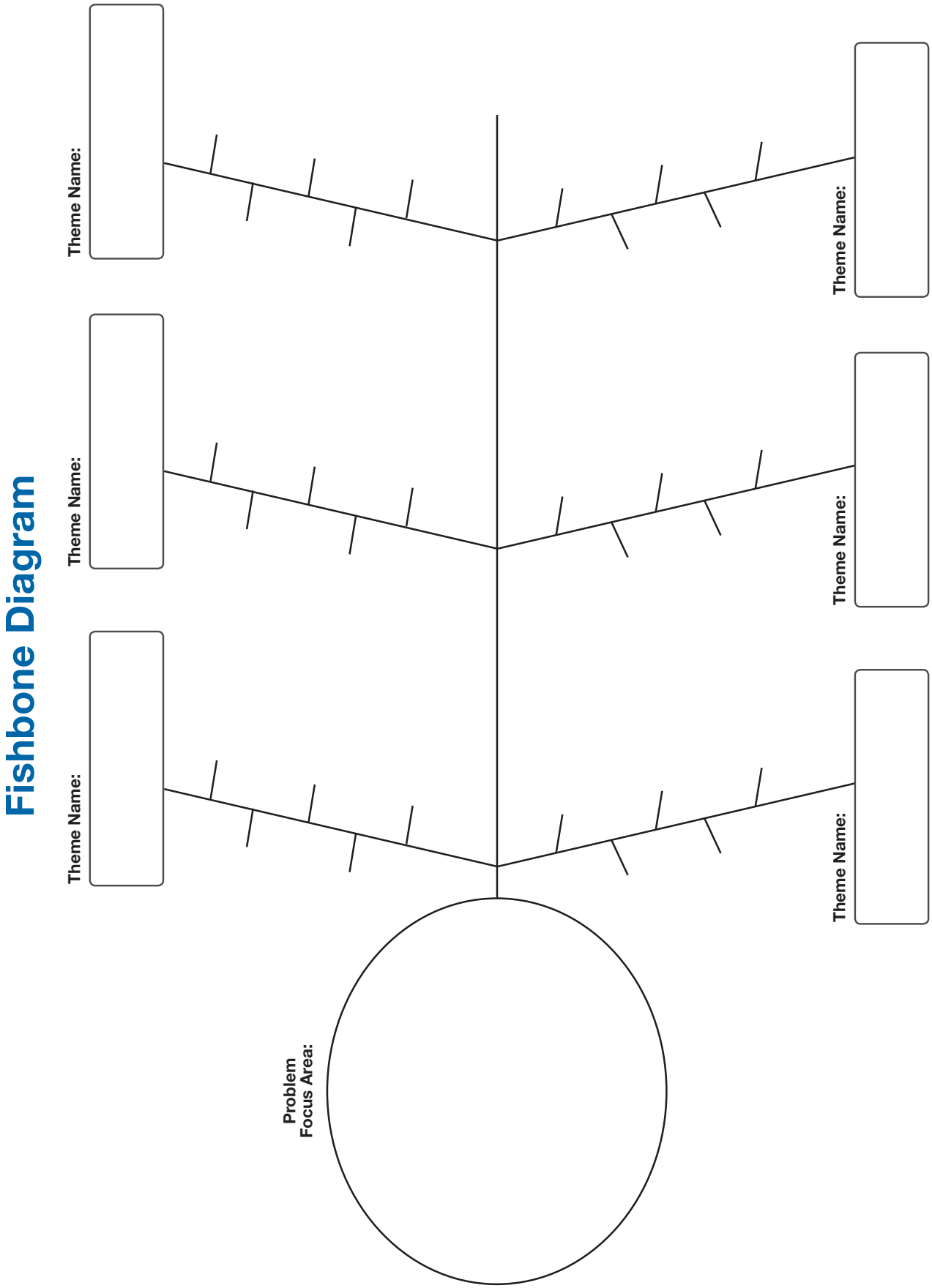
continued on next page

- When all of the clusters have been named and the causes matched to them, thank the participants for their time and effort. Thank the recorder for assisting with the production of the completed fishbone diagram.
- Bring closure by asking participants to think back to their original sticky notes and review the diagram to share how their thinking has expanded.

6. Next Steps (2 minutes)

- Within the next 48 hours, while the memory of the activity is still fresh, either the recorder or facilitator can complete a new copy of the fishbone diagram using the template provided on page 23.
- The *Solutions Parking Lot* document should be saved for subsequent meetings. Both it and the fishbone itself will be valuable sources of information when you construct a theory for solving your problem (detailed in ***Chapter Two: Creating a Theory of Improvement***).
- Use *Problem Statement Readiness Check* to guide next steps (see page 37).

Activity: Fishbone Diagram *page 5*



Fishbone Brainstorming Template

Theme Name: _____	Theme Name: _____	Theme Name: _____
Theme Name: _____	Theme Name: _____	Theme Name: _____

Solutions Parking Lot

It is inevitable that potential solutions will come up during a group discussion of problems and their causes. In order to recognize these ideas while keeping the discussion focused on the problem, the solutions should be parked here so that they can be used later, after the theory of action has been fully fleshed out on the driver diagram. At that point, the parked solutions can be connected to secondary drivers in the column on the right to facilitate a comparison of the merits of all the potential solutions at once.

Solution	Secondary driver(s) solution can link to

Activity: Fishbone Diagram *page 7*

Tool: Community Pulse

Overview

Surveys are powerful and versatile tools for taking the pulse of your school community. They allow you to expand the number of people you consult, increasing the number of perspectives you take into consideration and providing a check against groupthink and bias. A survey of your school community is also a great way to confirm your team's hunches and prioritize among multiple pieces of a problem. They are an effective way to deepen your understanding about what the right course of action might be before you embark on a year-long effort to solve your problem, and can be a great skill for members of your teacher team to develop.

Use this tool to help guide your team through the planning and execution of a community pulse survey.

Checklist—Is a Survey Right for You?

- ☐ Are you interested in consulting more than 15 people? Do you have 2–3 weeks?
  If not, consider a quicker method such as targeted interviews or empathy mapping.
- ☐ Are you interested in consulting fewer than 50 people?
  If you are consulting more than 50, it may be a good idea to ask for support. There are lots of subtleties to writing a good survey, so it is a good idea to call in some experience before sending one to a large group.
- ☐ Is this a sensitive topic?
  Consult school leadership if you have any doubts.

Step 1: Develop Questions

- Start by brainstorming your general questions about the problem. These can be prompted by discussion or other problem-analysis tools. Use the following guiding questions to help:
  - What are we still curious about?
  - What do we want to know about how others experience the community?
  - What do we believe about our problem that we want to confirm?
- Break these down into more targeted, specific questions. These will be your survey questions.
- Write your survey questions so that they are easy to understand and answer; use clear language that is appropriate for respondents, and keep in mind that respondents will most likely be choosing an answer that you provide.

continued on next page

Step 2: Develop Responses

- For each question you came up with in Step 1, prepare a set of possible responses.
- For closed-ended questions:
  - Think of a range of possible responses for each question, including responses that contradict your expectations. Avoid yes/no and "check all that apply" questions.
  - Use a scaled approach to capture nuance (e.g., "never," "sometimes," "usually," "all the time"; or "not at all," "a little," "a medium amount," "a LOT," etc.).
  - Aim for a number of response options that gives everyone a natural choice without overwhelming them. Four to five is the ideal for most questions.
- For open-ended questions:
  - Ask yourself if an open-ended question is worth the additional challenge you will face when you have to analyze 15+ responses in all their variety. If you can collect the responses you need with closed-ended items, you should.
  - Think about using open-ended items to accompany closed-ended questions on the same topic. They are best for expanding on topics you have already asked about.
  - Be especially clear about what you are asking them to write.

Step 3: Revise Your Survey

- Order your questions logically, so that themes of questions are asked together in an order that leads a reader along intuitively.
- Check the language. You should always say things simply, in as few words as necessary.
- Use the checklist on the next page to help refine aspects of the survey.

continued on next page

Survey Checklist

- ☐ Did you ask any "double-barreled" questions? You should only ask about one thing at a time.
- ☐ Did you ask sensitive, embarrassing, or incriminating questions? You should always ask these indirectly, by asking generally about the respondent's peers (e.g., "Has anyone in your classes been the victim of bullying?").
- ☐ Did you ask any leading questions or hint at your preference through the responses? Rewrite them so that they are completely neutral.
- ☐ Did you ask too many questions for the planned survey length? Consider the following advised timing: basic closed-ended questions = 30 seconds each; tough closed-ended questions = 60 seconds each; short open-ended questions = 60 seconds each; and long open-ended questions = 2–3 minutes each. Consider trimming questions if the survey feels long.
- ☐ Did you ask any identifying information (e.g., gender, race, primary language, disciplinary history, etc.)? Consider whether it is necessary and, if so, for what purpose. You might also consider whether there is another way to collect that information that does not involve asking the question on the survey. If you need to ask identifying information questions, always ask those questions at the end, since seeing them may prime respondents to consider stereotypes while answering any questions that follow.

Step 4: Field-Test Your Survey

- Make sure that you ask someone to test the survey for you. You can either:
  - ask a colleague to take the survey. This is usually quick and easy, and it is good for catching obvious issues.
  - ask one of the potential respondents (such as a student). This is a little harder to arrange, but yields more useful feedback.
- After they finish, ask them to tell you if any parts of it are unclear or confusing. You should also time the survey during field testing so that you can make necessary adjustments if it is too long. You can also ask them to explain the thought process behind their answers to see if you are getting the kinds of responses you are hoping for. After the field test, look at the data and what it tells you. Ask yourself: Does it answer my questions? If it were a representative sample, would it allow me to make decisions and/or take action? Which questions are the most helpful? Can I cut the others?
- Revise the survey based on the feedback you have gathered.

continued on next page

Step 5: Administer Your Survey

- Administering surveys involves ethical responsibility. Data should only be shared when appropriate and necessary, and anonymity should be protected. Consider these responsibilities and how you will live up to them before administering the survey.
- Prepare for how you will communicate the purpose of the survey so that respondents understand and answer questions honestly.
- If possible, use technology! There are free survey tools like SurveyMonkey, SurveyGizmo, and Google Forms that can be used to administer your surveys. These save you from time-consuming data entry.

Step 6: Analyze Results

- Calculate the number of responses of each type for each closed-ended question.
- Use graphics and visualizations only if they clearly communicate a major takeaway.
- Save your colleagues time by pulling the major headlines out of the data, and communicate those first.

Next Steps

- Use *Problem Statement Readiness Check* to guide next steps (see page 37).

Tool: Empathy Mapping

Overview

Adults working in schools often operate with certain blind spots that prevent us from understanding students' holistic experience while at school. Over the years we have all accumulated assumptions, misconceptions, and value judgments that can obscure our ability to clearly observe what is going on around us. Empathy techniques allow us to be more student centered in our thinking and see our work with a fresh set of eyes in order to use the insights to better meet our students' needs. If you are interested in understanding what your students think the problem is, or want to better understand some variation in student outcomes, this activity can help.

Empathy mapping is a two-step process. First, members of the improvement team each choose one of the approaches listed below to collect more data about the problem focus area that the team is investigating. After collecting data using one of the approaches, members meet together to combine their findings in an empathy map.

Step 1: Choose an Approach to Collect Data

There is more than one way to collect data for empathy mapping. Choose the one that feels like the best fit for you, your problem, and your school. If time allows, you may also have different team members engage in different approaches in parallel to create a more diverse conversation when you debrief together.

Student Interviews

- Prepare questions in advance. They should follow a trajectory of:
  - personal introduction (or reintroduction) and introduction to the purpose of the project and the interview
  - basic questions designed to break the ice and build rapport
  - question(s) asking students to tell a story or personal experience about the topic
  - question(s) asking students to describe feelings/emotions relating to the experience
- Conduct interview. These are semi-structured, so ask follow-up questions and ask "Why?"

continued on next page

Shadowing

- Identify students of interest to shadow for a part of the day (or whole day!). They should be chosen either because they are representative of a particular kind of challenge, or because they are a "paradoxical example" of a student who excels in the face of challenges or struggles despite your school's best efforts.
- Explain the goal of the project and ask the student for permission to shadow them.
- Notice and take notes on what they see, hear, and do.
- Notice *the way* they do things, and write down adjectives to describe what you see.
- Where appropriate, you can also arrange time for a short interview with the student. During the interview, ask them to explain or describe anything that you don't entirely understand or that piqued your interest. Be careful to be nonjudgmental and base your questions on things you saw and not your interpretation of them.

Self-Documentation

- Brief the chosen student on the issue of interest and tell them what you hope to learn.
- Have the student use a journal or self-reflection tool (such as a template or tally sheet) to record their experience.

Try It Yourself

- Try a particular process that students go through (e.g., take a test, participate in a class, go through the college application process, sit in on a class taught in a language you don't know, etc.).
- Do everything as if you were a student and take note of what you feel or notice about the experience.

Step 2: Empathy Mapping

Make sure to collect and bring notes you collected in Step 1 to the debrief meeting. If meeting time is tight, it may speed things along to pre-sort notes into categories for things the student said, did, thought, and felt.

Empathy Mapping Meeting Agenda and Facilitation Guide

1. **Introduction**
    - Open the meeting by reminding participants that the goal of this meeting and their investigation of student experience is to shed new light on the problem we want to solve.
    - Distribute copies of the graphic organizer and encourage participants to use it for notetaking.
    - Walk participants through the agenda and remind them that the purpose of the activity is to understand student experiences first, and that they should leave their interpretations until the final step.

continued on next page

2. Mapping

- Draw the quadrant below on a white board or chart paper, and ask team members who did the empathy work in Step 1 to organize their notes within these quadrants, sharing as they go. You may opt to use sticky notes to pre-write before sharing.
- During sharing, encourage other team members to ask clarifying questions, and allow for any new interpretations of what students think or feel to be included in quadrants.

Students say . . . *What are some quotes and defining words the student said?*	Students do . . . *What actions or behaviors did you notice?*
Students think . . . *What might the student be thinking? What does this tell you about their beliefs?*	Students feel . . . *What emotions might the student be feeling?*

continued on next page

3. Identify Needs

- After you have completed all four quadrants, ask participants to take a moment to reflect individually on what has been shared, and try to define one or two student needs that you see represented in the data.
- Share the needs the team has identified and record them on a white board or chart paper, consolidating needs that are very similar.
  - **Coaching tip:** Remember needs should be expressed from the student perspective; avoid deficit perspective and solutions. Leave interpretations for the next step!

4. Identify Insights

- The final step is to turn the fresh-thinking student needs into insights that can lead your improvement work forward. Ask participants to reflect in pairs on the following three questions:
  - *What insight have you gained about your students' experiences and needs?*
  - *What tensions or contradictions do you notice?*
  - *What does this suggest about potential approaches to addressing the problem?*
- After a few minutes, come back together as a whole group to share. Group the insights into themes and record them for later use.

5. Next Steps

- Use *Problem Statement Readiness Check* to guide next steps (see page 37).

Participant Graphic Organizer

The purpose of this empathy activity is to take time to deeply and holistically understand student experiences before making a decision about what they need. As you reflect on what you have observed, use the four quadrants below to separate what you have observed the students say and do, and what you can deduce about what your students think or feel.

1. Mapping Empathy Data

Students say . . . *What are some quotes and defining words the student said?*	Students do . . . *What actions or behaviors did you notice?*
Students think . . . *What might the student be thinking? What does this tell you about their beliefs?*	Students feel . . . *What emotions might the student be feeling?*

continued on next page

Tool: Empathy Mapping *page 6*

2. Identify Student Needs

Focus on the students' experience, and collectively decide what this tells you about their needs, especially those needs that aren't being met. Leave conclusions and solutions until later.

3. Identify Insights

What insights have you gained about your students' experiences and needs?
What tensions or contradictions do you notice?
What does this suggest about potential approaches to addressing the problem?

Tool: Problem Statement Readiness Check

Overview

By working through the problem-analysis stage of improvement science, your team has spent time exploring your school's problem focus area from multiple perspectives and developed a common understanding of it. The goal of this analysis is to deeply understand the larger problem so that you can focus on a part of the problem that is within your power to address. Every problem is different, and there is no rule for how much investigation is required to get to the point when your team is ready to shift from analysis to crafting solutions. For this reason, this *Problem Statement Readiness Check* tool allows your team to ask itself whether it is ready to move on, or if it is better to engage in another round of analysis.

Objective

- Consolidate the learning from your team's problem analysis and capture any remaining questions.
- Check your team's readiness to move on from investigation to crafting solutions.
- Draft and finalize your problem statement.

Participants

- Some combination of school leadership, improvement team leaders, and members of the improvement team.

Materials

- Documents and data produced and collected during the analysis of the problem focus area.

Guiding Questions

- What has the team uncovered during the analysis of the problem focus area?
- In what ways do individual team members, stakeholders, and students see the problem focus area differently?
- What questions do you still have about the problem focus area?
- Do any parts of the problem focus area have the potential to become the focus of the improvement team's work?

continued on next page

How to Use This Readiness Check

After concluding at least one tool from the problem-analysis chapter, or any complementary investigative step, this short exercise should be used as a prompt to ask your improvement team and/or leadership whether the most appropriate next step is to continue investigating or move on.

Problem Analysis Readiness Check

1. **Introduction and Framing**
   - Welcome your team and review the objectives and guiding questions of the activity.
2. **Review Your Team's Learning**
   - Spend a few moments reviewing the provided documentation of your problem analysis. Where helpful, have the primary investigators summarize. Allow time for clarifying questions, but remember that this should be a review, not a comprehensive presentation.
3. **Initial Brainstorming**
   - Remind your team that this exercise involves separating the insights and questions that will have continued relevance from the ones that aren't worth pursuing. Tell them that they should feel free to bring up topics if they seem worth discussing, but should work as a group toward selecting the insights and questions that are worth recording.
   - Work together to pull out the most important insights and questions that have arisen through this process.

What insights into your problem focus area are particularly helpful? What learning has the potential to lead you to effective solutions? Jot your team's notes here:

What questions remain to be answered? What do you still need to know? What new questions has the problem analysis revealed? Jot your team's notes here:

continued on next page

4. Readiness Checklist

- Now, having just reviewed the learning that took place during your problem analysis, discuss each of the questions in the following checklist to decide how confident you feel about your readiness to move on. Given the premise that the challenges schools face are complex, we must recognize that our understanding of these challenges will always be imperfect. That said, you should feel at least somewhat confident you have made progress toward the criteria on the checklist.

Readiness Checklist

Write your problem focus area here:

Now, think about your team's investigation into the problem focus area and your school context and discuss your degree of confidence that your team has accomplished the following goals:

- ☐ Has your team investigated multiple perspectives on the problem focus area?
- ☐ Have you challenged assumptions your team held about why the problem occurs?
- ☐ Have you gained useful insight into why previous efforts haven't been as successful as desired?
- ☐ Has your team gained sufficient insight into student needs to give you confidence that you know which kinds of improvements will lead to improved student experience and outcomes?
- ☐ Have you identified existing school-based practices or processes connected to the problem that might be improved?

If you checked three or more boxes, move on to the next step and try to write a problem statement.

Draft Problem Statement

*A **problem statement** is a specific part of the **problem focus area**. It is the "corner of the problem" or the underlying cause that you are choosing to address. Write a draft problem statement here:*

continued on next page

Final Check

- ☐ Has your team normed their understanding of the problem statement and the language they use to talk about it?
- ☐ Does the problem statement generate consensus?
- ☐ Do you have some idea what effective solutions to this problem statement could look like? These can be from your team's expertise, other practitioner examples, or research.
- ☐ Can a sufficient percentage of your team impact the problem statement through their daily work?

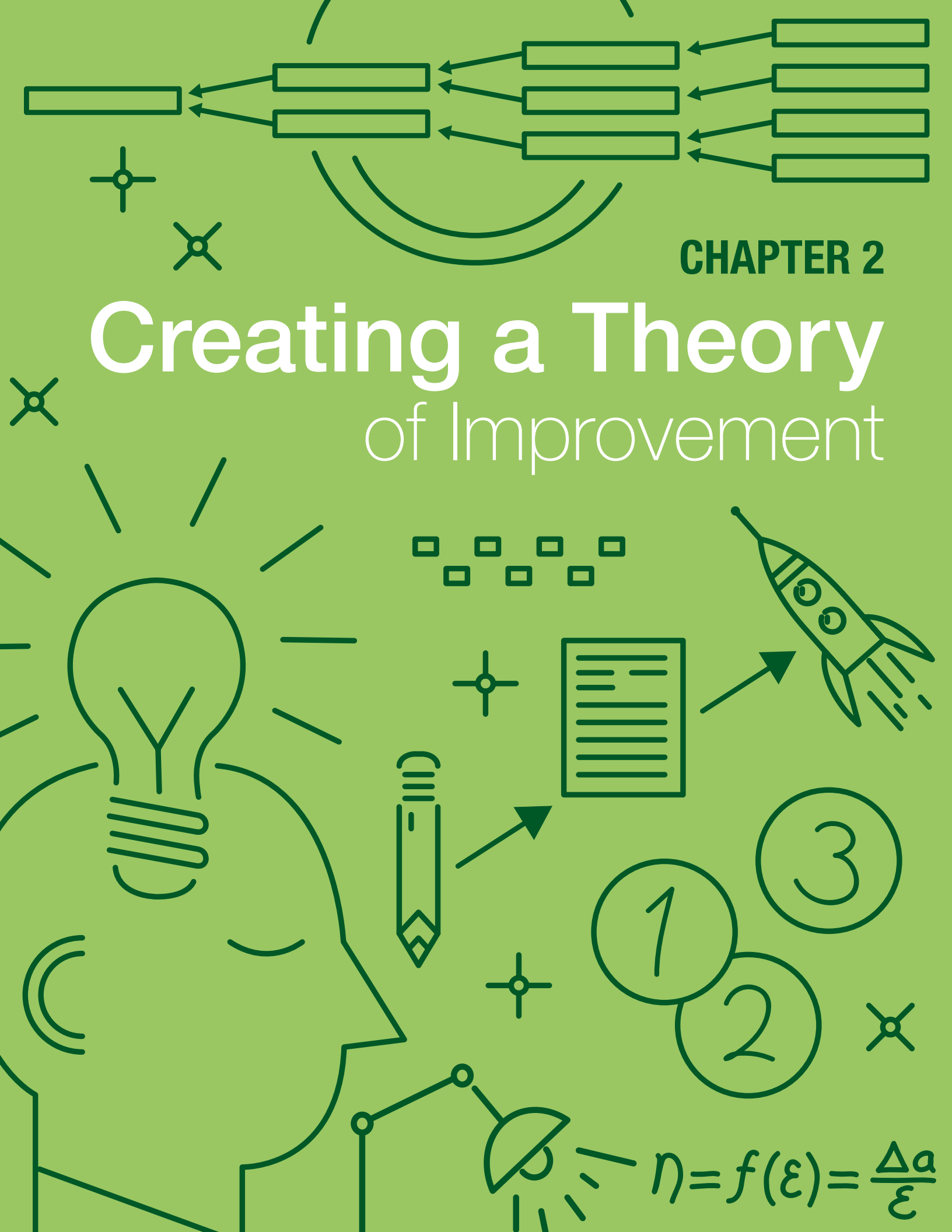
If you have checked all of these, congratulations! You are ready to move on. If not, don't despair. Problems worth solving are rarely simple. Continue to next steps below.

5. Next Steps

- If you crafted a problem statement and are pleased with it, move on to the *Crafting an Aim Statement* tool in Chapter 2 of the handbook and start building a driver diagram. If you are feeling uncomfortable with your team's progress in these four areas, consider:
  - engaging in another round of investigation. Using another tool from *this chapter* may be helpful.
  - consulting an outside expert or reading about the approaches others have taken to solve this problem. If your investigation leads you to a place where members of your team aren't experts, you should feel free to call on others with more experience.
  - using the final check items that you couldn't satisfy as a starting point for any further investigation, team discussion, or refining of the problem statement. Resolving these specific issues may be what you need to move forward with confidence.

CHAPTER 2

Creating a Theory of Improvement



Activity:

> Driver Diagram

Work with your team to map out a visual representation of your team's theory for how you can create the improvement you want to see.

Tools:

> Crafting an Aim Statement

Provides guidance on how to write and refine a strong aim statement, which will serve as a unifying goal of your team's work.

> Revising Your Driver Diagram

Provides guidance on how to update your driver diagram to reflect your team's learning and growing expertise.

The purpose of this chapter is to develop a theory of how to improve by mapping the many factors that can influence your problem. By creating a theory of how the problem can be solved before moving to action, you will set yourself up for success. It should be used after you have analyzed your problem.

CHAPTER 2

Creating a Theory of Improvement

Quick Look:

Creating a Theory of Improvement

What is the purpose of this chapter?	To develop a theory of how to improve by mapping the factors influencing your problem
When should it be used?	After analyzing your problem
Who should be involved at this stage?	• Improvement team leader • Improvement team members

I. Chapter Overview: Planning for Change

Introduction

WORKING THEORY OF IMPROVEMENT:

Your team's collective hypotheses about what key factors and changes will be necessary for achieving your aim. It answers the critical question: "What change can I introduce and why?"

It is all too easy to rush directly from research and analysis into action. After spending weeks studying and discussing a problem, an urgency builds: *Let's start making changes.* However, rather than moving haphazardly into the practical world of implementation, potentially wasting valuable time heading down the wrong path, improvement science asks us to take a deep breath and develop a **working theory of improvement** first. This theory articulates a hypothesis, outlining exactly how you see changes in practice sparking improvement and providing a conceptual bridge from your analysis of the problem to action in the real world.

At the heart of this process—and chapter—is a tool called a *driver diagram*. A driver diagram takes your best understanding of how a system functions in practice and puts down on paper your best ideas for improving it, consolidating all of your team's thinking into a working theory of improvement. Building this theory with your team will offer clear starting points where you should begin your improvement efforts and make visible the collective thinking behind your hypothesis. Later on, it will suggest data you can collect to verify progress and provide a place to record the learning that occurs as you test your ideas in practice. By taking the time to name your theory and incorporate the multiple perspectives on your team, you will create a stronger theory that can continue to be refined as your understanding grows.

WHERE A THEORY SHOULD COME FROM:

A good theory should be based on a broad and diverse understanding of the problem and how it can be solved. To ensure your theory is as strong as possible, consider including each of the following:

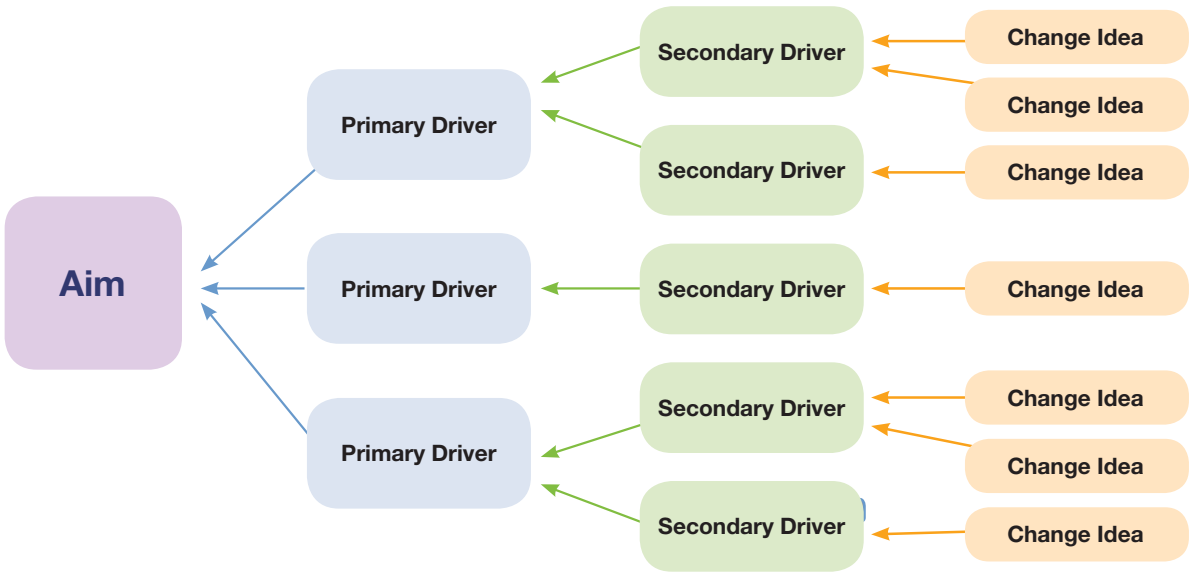
- The considerations of diverse stakeholders within your school community such as teachers, administrators, support staff, students, and parents. See Chapter 1 for more on how to analyze the problem.
- Experiences of others outside the community such as other schools, district staff, or professional-development professionals. Take the time to talk to other educators as you develop and refine your theory.
- Existing research and resources on proven practices. Read more about what is already known about your problem and how others approach solving it.

The Tool: Driver Diagram

A driver diagram is a guiding document. It simultaneously provides an overview of your hypothesized solutions and allows you to narrow your focus on high-leverage areas. Most importantly, by connecting these high-leverage areas of action to an overall aim, it ultimately represents an illustration of how your improvement will occur: a diagram of your working theory of improvement. It is not intended to be comprehensive, exhaustively detailing everything that could be done to solve your problem. Nor should it be seen as a to-do list, demanding that you try out every single change idea suggested by the document. Instead, think of your driver diagram as the first draft of a map of potential approaches to be used to decide on the most strategic path to pursue your improvement, and then revisited and revised as you learn from the process of testing.

Driver Diagram

A visual representation that turns an improvement team's understanding of a problem into a theory of the changes that must take place in order to accomplish their aim.



Adapted from the Carnegie Foundation for the Advancement of Teaching

Your driver diagram will be defined by **three key parts**:

1 Aim. Your aim headlines your theory of improvement, answering the overarching question "What are we trying to accomplish?" It will be the most specifically tailored statement of your problem created yet, written to be as detailed as possible about the long-term outcomes you expect from your team's efforts. Aims follow the protocol for S.M.A.R.T. goals: Specific, Measurable, Aspirational but attainable, Relevant, and Time-bound. They are often targeted at goals far removed from the day-to-day events, too ambitious to be completed in one year but still a possible victory over the 2-to-5-year range. Think of your aim statement as your bull's-eye: it's at once a guide for your effort and the validation of your results.

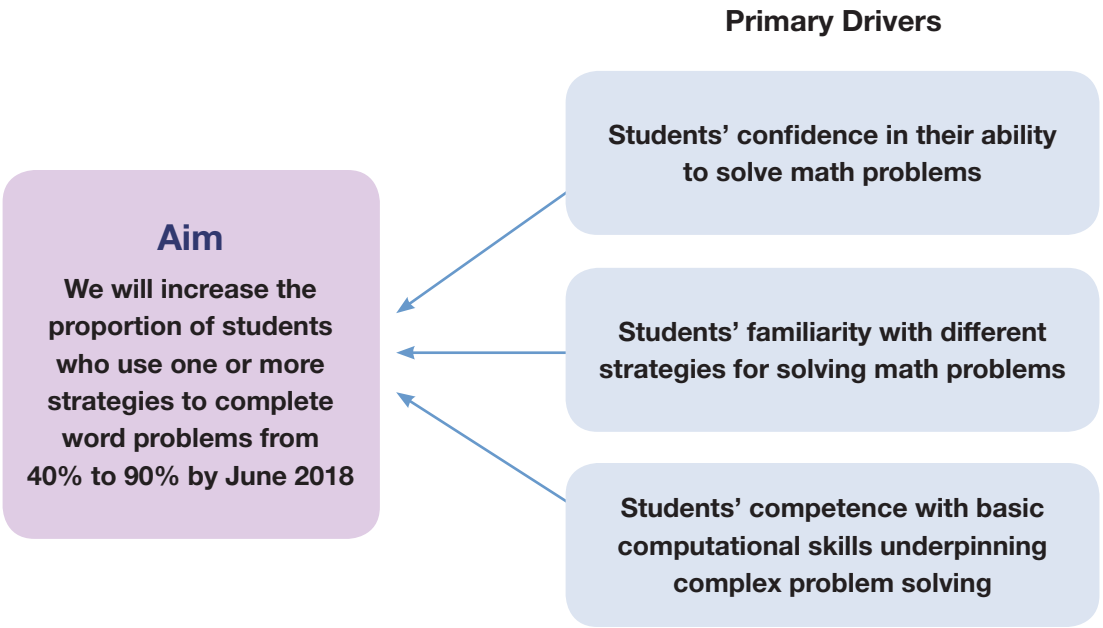
AIM STATEMENT:

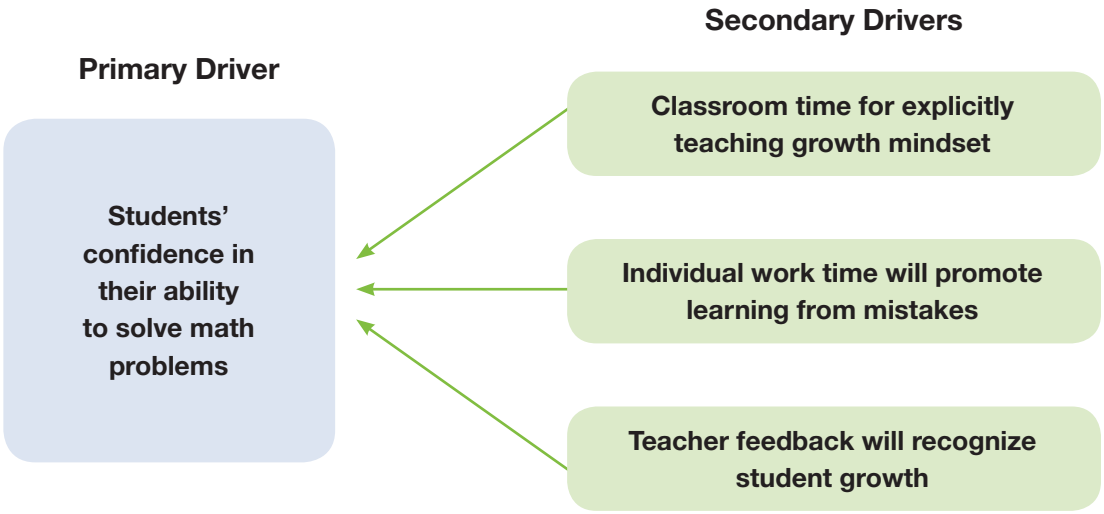
A statement defining the improvement your team is trying to accomplish, written as a S.M.A.R.T. goal.

Ex. Problem Statement:	**Ex. Aim Statement:**
Students do not attempt or persist through challenging word problems in math class.	**We will increase the proportion of students who use one or more problem-solving strategies to complete word problems from 40% to 90% by June 2018.**

2 Drivers. These are the high-leverage areas you believe play an essential role in influencing your aim. Each driver represents a category of possible factors that affect your aim, and each is influenced by dozens of smaller steps you can take over the next several months. A driver is not something you control directly, but rather something you achieve through other actions.

For example, *primary drivers* are broad categories for thinking about the factors that can get you to your aim. These are big-picture areas where impact can be seen over a longer time-scale—quarterly to yearly—and that the team hypothesizes are essential for driving progress toward the aim.





For example, if your aim calls for increasing the proportion of students who use problem-solving strategies to complete word problems, then your primary drivers are the macro-level factors that influence a student's use of problem-solving strategies, such as their familiarity with problem-solving strategies and their confidence using strategies to solve problems in general.

More fine-tuned, *secondary drivers* consist of the sub-factors that influence each of these broader primary drivers. These are moments when the primary driver can be influenced in your day-to-day context; often it is helpful to think about them as tangible *opportunities* for creating change. Secondary drivers are more closely related to existing everyday practice, and accordingly occur on a more frequent timescale: monthly, weekly, or daily. Thinking again about the aim to increase the proportion of students using problem-solving strategies to complete word problems, these are the opportunities where small changes could influence the primary drivers. For example, if you have decided on improving students' confidence in using problem-solving strategies as your primary driver, these opportunities might include mini-lessons where students are introduced to strategies, classwork where students practice problem solving, or teacher/student conferences where teachers provide feedback to build students' confidence.

PRIMARY VERSUS SECONDARY DRIVERS:

Primary drivers are the essential components of our approach that will allow us to accomplish our aim.

Primary drivers can also be thought of as:

- "what" must happen to get to your aim.
- "what" are the big things that, if accomplished, give you confidence that you will achieve your aim.

Secondary drivers are the opportunities or practices that should create the improvement in our primary drivers.

Secondary drivers can also be thought of as:

- "where" you might change practices of processes to create improvement in your primary driver.
- "where" your primary driver falls apart in practice.

The purpose in listing secondary drivers is not to be exhaustive, but to leverage your research and analysis to select your "best bets" as to where changes are most likely to create the improvement in the primary driver.

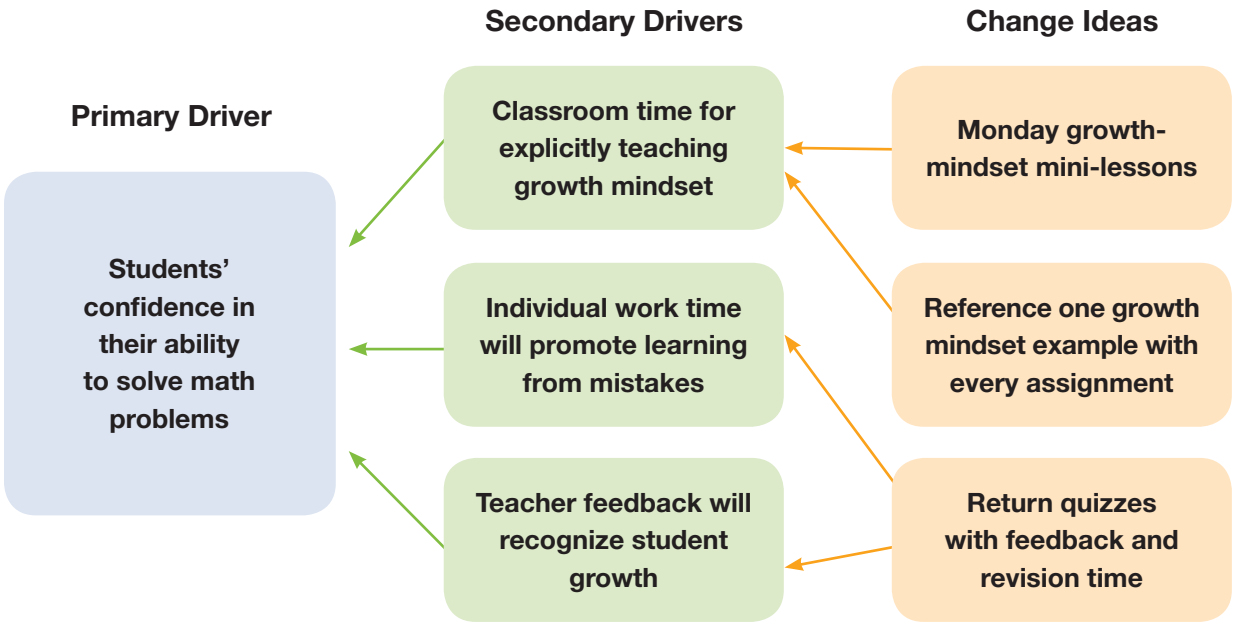
3 Change Ideas. Descending one level from the secondary driver to actions taken on a day-to-day or week-to-week basis are change ideas tied to secondary drivers. Change ideas are small changes or tweaks to classroom practice, materials, or other things you do in a school that can be tested over a short period of time. If your change idea is bigger than that (e.g., we want to redesign our introductory Grade 6 course), then make it smaller (e.g., let's try a new activity in the opening lesson in Grade 6 advisory). Change ideas represent your entry point and will test your theory within your particular school or classroom context to see whether the change brings about an actual improvement.

CHANGE IDEAS:

Small changes in the way we work that make an impact on our secondary driver. Change ideas can also be thought of as:

- **a change in practice small enough that you can test it "by next Thursday."**
- **a tweak to the way you work that is just different enough that there is value in seeing how it goes.**

To return to our example aim of increasing the proportion of students using problem-solving strategies to complete word problems, these change ideas are the small yet substantive adjustments you might make to implement your approach on a-day-to-day timescale, such as creating a mini-lesson on growth mindset to teach on Mondays, making a commitment to reference one growth-mindset principle when handing out every new assignment, or adapting your existing practice for giving students feedback on their work.



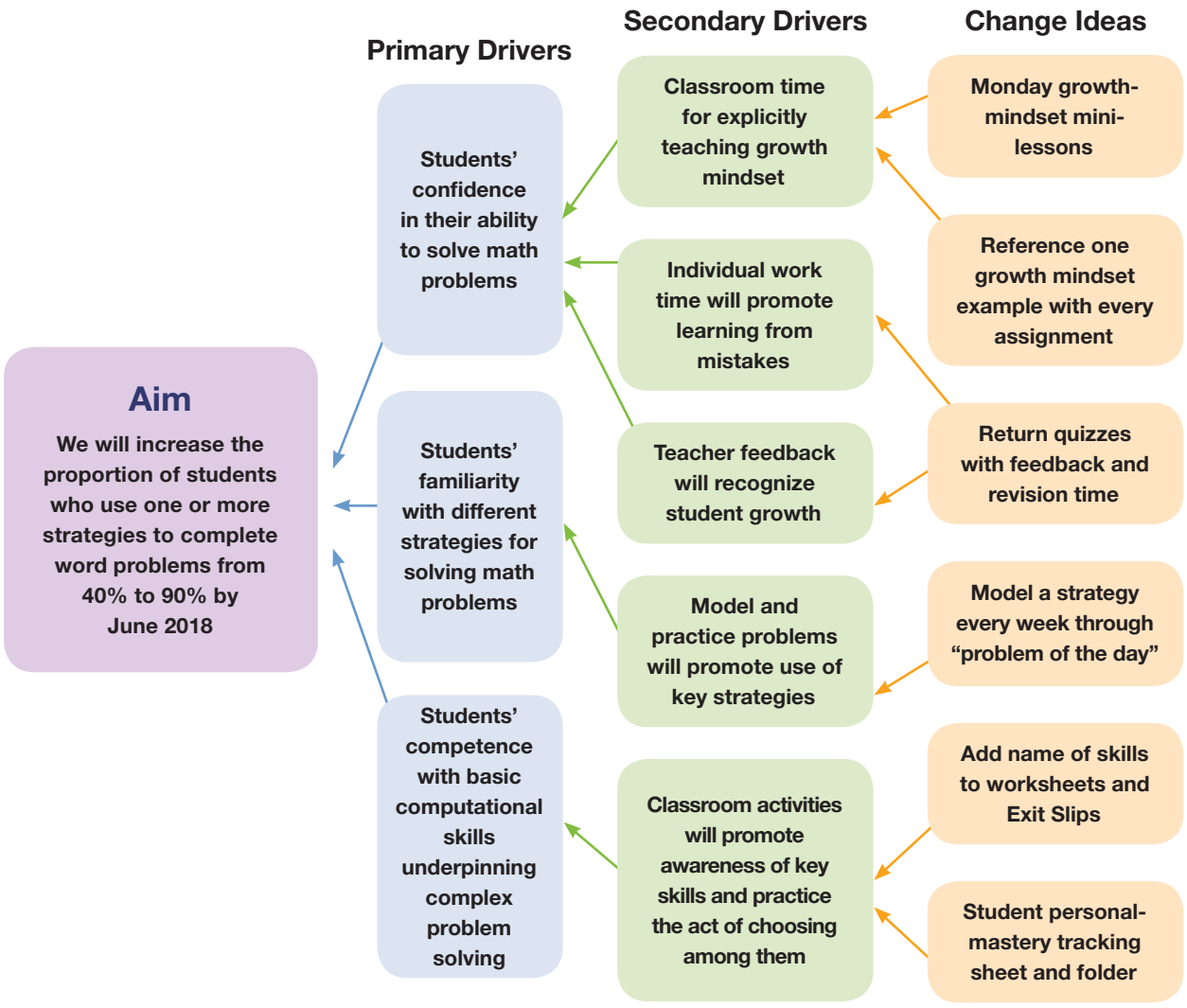
CHANGE IDEAS, RESEARCH, AND IMPLEMENTATION:

Change ideas are a particularly good place to integrate existing research or proven practices into your working theory. Rather than adopting an outside approach wholesale or basing your entire theory on one set of ideas, use change ideas to integrate practices from many sources into a cohesive whole that addresses multiple facets of the problem.

Change ideas are also where much of the focus of improvement science lies, as these are the changes in practice that we test, reflect on, and iteratively improve. This chapter focuses on the theory that will guide and organize the work of testing change ideas. Subsequent chapters explore the testing of small changes (see Chapter 3) and measuring improvement (see Chapter 4).

Putting It All Together

Completed driver diagrams come in many shapes and sizes, and may or may not look like the example below. It is important that your driver diagram makes sense and contains logical connections that map from change ideas all the way through to the aim.



It can be helpful to check your newly drafted working theory of improvement. One way to check your thinking is to fill in the sentence prompt below. If your ideas from single horizontal rows of the driver diagram mesh into coherent, exciting sentences, chances are you have created a driver diagram that outlines a working theory of improvement with a high-leverage change idea to begin testing. Read across your driver diagram using a single "row":

Sentence Prompt Check

"If we want to **[aim]**,

then we need to focus on **[primary driver]**,

through/by/with **[secondary driver]**,

and the best way I can think of doing this is to **[change idea]**. "

Example:

"If we want to **increase the proportion of students who use one** *[aim]*

or more problem-solving strategies to complete word problems

from 40% to 90% by June 2018, then we need to focus on **students'**

confidence in their ability to solve math problems, through/by/with *[primary driver]*

feedback structures to emphasize effort, and the best way I can think *[secondary driver]*

of doing this is to **return quizzes with feedback and revision time**." *[change idea]*

A second way to check the connections between components is by using "why" and "how" prompts. Reading from right to left, each connection should answer the question "Why?"; while reading from left to right, each connection should answer the question "How?":

Right-to-Left Check

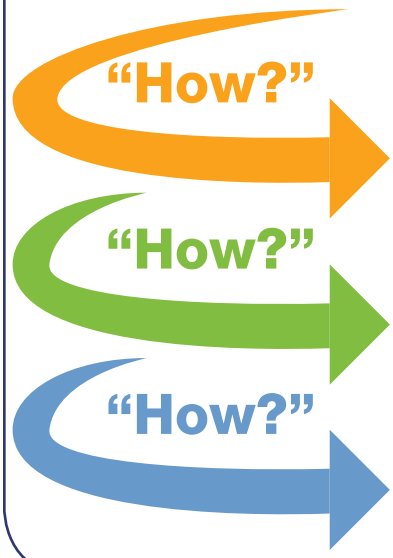
"We will try Monday growth-mindset mini-lessons" **[change idea]**

"To explicitly teach growth mindset to students" **[secondary driver]**

"To increase student confidence in their ability to solve problems" **[primary driver]**

"To increase the proportion of students who use one or more strategies to complete word problems from 40% to 90% by June 2018." **[aim]**

Left-to-Right Check



"We will increase the proportion of students who use one or more strategies to complete word problems from 40% to 90% by June 2018." **[aim]**

"By increasing student confidence in their ability to solve problems" **[primary driver]**

"By explicitly teaching growth mindset to students" **[secondary driver]**

"By trying Monday growth-mindset mini-lessons" **[change idea]**

These techniques should help you look for gaps or leaps in logic in your theory, and are helpful for beginners to make sense of the diagram. Remember that while your driver diagram should make sense and generate consensus among the team, it doesn't need to be perfect. A driver diagram is always a work in progress. You can and should revise it as you learn more.

II. Orientation: Self-Assess to Stay on Target

Where Are You in the Improvement Process?

Improvement science moves through several distinct phases. While the process is not always linear, often shifting back and forth between phases as your learning evolves and sparks new questions, identifying where you are within the work is critical to taking effective action.

Before you begin creating a theory of improvement, we recommend you complete the following four steps from *Chapter One: Analyzing a Problem* to ensure you get meaningful results.

You will know you are prepared for this chapter when you have:

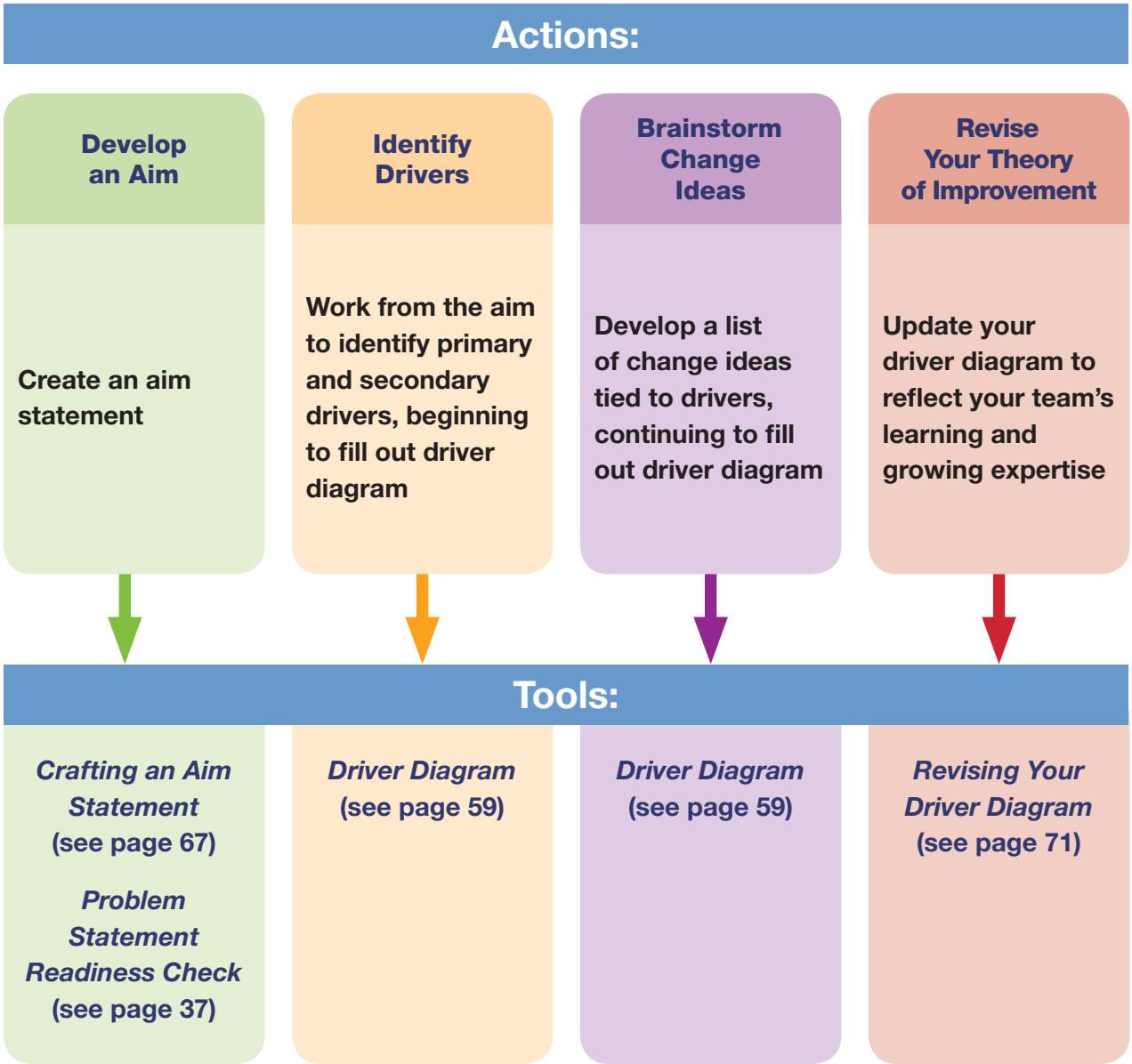
- ☑ defined your problem clearly and **crafted a problem statement**.
- ☑ **gained new insight and understanding about the problem**, identifying specific causes and underlying issues that you as a team have not explicitly focused on deeply before.
- ☑ **completed the *Problem Statement Readiness Check*** from ***Chapter One: Analyzing a Problem*** to consolidate your thinking around the factors affecting your problem.
- ☑ **generated a list of possible actions** you predict will have influence on that problem.

You will know it is time to proceed to *Chapter Three: Testing Changes* when you have:

- ☑ **created an aim statement** which captures the goal you expect your improvement to accomplish.
- ☑ **completed a driver diagram** that maps the factors influencing your problem.
- ☑ **identified and prioritized several change ideas** that can be tried with minimal planning.

III. Coaching Steps

As the leader of your improvement team, you have several options for leading your team through this stage. The following coaching steps should help frame the steps you can take, and orient you to tools and activities that will help you.



IV. Frequently Asked Questions

The questions below represent common issues that come up during the theory of improvement phase.

Q1 Where should I start when creating a driver diagram?

A In general, there are two approaches to creating a driver diagram: *working from your aim* and *working from potential solutions*. In practice you'll probably flip back and forth between the two rather than strictly following one approach or the other. We'll examine both of these side by side below, but in either case the absolute first step begins by gathering and organizing your research and analysis from ***Chapter One: Analyzing a Problem***.

Working from your aim is an intuitive next step from your research. Your team will take what you have learned about causes and sub-causes from your fishbone, empathy mapping, and/or community pulse, and organize these insights into drivers. For example, you may have discovered that students give up when they encounter difficult math problems on exams because they:

- don't believe they can pass.
- feel like they've tried before and never make any progress.
- think that they just aren't "math people."

These issues could all be addressed by a common primary driver: "Students believe they can improve their math ability with effort." Once you have a primary driver, you can drill into secondary drivers capturing the specific areas in which you might engage this driver (e.g., method of feedback, allowing opportunities for revision); you can map underlying change ideas on the diagram (e.g., mini-lesson on growth mindset every Monday or using words like *yet* in written feedback). In this way you are building your driver diagram from a broad vision, starting from the problem focus area and then thinking about causes with a progressively finer focus.

Working from potential solutions takes the opposite approach. It means starting from possible change ideas and building outward. Begin by thinking about the potential solutions that have come up during your problem analysis and that might currently reside in your *Solutions Parking Lot*. Use those ideas for solutions to build outward, thinking about how each connects to drivers and your aim. This approach is often unavoidable during the brainstorm process—and there is nothing wrong with it. But beware of "solutionitis," that tendency to latch onto easy, quick-fix solutions, by taking the time to elicit a clear theory of what you expect to accomplish and how, specifically, it will move you toward your aim.

For example, consider how we might build a driver diagram working from a potential solution for the problem focus area "Increasing student persistence in math classes." If, during a survey or interview in our research, we noticed that an individual teacher had great success building lessons around a set of techniques called "the math habits of mind," we might start from there. We then might ask what moments, structures, or routines in our classroom could benefit from building these habits, thus finding secondary drivers. This would be an example of working upwards from a solution. Remember, in practice, you will probably find yourself using both approaches simultaneously when building your driver diagram—and there is nothing wrong with that!

Q2 Who should be involved in creating a driver diagram? Should we solicit outside expertise beyond our team?

A Including multiple stakeholders and perspectives is essential in the overall improvement science process, but seeking outside expertise need not be a primary focus at this point. By this stage, your own team has gathered insights, completed an analysis, and is a more important resource than outsiders who won't be involved in implementing changes. That said, outside expertise can be a great complement to your team's knowledge of the local context; try to strike the right balance.

If you find yourself stalled out—struggling to identify drivers or unable to drill down into specific changes in practice—remember that this is a nonlinear process and there is always the chance to clarify your understanding of the problem by returning to and deepening the analysis in *Chapter One: Analyzing a Problem*. In these cases, soliciting input from research or other outside sources of expertise can be extremely helpful in propelling you forward.

Q3 I'm having trouble identifying drivers. What are some suggestions for identifying them?

A The first step when getting stuck with drivers is to return to your research with new eyes and get specific. Look at findings from individual students. Think about earlier results from your surveys. Make use of "user perspective" as much as possible, thinking about who specifically the changes will impact and what kind of improvement you expect to come from those changes. Consult with research articles and outside experts. If you are taking a bottom-up approach (i.e., working from potential solutions) and drivers are hard to identify, there is a chance the solutions you are examining are not specific enough. Again, ask yourself what changes you would expect to see in an individual student if your change idea was implemented. The resultant changes should be examples of your drivers.

Q4 Can driver diagrams be updated? Or are they unchanging laminated reference tools?

A Yes, driver diagrams can and should be updated! Laminate only if you are looking for a placemat! Your driver diagram is a working document not intended to be comprehensive or permanent. It is a snapshot of a working theory reflecting your knowledge and understanding at a given moment in time. It will evolve as your interaction with the problem continues. Incorporate your best thinking into the drafting process and then move on, knowing that the insights you gain from testing will be more valuable than any attempt at making your diagram perfect right now could be. Keep in mind that the purpose of having a documented working theory of improvement is so you can revisit and revise it as you learn more about your improvement project. In particular, you will be revisiting and enhancing the driver diagram after you run your first tests, and again after those tests yield concrete insights you attempt to scale. Remember, if you don't revise your driver diagram, you aren't learning!

Q5 How long does creating a driver diagram typically take? How do we know when it is time to move on?

A You will know that the research and analysis you have completed are sufficient when you can create a draft of a driver diagram in a single 60-to-90-minute session. The surest sign it is time to move on is when you have a set of change ideas—specific, measurable, achievable, and within your control to influence—that you are excited to test and believe will have an impact on your problem. If you are unable to come up with these change ideas or are banging your head against the table trying to come up with a single driver, rather than belabor the driver diagram, consider *moving back* to the research and analysis stage described in ***Chapter One: Analyzing a Problem***. However, in most cases, it is desirable to embrace a change idea, begin implementation, and let experience develop your theory for a moment. Then you can come back to your driver diagram with a new perspective.

Q6 How do I know if my driver diagram reaches the correct level of detail?

A Finding the right level of detail in your driver diagram may take a little discussion. Generally you may be too "zoomed out" if there are areas that feel fuzzy or unclear, gaps between causes and effects, or statements that are vague, unmeasurable, or hard to define. On the other hand, you might be too "zoomed in" if your drivers overlap so much they are hard to distinguish, or if your aim feels small, inconsequential, or directly connected to your change ideas with no drivers in between them. If you suspect any of these might be plaguing your driver diagram, use the *Revising Your Driver Diagram* tool included in this chapter to deepen and clarify the components of your driver diagram.

Q7 When selecting the change ideas to focus on, how do I know which to prioritize? I know I should focus on those that are "high leverage," but how can I identify them?

A On a fundamental level, trust your gut when thinking about high-leverage change. Ask yourself which of the change ideas are you most excited about trying out based on your own experience. Which change ideas do you think will have the greatest impact? Which change ideas can you implement immediately? These are your high-leverage changes.

If you get stuck, high-leverage change ideas typically meet the following three criteria:

- The change idea addresses a problem that affects a significant number of students or a few students in a significant way once implemented at scale.
- The change idea does not require a large investment of time, money, or other resources to test initially.
- The change idea is connected to other problems facing students such that solving this one problem may make solving subsequent problems easier.

Q ADVANCED QUESTION: My team is working on a particularly thorny problem that feels too complex for a driver diagram. What should we do?

A If you are working on particularly large and complex problem, it is possible to create a driver diagram *within* a driver diagram to explore a subsystem. These "nested" driver diagrams can be helpful if you are struggling to include specificity and a larger long-term aim in one diagram. If you do decide to use a nested driver diagram, make sure the subsystem is independent enough from the rest of the improvement project to stand on its own.

In a similar fashion, if your aim statement is focused on a very distant "big dot" goal—perhaps only achievable in a 3-to-5-year time period—teams often find it helpful to create a "small dot" aim that articulates a goal that can be accomplished in a year or less. This creates a target that is both more attainable and gives teams a chance to narrow their focus so that drivers and change ideas might flow more freely. For more on "big dot" goals and "small dot" aims, see the *Crafting an Aim Statement* tool in this chapter.

V. Facilitator Step-by-Step Guides

On the following pages of the handbook you will find facilitator guides for the following tools and activities:

- Activity: Driver Diagram
- Tool: Crafting an Aim Statement
- Tool: Revising Your Driver Diagram

Use the guidance from the preceding pages alongside the facilitation notes to lead your team through the use of each.

Activity: Driver Diagram *(50–60 minutes)*

Overview

Having spent time analyzing your team's problem focus area and having drafted a problem statement and aim statement, the next step is to turn that thinking into a visual improvement plan. This will be preserved as a driver diagram, or a visual representation of your team's best theories for how your team can create the change you want to see. This diagram will become a platform for future work in several ways, but primarily through helping identify action steps, checking progress toward the goal, and capturing the team's learning (reflected in their evolving theory) throughout the improvement process.

Objective

Through a guided session of small- and large-group discussion, participants will create a visual improvement plan called a driver diagram, which will guide their work through testing changes to practice.

Participants

- Improvement team
- Improvement team leader (as facilitator)

Materials

- A completed *Problem Statement Readiness Check* tool (page 37) with a draft problem statement and a completed *Crafting an Aim Statement* tool (page 67) with a draft aim statement
- Any other critical documents produced during problem analysis (e.g., survey findings, empathy map results, observational checklists, etc.)
- (Optional) Graphic organizers (page 65)
- (Optional) *Solutions Parking Lot* (in Chapter 1)
- (Optional) Chart paper or a white board and markers, and stickers for voting

Guiding Questions

- What is the aim of our improvement project and how do we plan to accomplish it?
- Where are the potential strategies for creating high-impact change?
- How can we turn our ideas into a coherent improvement plan?

continued on next page

Facilitation Notes

1. Introduction and Framing (5 minutes)

- Welcome your team and review the objective and guiding questions of the activity.
- Explain to your team that this activity will build on their previous work developing an understanding of the systemic nature of the problem they aim to solve. First, they will use some of the documents they have produced while investigating the problem to bring that thinking to the front of their minds. Then they will turn that knowledge of the problem and its components into a visual diagram of potential action steps for their ongoing improvement efforts.

2. Primer on Avoiding "Solutionitis" (5 minutes)

- Read your team the following quote, reminding them that they can find it at the top of their graphic organizer:
  - *"Solutionitis is the propensity to jump quickly on a solution before fully understanding the exact problem to be solved. It is a form of groupthink in which a set of shared beliefs result in an incomplete analysis of the problem to be addressed and fuller consideration of potential problem solving alternatives. When decision makers see complex matters through a narrow lens, solutionitis lures them into unproductive strategies."* – Bryk *et al.*, *Learning to Improve*, page 24
  - Ask your team what about the quote resonates with them. Invite them to share a story if anyone has an example of a school improvement that might be described as the result of solutionitis.
- Tell your team that today they are going to try to avoid succumbing to solutionitis by exploring multiple options before committing to one approach. For this reason, the activity breaks up the planning into multiple steps and leaves solutions to the end. Solutionitis is a common problem because solution ideas naturally flow from discussions about the challenges educators face. Remind them that when the conversation drifts toward solutions, their job is to call it out and record the idea on the *Solutions Parking Lot* so that they can return to it later in the activity.

3. Refining Your Aim Statement (10 minutes)

- Explain that the first step toward collectively solving their common problem is setting a goal to work toward. Review the work that the team has done to analyze the problem by looking at the *Problem Statement Readiness Check* tool and draft aim statement.
- Spend a few minutes reviewing the draft aim statement for feedback and understanding.
  - Show your team the criteria of a good aim statement.

continued on next page

- Read them the aim statement and ask them to discuss the aim statement as it relates to the listed criteria:
  - It should be S.M.A.R.T.[1]
  - It should address a high-priority need of students and the school community overall.
  - It should reflect the insights from the analysis of the problem, or be closely connected to them so that you can benefit from what you have learned.

4. Creating Drivers (20 minutes)

- Write the aim statement on the left side of your chart paper or white board.
- Explain that the next step in the process is to describe the primary drivers. Primary drivers represent the areas of influence that are necessary for accomplishing the aim.
  - For example, if a school selects an aim of "increasing homework completion to 90%," possible drivers might be "students understand the task" or "students see the value of the homework." These drivers work because they describe an area that has a clear connection to the aim, and a school can reasonably believe that by making progress in these areas they can *drive* an increase in homework completion.
  - A driver should answer the question: "What must happen in order for us to accomplish our aim?"
- Tell your team that the work they have already done to analyze the problem was critical to this process and they should lean on their earlier thinking. Distribute the *Problem Statement Readiness Check* tool and any other problem-analysis artifacts.
  - Divide your team into two or three groups and have them spend two minutes reviewing the documents and three minutes sharing insights that they think are important for accomplishing the aim.
  - Tell your team to work within their groups to write potential drivers on sticky notes for about three minutes (one driver per sticky note).

    Have your team share their ideas with the larger group. Encourage them to look for similarities and cluster "like" ideas. If stuck, encourage the group to think about the problem from the perspective of students or other users. Move on when the group runs out of ideas, hits 10 ideas (after clustering), or exceeds the 20-minute time limit for this step in the protocol.

[1] S.M.A.R.T. goals are *Specific, Measurable, Aspirational but attainable, Relevant,* and *Time-bound.*

continued on next page

- Explain that part of the purpose of creating drivers is to help schools to prioritize their efforts to create the biggest impact while still respecting the time educators have to dedicate to their many other responsibilities. Ask your team to rank the top six drivers (or driver clusters) in order of potential impact on the aim.
  - Tell your team they have five "votes" for the driver(s) that they think will have the greatest impact on the aim. They can distribute those votes among the drivers, or they can vote multiple times for the same driver if they want, as long as they don't exceed five total votes.
  - Go around the room voting, using stickers or tally marks.
  - Place the final six drivers on the communal driver diagram.

5. Creating Secondary Drivers (10–20 minutes)

- Tell your team that the next step involves thinking about how they can enact each of their drivers. In doing so they will be identifying areas that are within their control to influence and which will lead to the changes described by each driver. It can be helpful to think of these steps as opportunities where they can take action.
  - Divide into two or three groups and assign each group **one primary driver** to tackle. Have them brainstorm ideas on sticky notes like before, but this time using the following guiding questions:
    1. How can we make this happen?
    2. Where is an opportunity to make an impact on this driver?
  - After three to five minutes, bring the groups back together and ask them to share. Place the secondary drivers on the communal driver diagram and ask listening teams if they have any secondary drivers they want to suggest to the presenting group.
  - If time allows, divide the remaining primary drivers among the groups and repeat these steps until the diagram is complete.

6. Reflection and Next Steps (5 minutes)

- Use a marker to draw lines on the communal driver diagram connecting the aim statement to the primary drivers, and those drivers to their associated secondary drivers. Label the space to the right of the secondary drivers as change ideas, and explain that these will be the focus of the next step in the process. But before the team gets there, you want them to understand what they have just finished creating.
  - Ask your team to look at the diagram as a whole for a moment. Tell them that it represents a snapshot of their collective thinking at this moment in time. Remind them that it does not have to represent a perfect plan for solving their problem, just a promising one.

continued on next page

- Tell your team that one way to make sense of the driver diagram is to use the following sentence, read from left to right (if you plan to engage in the optional Step 7 below, you can distribute the graphic organizers now):

> "If we want to accomplish **[aim]**, we must **[primary driver]**, through/by/with **[secondary driver]**, and one way to do that is **[change idea]**."

NOTE: *Deciding on which change idea to begin testing will happen in the next session. If your team needs clarification on what change ideas are, you can tell them that they are small action steps that they will be using to implement changes in a deliberate and measured way.*

- (Optional) A second way to check the connections between components is by using "how" and "why" prompts. Reading from left to right, each connection should answer the question "How?"; reading from right to left, each connection should answer the question "Why?"

7. (Optional) Preview of Future Use of the Driver Diagram (5 minutes)

- If time allows, you may want to preview the purpose of the diagram your team has just created. Ask your team to look at the diagram and take two minutes to answer the following four questions for themselves:
  1. What secondary driver do you think would be the most fruitful for you to work on?
  2. What piece of the diagram are you most motivated to work on?
  3. What piece of the diagram would you want formative data on to show you if you are making progress?
  4. What piece of the diagram do you worry might not work as planned?

- Ask them to quickly share their answers with a partner.
- Tell them that each of the four questions they were discussing corresponds to one of the four uses of the driver diagram. Tell them to look to the bottom of their graphic organizer and compare their answers with the four listed purposes:
  1. Prioritize among the many possible strategies for accomplishing their aim.
  2. Organize the efforts of different members of the team (and/or partners at different schools) to work toward accomplishing a common aim.

continued on next page

3. Provide a tool for selecting the best way to measure progress toward that aim.
4. Capture the learning that happens over the course of the work in the form of revisions to the diagram.

- Tell your team that the first step toward accomplishing all four goals is to create a shared understanding of your strategy, and the document they have just helped create does exactly that. The next step of the process will be to use the driver diagram to accomplish purpose number one, in which they will prioritize and decide what small part of this strategy to tackle first. Thank your team for their work.

Participant Graphic Organizer

Prompt for reading a driver diagram:

> "If we want to accomplish **[aim]**, we must **[primary driver]**, through/by/with **[secondary driver]**, and one way to do that is **[change idea]**."

Reflection questions:

1. What secondary driver do you think would be the most fruitful for you to work on? (Consider your interest and how closely it connects to your work.)

2. What piece of the diagram are you most motivated to work on?

3. What piece of the diagram would you want formative data on to show you if you are making progress?

4. What piece of the diagram do you worry might not work as planned?

Purposes of a driver diagram:

1. Prioritize among the many possible strategies for accomplishing the team's aim.
2. Organize the efforts of different members of the team (and/or partners at different schools) to work toward accomplishing a common aim.
3. Provide a tool for selecting the best way to measure progress toward that aim.
4. Capture the learning that happens over the course of the work in the form of revisions to the diagram.

Tool: Crafting an Aim Statement

Overview

The crafting of an aim statement signals the moment when an improvement project shifts gear and moves from analyzing a problem to addressing it. It answers the question "What are we trying to accomplish?" and provides a common goal to link together the efforts and innovations of your team over the course of the next several months. It is a critical tool that future work will build on, so it is well worth the time spent to craft an aim statement that motivates your team and generates consensus.

Prerequisites

- Completed at least one research tool from ***Chapter One: Analyzing a Problem*** (fishbone diagram, empathy map, community pulse data)
- (Optional) Completed the *Problem Statement Readiness Check*

Steps

1. Document Review and Early Brainstorm

- Review problem-analysis tools and documents
- Discuss and/or reflect with the following guiding questions:
  - How complex is the problem?
  - Where is the will (i.e., what will galvanize your team and/or school community)?
  - What would an early win look like (6-to-9-month timeframe)?
- Dot-voting/pulse check. If you are working with a team, it can help to narrow down your list of ideas:
  - What part(s) of the problem seems like the most promising place(s) to start?
- Distribute a set number (5–7 is typical) of stickers to each team member and ask your team to place their stickers according to the priority of their choice. Multiple stickers on a single choice are encouraged, but not required (pens can be substituted for stickers to draw dots/checks/etc. if stickers are not available).

continued on next page

2. Introduce Aim Characteristics

An aim is a S.M.A.R.T. goal, meaning it is . . .

Specific and

Measurable: You can observe and recognize it.

Aspirational but attainable: It is important enough to motivate without being so large it intimidates.

Relevant: It is connected to the work your team already does.

Time-bound: It should be a target for achieving before the end of this year.

But wait! Before we jump to old and familiar metrics, it is important to get the scope and the focus right. It's OK to let your aim statement stay "dumb" for a little while longer.

3. Crafting an Aim: Define the Scope

- Choose the right scope for your problem, team, and context by asking yourself the following guiding questions:
  - How complex is the problem?
- The greater the complexity, the smaller scope should be initially. Less complexity means that you can choose a slightly broader scope.
  - What do you already know?
- The more knowledge your team has about the problem, the broader your scope can safely be. If your team is starting out from a position where they aren't experts, it is recommended the scope be narrow and focused.
  - What resources are available?
- If you have a variety of relevant resources to call on, you can be more ambitious in your scope. If you do not have access to any additional resources, then it may help to stay focused on a smaller scope.
- Choose the right scope for your timeline. Reconcile a realistic scope with the long-term goals of school and district leadership and "the fierce urgency of now."
- Use "small dot"/"big dot" aims to reconcile the tensions of different demands. Using the examples below as a guide, decide if it is helpful to set a "big dot" aim first, and then embed a more quickly attainable "small dot" aim within it.

continued on next page

"Small Dot" Aim		"Big Dot" Aim
Shorter-term goal for team's early work	→	Longer-term goal for overall project
Figure out how to get the 1/3 of the class who struggle with word problems to consistently use strategies and persist by end of June 2018	→	Increase school-wide completion of word problems on unit exams from 65% to 85% by July 2019
Increase from 30% to 70% the percentage of chronically absent students who believe "there is an adult I can trust" at school by June 2018	→	Increase from 50% to 80% the percentage of students who score a 4 or 5 on the school engagement scale by July 2019

4. Write Your Aim Statement(s) Below

- Don't be put off by the fact that what you want to accomplish is hard to measure. It is OK to start the next steps before you finalize success metrics.
- Remember that the aim isn't set in stone. Aims often evolve as teams learn about and make progress toward solving their problem.

"Big Dot" Aim Statement:

"Small Dot" Aim Statement:

continued on next page

5. Final Check

Discuss the following guiding questions to check your thinking and make sure you have chosen an aim statement that is the right fit for your school and the problem you want to solve:

- Where is the will?
  - What parts of the problem are people most interested in?
  - What is leadership invested in achieving?
  - Where is momentum/opportunity building?

- Where can you have the biggest impact?
  - Where do you get stuck?
  - What parts of the problem are most prevalent in your classroom?
  - What parts of the problem are most influential?

- Are we being strategic?
  - Aim for early wins!
  - Choose something that you are interested in working on over time!

If this check doesn't reaffirm confidence in the selection, or if more than one option remains, consider taking the question to school leadership. Differences that are technical in nature can be resolved later, often after seeing early results in the data, but a more philosophical disagreement about the desired direction of the work should be sorted out early, and with the support of school leadership.

NYC Department of Education

Continuous Learning

Tool: Revising Your Driver Diagram

As the working representation of your theory of improvement, the driver diagram should always be considered a work in progress. As you engage in improvement work, learn more about your problem's many manifestations, and experience successes and setbacks, your driver diagram should evolve to reflect your most current thinking. Use the guidance in this tool to prepare for revisions to your driver diagram.

WHEN you should revise your driver diagram

- **After you have learned something important**, either through PDSA tests, problem analysis, or desk research.
- **At a natural pause point**, such as before winter or summer break.
- **Before sharing** with others outside of your team.

WHY you should revise your driver diagram

- **Capture** and name parts of your evolving hypothesis.
- **Organize** your team's work on multiple change ideas.
- **Review your progress** toward your aim.
- **Communicate** your strategy to others.

WHO you should involve in your revision

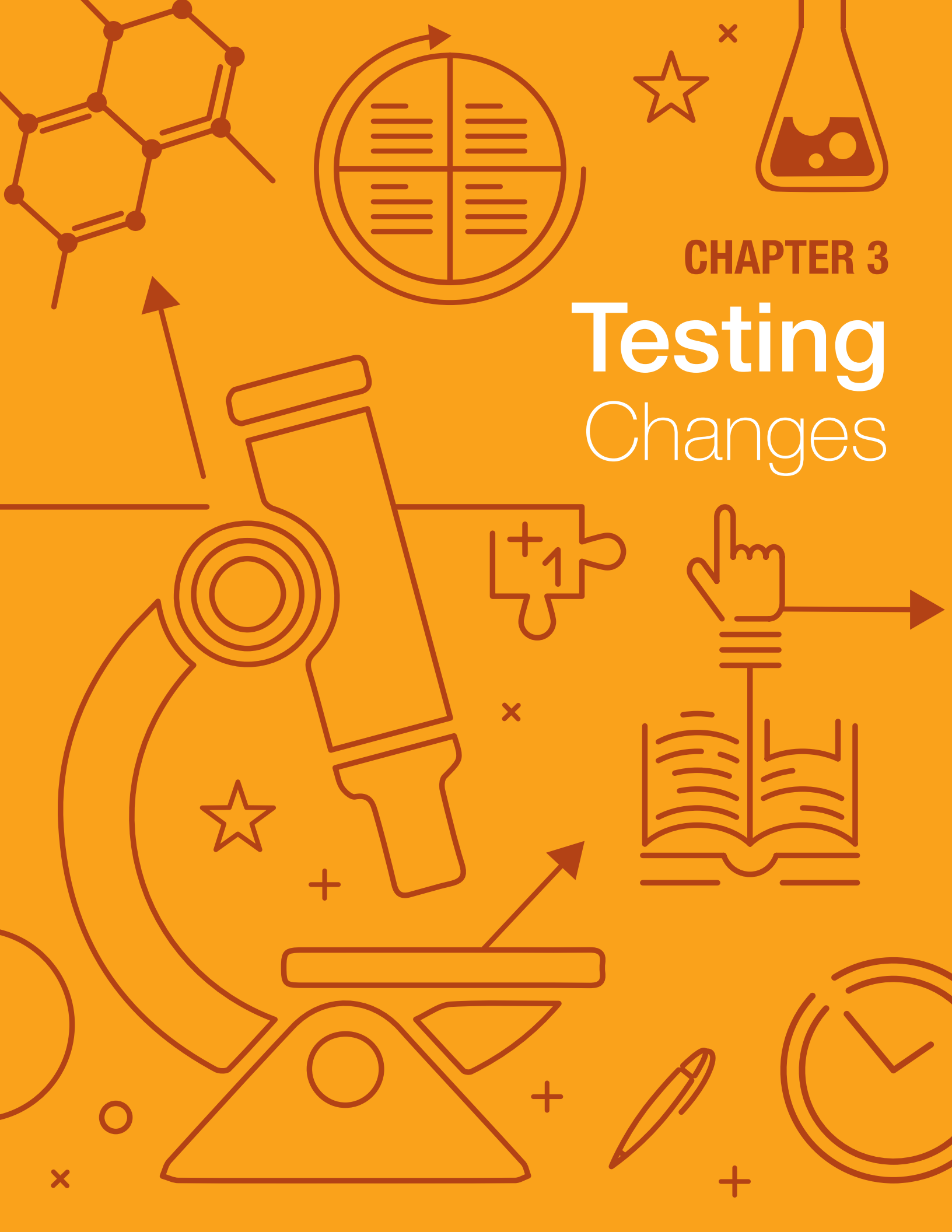
- Leaders of the improvement team.
- Principal testers of the change ideas.
- Other team members who were heavily involved.

  OR

- Your whole team, if time and interest allow.

HOW you should refine your driver diagram

- **Challenge** a part of your theory that didn't work as intended when you tried it with students. Use what setbacks and failures have taught you to change the parts of the diagram that didn't pass muster. Remove failed change ideas and consider revising attached drivers to reflect your learning.
- **Trim** the parts of the diagram that you won't be able to get to. Often, a brainstorming session produces more ideas than we have time to deal with. If parts of your diagram are unrealistic in the short- and medium-term, they can be trimmed.
- **Expand** on parts of the diagram where critical details are missing. If you have uncovered components of your strategy that you didn't think of or include initially, they can be added here. If something you have learned or observed is central, add it.
- **Clarify** your language to better reflect what you now know about what works and what doesn't. Make sure the language you use to describe your theory keeps up with your growing expertise.
- **Consolidate** the practices you have developed where appropriate. Consider combining change ideas that are refinements of each other, while keeping separate the ones that can exist independently of each other.



CHAPTER 3

Testing Changes

Activities:

> Introduction to PDSA Cycles

Work with your team to introduce yourselves to and complete a PDSA form to prepare to test your first change idea.

> Debriefing a PDSA Test

Work with your team to reflect following the implementation of a test of a change idea.

Tool:

> Change Idea Checklist

Provides a list of criteria that change ideas should meet in order to maximize your chances of running a successful test. For use before testing a new change idea.

The purpose of this chapter is to provide guidance on using Plan-Do-Study-Act (PDSA) cycles to test, reflect on, and refine changes to practice. It should be used once the team has mapped out a working theory of improvement.

CHAPTER 3

Testing Changes

Quick Look:
Testing Changes

What is the purpose of this chapter?	To provide guidance as you conduct your first Plan-Do-Study-Act (PDSA) cycle
When should it be used?	Once the team has mapped out a working theory of improvement
Who should be involved at this stage?	• Improvement team leader • Improvement team members

I. Chapter Overview: Beginning a Cycle of Improvement

Introduction

The heart of the improvement process lies in testing change. By observing how small changes made in a deliberate step-by-step manner influence behaviors within a classroom or other school contexts, we create conditions for continuous learning to take place and steady but real improvement to grow. Unlike many big initiatives in education, however, these tests are deliberately engineered to be low stakes—especially in the beginning—prioritizing simplicity in implementation over perfect planning. Where traditional school reform often relies on efforts to optimize initiatives before they are introduced, improvement science thrives on much smaller tests, designed for rapid *cycles* of feedback, reflection, and adjustment, building in scale only after learning what works in varied contexts.

Within improvement science, these cycles follow a path referred to as *PDSA*, an acronym for Plan-Do-Study-Act. Each PDSA is a small sequence, which, like the adage of a rolling snowball, starts off with small, simple, practical actions, and with repetition grows to gain progressively larger and larger momentum. It is a powerful process to practice, and there is little in education like watching initial humble PDSA cycles blossom into major agents of school change. Unlike the rotation involved in rolling a snowball, however, the repetition of the PDSA cycle is anything but uniform, requiring attention, tinkering, and comfort with failure, necessary to optimize a change until it is ready for scale.

A Word about Scale: The Power of Small Change

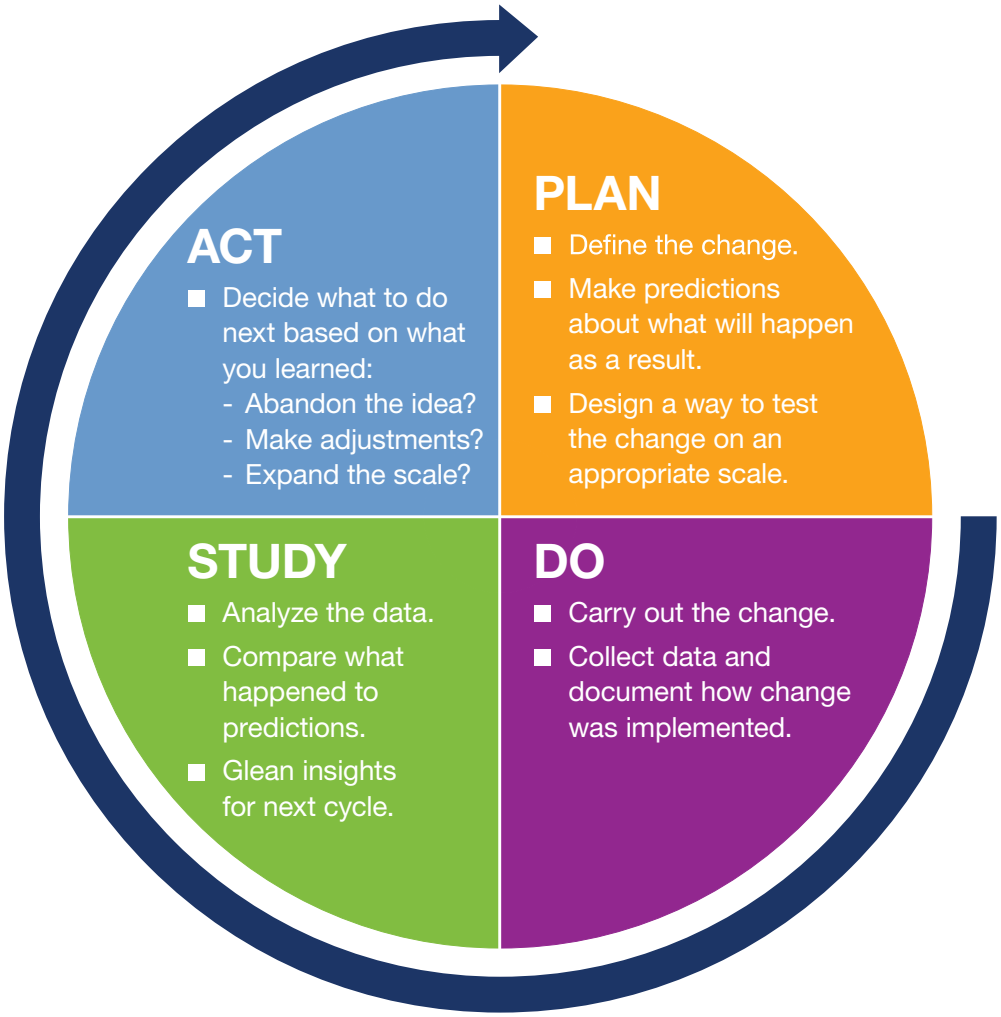
Initially, many educators unfamiliar with improvement science may bristle at the suggestion that a whole teacher team should focus on changing something so small. After days of study, hours in team meetings, weeks carefully making their way through this handbook—mapping out diagrams and creating theories of change—there is a tendency to want to make changes that will be immediately impactful and felt by many students. And while it is true that this process differs markedly from the standard practice of implementing at scale (see figure below), it comes with several key benefits. First, by starting small you are able to leverage the resources available to you—to "learn quickly and cheaply," in the words of Anthony Bryk—by choosing action and testing over theory and planning. Putting this testing in your own hands within your day-to-day work will also increase your motivation as a team when you see successes in your classroom. Second, and perhaps counter-intuitively, starting small gives you permission to fail. Failing in small and safe ways provides freedom to acknowledge positive and negative effects of each test, rather than defensively cling to a theory in the face of opposing evidence. Creating the space to safely try things that could fail ultimately allows true learning and innovation. **Rather than focus on the size of your initial change, focus on the speed of your learning**, recognizing that by cycling through several successive PDSAs you will be creating change much more effectively, even if scale is the last thing to fall into place.

Implementing at scale...	differs from...	testing small changes
1. A lot of planning happens before implementation		1. Involves planning just enough to jump in and try something
2. Decisions are made without the benefit of specific expertise in new practice		2. Expertise is generated among the team and shared before full-scale implementation
3. Implementation often doesn't work exactly as planned or live up to expectations		3. Expectations of learning replace expectations for impact as the immediate goal
4. High-stakes effort relative to results leads to loss of motivation		4. Small successes increase motivation of team to continue
5. Setbacks can lead to abandoning the practice		5. Setbacks lead to adaptation and improvement before scaling

The Plan-Do-Study-Act Cycle

The core of this chapter, and the improvement process, is the PDSA cycle. It provides a structure for moving through four steps: 1) using one of the change ideas you developed in your driver diagram to create a small test and make predictions; 2) gathering embedded data by using existing daily or weekly classroom measures or structures to look for evidence of change; 3) evaluating how the results compare to your initial predictions; and 4) using that information to make adjustments to the change idea. The reality of all changes to educational practice is that nothing ever goes exactly as planned, and as your team grapples to reconcile its predictions and the results to come up with an enhanced change idea, the cycle begins anew. One PDSA cycle typically lasts only 1–2 weeks, and the emphasis is on cycling quickly. PDSAs thrive when a team is gaining experience working on their problem, allowing them to continually refine their tests and try out their change ideas in new contexts to optimize the practice before eventually going to scale.

You can find a blank copy of the PDSA form on page 98 of this chapter, or online, using the link: http://bit.ly/PDSAnyc



Plan. The first step in the PDSA cycle is planning. The team considers its aim and driver diagram, and selects a change idea from the driver diagram team members believe will maximize potential for improvement. An ideal change idea will take a single step to implement, can be implemented over a short duration (i.e., no more than two weeks), and often involves only a small sample size. For additional support selecting a change idea, see the *Change Idea Checklist* tool on page 104.

Once a change idea has been selected, the team makes predictions about the results expected by visualizing the change and anticipated challenges that might arise. This visualization helps the team create a concrete plan to carry out the improvement—detailing responsibilities and logistics (who, what, where, when, and how)—and identifying how they can easily collect evidence by using existing tools or measures already embedded in their practice (such as collecting notes from a student/teacher conferencing sheet or in-class assignments).

As illustrated in the example below, the "plan" box of the PDSA form is the workspace for the teacher team to develop an action plan. This section of the form is filled out before the change idea is tested, typically during a teacher team meeting. While it is common to identify one or two tasks to be completed before the change idea is tested, if you find that you need additional time to action plan, your test is probably too big.

EXAMPLE: RUNNING A PDSA TEST

Plan

Aim: We will increase the proportion of students who use one or more problem-solving strategies to complete algebra word problems from 40% to 90% by June 2018.

Change Idea: Use a feedback protocol to help students revise quizzes.

The team begins by creating a concrete plan around their change idea, then using it to visualize their test: coming up with questions and predictions about the plan and types of data they'll need to verify their predictions.

1. PLAN: Describe the who/what/where/when for the test. Include your data-collection plan.

- One teacher will create a protocol for providing students with written feedback on quizzes.
- That same teacher will also create a data-collection sheet for recording data and notes.
- All three teachers on the team commit to finding an opportunity over the next two days to use the protocol with one of their students and to provide that student with 20 minutes of in-class time for revision.

QUESTIONS →	PREDICTIONS →	DATA
How many of the students will use the full 20 minutes of revision time?	One student will use the full 20 minutes	Minutes each student takes to revise quiz
How many pieces of feedback will the students address?	Students using the protocol will address all pieces of feedback	# of pieces of feedback addressed
How many students will need additional time to revise?	Two students will need additional time to revise	# of students who have not completed the revisions after the 20 minutes

Do. Here the team takes action and carries out the plan, implementing the change idea and collecting evidence and observations along the way. Typically, the "do" portion of a PDSA cycle will happen in less than a week—frequently it will occur within a single class period—and team members should take extra care documenting inevitable problems and unexpected outcomes that occur. These will ultimately provide the inspiration for your learning, especially in early stages.

The "do" section of the PDSA form is completed immediately after the change idea is tested. It is where all relevant notes on what happened are recorded for later discussion. Summaries of the data collected during the test are aligned with the team's questions and predictions so that they can quickly assess how it went.

EXAMPLE: RUNNING A PDSA TEST

Do

In the days after the meeting, the team conducts their test. As a part of the testing process, they record their notes on what happened, alongside any data they planned to collect to bring to the next meeting.

2. DO: Briefly describe what happened during the test, including surprises, difficulty getting data, obstacles, successes, etc.

All three students used the protocol to revise their quizzes: one in class and two after class. One student seemed a little surprised to receive the feedback, but all were very engaged. In one case the revisions the student completed did not match the suggested feedback ("try a different strategy here"). In the other cases the teacher had to provide additional verbal prompts to help the students make sense of the feedback. Teachers often forgot to record the total amount of time the students spent on the revisions.

What were your results? Comment on your predictions box below. Were they correct? Record any data summaries as well.

- One student spent the full 20 minutes on the revisions. The other two teachers forgot to record time.
- 1/3 of the students fully completed all revisions suggested through the feedback protocol. All students addressed most of the feedback.
- Because two of the teachers forgot to record the full amount of time, it was unclear if students would need more time to revise. However, 20 minutes was plenty of time for the student whose revision session was timed.

Study. After carrying out the test, the team then meets to complete the data analysis by comparing their results to initial predictions. During these debrief meetings, the team's collective experience will be brought to bear to make sense of the data and what they saw. Previously unrecognized issues should come to the fore. You can expect your results to be a little messy. Especially in the early stages of an improvement, gaps in understanding will be frequent and accepting them is critical to making the connections necessary to really understand your problem. Do not be deterred; this is learning!

Ultimately, as you cycle through successive PDSAs, these gaps in understanding should narrow, allowing you to refine your change idea and create a stronger, more consistent improvement.

EXAMPLE: RUNNING A PDSA TEST

Study

At this point, the team analyzes their findings by comparing their results to predictions. For instance, comments on predictions and analysis in this example might include:

PREDICTIONS	RESULTS
One student will use the full 20 minutes →	One session lasted 20 minutes. The other two teachers forgot to record time.
Students using the protocol will address all pieces of feedback →	1/3 of students fully completed all revisions suggested through the feedback protocol. All students addressed most of the feedback.
Two students will need additional time to revise →	1/3 of students used the full 20 minutes; the other two sessions were not timed, so it's unclear if they would need more time.

3. STUDY: What did you learn?

- Using the protocol to give students feedback was natural and doable in a short amount of time.
- Students didn't always revise their work in the way suggested by the teacher.
- However, revisions were pretty good anyway. Maybe there is a better way to help students understand where they made mistakes?

Act. While the A in PDSA stands for "act" in official improvement science terminology—indicating the upswing of the cycle and return to "plan"—it could just as easily stand for "adjust." This final quarter of the PDSA cycle is a time to leverage the insights gained as well as the remaining questions to make adjustments for the next round. Here the improvement team decides what to do with the change idea and whether the evidence suggests they should "adopt, adapt, or abandon" it.

This is also an opportunity to take stock of progress and record the team's learning by updating their theory of improvement to reflect their most current understanding. The team should repeatedly ask itself, "What changes do we need to make to optimize our improvement?" before beginning the cycle anew.

EXAMPLE: RUNNING A PDSA TEST

Act

Finally, the group discusses modifications and decisions for the next cycle.

4. ACT: What will you do next?
The feedback protocol was effective in structuring targeted time for revisions, and students used the time to work through the feedback. Next week, let's adopt this procedure with three students in each class and see if it changes the amount of revisions students make.

Putting It All Together: PDSA "Bursts" and Refinement until Optimization

Just as each individual PDSA cycle creates time for action balanced by reflection, scheduling cycles of PDSAs into "bursts"—6 to 12 weeks of more frequent meetings for team members—allows for several rapid iterations of the PDSA cycle. This creates conditions that best nurture both the experimentation required during testing and the reflection and refinement needed when scaling up.

To keep track of your efforts during these bursts, we recommend using the PDSA form (see page 98) to integrate your actions, reflection, evidence of change, and next steps into a single document. The PDSA form is your team's workspace and, over time, becomes a record of your challenges, learning, and progress, offering yet another opportunity for reflection and refinement. This record keeping will help guide you through your burst as you reflect and adjust between each cycle, and will also prove invaluable after the burst, when your team comes together to make strategic decisions about what change to make next.

II. Orientation: Self-Assess to Stay on Target

Where Are You in the Improvement Process?

Improvement science moves through several distinct phases. While the process is not always linear—often shifting back and forth between phases as your learning evolves and sparks new questions—identifying where you are within the work is critical to taking effective action.

Before you begin *Testing Changes*, we recommend you complete the following four steps from *Chapter Two: Creating a Theory of Improvement* to ensure you get meaningful results. You will know you are prepared for this chapter when you have:

- ☑ **completed the *Problem Statement Readiness Check*** to consolidate your thinking around the factors affecting your problem (see *Chapter One: Analyzing a Problem*).
- ☑ **captured your team's working theory of improvement in a driver diagram** (see *Chapter Two: Creating a Theory of Improvement*).
- ☑ **identified several potential change ideas** from your driver diagram as places to start testing. These should have the potential to be high impact, and should be accessible to your team's daily work.

When Am I Ready to Move On?

If it is your team's first time testing changes with the PDSA form, developing your own testing skills should take priority, and you should plan to accomplish the following before moving on to *Chapter Four: Measuring Your Progress* and *Chapter Five: Scaling and Sharing*.

- ☑ **complete 2–3 PDSA tests.**
- ☑ **experience one successful change.**
- ☑ **experience one failed change** that leads to learning.
- ☑ **experience one test that highlights** variation in impact among students (and preferably a deeper understanding of why that variation occurs).
- ☑ **reflect on your PDSA burst**, draw conclusions, and record learning and implications for future work.

Before you reach the milestones above, you may choose to read through and engage with the activities in *Chapter Four: Measuring Your Progress*, which are designed to help your team more deeply understand the types of measurement that will best support your improvement work. This is the stage where improvement science becomes less linear. If you think your project would benefit from taking time to think about the types of evidence and data you want to collect before beginning to run tests, then feel free to explore *Chapter Four: Measuring Your Progress* first.

Where Do I Go from Here?

Testing is a little different from other parts of the improvement process. Chapters 1 and 2 are designed to lead you towards testing changes, while Chapters 4 and 5 are for maximizing the impact of the changes you test. **Running PDSA cycles will become the largest single part of the improvement process and the centerpiece of your future work.**

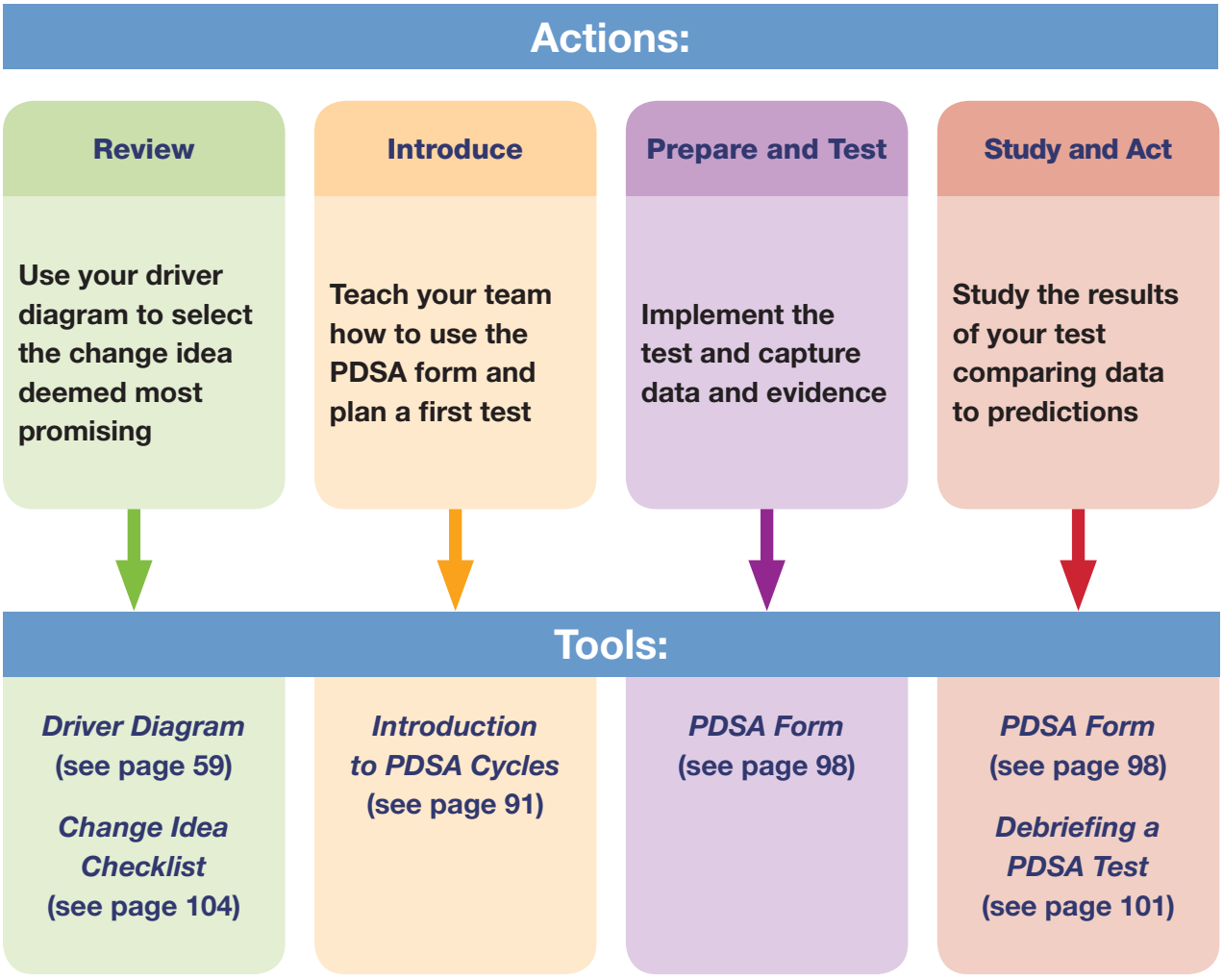
That does not mean, however, that you won't pause testing efforts to reflect on your progress or return to the work of another chapter. In practice, implementing changes should lead to new insights and ideas that might in turn lead to:

- further investigation of some aspect of the problem using the tools in *Chapter One: Analyzing a Problem*.
- further refining your theory by updating your driver diagram, returning you to *Chapter Two: Creating a Theory of Improvement.*
- further improving the ways you measure your progress, leading you to *Chapter Four: Measuring Your Progress*.
- further testing in new contexts and slowly scaling up, leading you to *Chapter Five: Scaling and Sharing.*

For more help making these decisions, see the *"What Next?"* tool in *Chapter Five: Scaling and Sharing.*

III. Coaching Steps

As the leader of your improvement team, you have several options for leading your team through this stage. The following coaching steps should help frame the steps you can take, and orient you to tools and activities that will help you.



IV. Frequently Asked Questions

The questions below represent common issues that come up when learning how to test changes and use the process to drive progress towards your aim.

Q1 How do changes that are this small get us anywhere?

A Improvement science follows on the back of years of more traditional approaches in educational reform—large initiatives, often backed by compelling research and big-money donors, involving years of planning before implementation—that have had a decidedly mixed impact on the lives of actual students. It is a cornerstone belief that sustainable improvement is never made all at once, but rather occurs in small, refined steps that build on each other over time. Starting small allows you to focus on the details of a new practice *in your school, for your students*, and optimize it so that as it expands it continues to work effectively for as many students as possible. Small changes also provide a safe space for people to acknowledge what they don't know, to admit failure, and to learn. It is much better to do these things in a small way and scale deliberately as skill and confidence grow.

Q2 I've bought into the idea of starting small. But what exactly am I testing? How do I know the difference between a small change and a meaningless one?

A You are testing small changes to the way you usually work, to your normal classroom routine, or to your students' typical approach to their work—and you are doing so in bite-size portions in connection to your theory of improvement (as outlined in your driver diagram). We call these *change ideas* to distinguish them from larger initiatives or vague concepts. They should involve a *single step*, occur over a *short period of time*, and be implemented within only a *small sample size.* It is also critical that they produce a *measurable result*, which you can collect as evidence. If your change idea is the thoughtful result of your problem analysis and produces a measurable effect, it is unlikely that it will be too small to be meaningful. Try it out. Learn from it. Refine and expand it. For ideas on choosing a change idea, see the *Change Idea Checklist Tool* on page 104. For ideas on how to measure a change idea, see ***Chapter Four: Measuring Your Progress***.

Q3 When does the testing happen?

A As soon as possible! PDSA cycles are designed to be easy to implement, low stakes, and practical. We want to be thoughtful and deliberate with our actions, but we are not trying to build the perfect solution before testing, but *through* testing. Take one meeting to *plan* the test, fill out the PDSA form, and make predictions based on your hypothesis. Then begin implementation. This "do" portion of the PDSA—when you try out a change idea—should occur during the course of normal work. For instance, if you are testing a new feedback tool, make sure to test it during your normal classroom routine and collect data by using existing "embedded" measures—such as counting during class how many students use the feedback to revise their work. *Study* and *act* take place in separate meetings. It is more than possible for the reflection on a previous test to happen at the same time as the planning for the next one; it just depends on the specifics of the test, the gaps of knowledge revealed, and the group's intuition as to whether they have fruitful change ideas to test next.

Q4 How long does a test take?

A A single test should take no more than two weeks from beginning to end. For your first several attempts, you should aim for even quicker than that: to plan, test, and review in one week or less. Remember you want rapid, low-stakes tests, especially in the beginning, to build knowledge and experience through action. As you gain expertise in running PDSAs, this timing might shift depending on your needs, and it is certainly possible for an experienced team that has built considerable expertise from the ground up to find itself running longer tests. But again, that is not a starting place; it is the result of hard-fought progress.

Q5 Who should be involved?

A Initially, you will want the whole team involved in planning and reviewing PDSA tests so that everyone learns the process by engaging in it. The person(s) carrying out the test should be someone whose daily work is being changed. As your team becomes more experienced with the PDSA process, you can reduce the number of people involved in testing individual change ideas, but there should always be a minimum of two people involved and frequent check-ins with team leadership.

Having multiple people involved in the process is helpful because their experience and perspective can provide a useful check on the thinking of the person carrying out the test. Having fewer people makes it possible to carry out more tests at once, or free up team members to focus on other aspects of the work. Try to strike a balance that works for your team and the changes they are working on.

Q6 What is the point of the PDSA form?

A The PDSA form is your workspace: a place for planning, recording, allowing ideas to shift, and ultimately refining improvements. The PDSA form simplifies the execution of the Plan-Do-Study-Act cycle by allowing each of the steps to be recorded in a single document. It operates as guide, teaching you how to test a change idea within the PDSA cycle by clearly marking the steps to completion. Finally, the forms (alongside any other evidence collected) can support group reflection and sharing of lessons beyond your team. You might also think of it in the same way you would a scientist's log or an anthropologist's field notes; it exists to help connect the discrete pieces of evidence you collect and ultimately provide rigor to your testing.

Q7 Can we run multiple tests at the same time?

A Absolutely! Eventually! Multiple tests are a great idea for advanced teams, but probably not appropriate for beginners. Wait until the team is experienced with the process and operating smoothly enough to allow work to be delegated. More tests mean faster progress and more opportunities for team members to work on change ideas that motivate them, but they also require more work, more coordination, and more meeting times to reflect on the results. When a team is ready to begin running multiple tests at the same time, the team lead should continue to oversee tests and give guidance when planning appropriate questions and data-collection strategies for each test. However, the team will function better when planning in small groups or pods.

Q8 What kinds of questions should we be trying to answer through our test?

A There are many types of questions you can choose to try to answer in a PDSA test. At first you will be most concerned with whether or not a change idea is even feasible—*can it be implemented as part of your usual routine?* Once implemented, you may focus on students' behaviors or learning—*for which students is the practice working and under what conditions?* The important thing is to let yourself be guided by your doubts and your curiosity, and try to focus more on how a change is working rather than if it is working.

If you are in need of tips:

- Ask yourself what you hope to accomplish with the test. Feel free to look back at your driver diagram and use the driver(s) this change idea attaches to.
- Predict what might go wrong or who might struggle. Paying attention to obstacles is another good approach to asking fruitful questions.

- Pay attention to what you need to learn in order to make progress towards your aim. Take an active role in investigating the problem by asking the kinds of hard questions that you don't know the answers to.

Q9 What is the point of making predictions?

A Predictions may seem unimportant, but all human beings suffer from something called confirmation bias, where we interpret information so that it suits our pre-existing beliefs. This can get in the way of our ability to interpret data correctly and miss opportunities for learning. By taking this seriously, we are making explicit a hypothesis about what we expect to happen, so that if we are wrong we are forced to deal with the question "Why didn't this go as planned?" Those moments when our predictions fail are some of the most valuable opportunities for learning. Take advantage of these moments to make sense of what went wrong and how your previous thinking contributed. Remember that nobody has a perfect understanding of anything, especially the thorny problems improvement science is designed for. Uncovering the flawed assumptions that underlie how we work will lead to more effective practice, and even breakthroughs that transform our work.

Q10 How do we know what kind of data to collect?

A PDSA cycles are supposed to be quick and informative. The data you choose to collect should support that end. Make sure the evidence you collect is well suited to answering the questions you care about, easy to find and gather, and embedded in your normal classroom routines. For instance, in the example of testing out a new feedback protocol to see if it increases the number of students who complete revisions on their work, the evidence that the protocol is working might include the number of pieces of feedback addressed in the revisions or the amount of time students spend revising. If data collection is too onerous, it can get in the way of the rest of your work and prevent you from noticing the many intangible effects of the changes you are making.

Don't fret if your data collection isn't perfect; at this stage, it only has to be "good enough." Once your tests start showing consistent positive impact, then it makes sense to start asking harder questions with more rigorous data. Until then, prioritize data that supports your learning over the desire for definitive proof of success. For more information on data collection, see *Chapter Four: Measuring Your Progress*.

Q11 Should data be quantitative or qualitative?

A In recent years, the emphasis within education has been to focus on hard, quantitative data. This should certainly be your approach to measuring your long-term progress, but you should not feel limited to numeric indicators while testing small changes. In fact, most early tests use qualitative data, such as open-ended questions to students or teachers. Simply asking them how the change went is a great place to start. The anecdotal evidence that you gather by simply paying attention is often the key to deciphering what "hard" data tell you. Later, when you have a more solid understanding of what tends to happen as a result of your change, then it will be easier to know what numeric indicators are appropriate. Remember, the data should be good enough to help you decide what you can do better next week.

Q12 When is it time to abandon a change idea that isn't working?

A You shouldn't persist with a change idea that isn't getting you anywhere. As a general rule, you should feel free to move on to something more promising anytime you aren't seeing results. However, you should keep a couple of caveats in mind. First, *there is a lesson in every failure*. You should try to make sure you reflect on what happened to ensure that any potentially valuable insights aren't missed. This is especially important when a setback is unexpected, since these are often opportunities to deepen your understanding of the problem you are trying to solve.

Second, *abandoning a change idea outright can sometimes be an overreaction*. Many changes to practice that are insufficiently effective by themselves can work when supplemented by other change ideas. If you have reason to believe that your change idea remains promising and your team feels good about continuing, then adapting it to work better next time may be a wiser course of action. Pay attention to *how* the change is working, rather than *if* it is working, and it will become easier to distinguish between the aspects of the change that are worth keeping and the areas that need work.

Q13 When should we look back at the driver diagram?

A The driver diagram is your guiding document, and should be revisited anytime you want to take stock of progress towards your larger aim. It can sometimes happen that spending time working on small changes can lead to feeling lost in the weeds. When this occurs, it is probably a good time to take out your driver diagram to update it based on what you have learned. Testing leads to all kinds of insights into the nature of the problem and which strategies are likely to be effective. Make sure you dedicate a few minutes to capture these every once in a while, ideally after a "PDSA burst." A driver diagram is only as useful as you make it. If you invest the time and refine it, it will become a living record of what you have tried, what works, and what still needs to be done.

V. Facilitator Step-by-Step Guides

On the following pages of the handbook you will find facilitator guides for the following tools and activities:

- Activity: Introduction to PDSA Cycles
- Activity: Debriefing a PDSA Test
- Tool: Change Idea Checklist

Use the guidance from the preceding pages alongside the facilitation notes to guide you through the use of each.

Activity: Introduction to Plan-Do-Study-Act Cycles *(45 minutes)*

Overview

This activity is meant to guide a team through the exploration of a Plan-Do-Study-Act (PDSA) cycle. Through discussion and application, participants will scope a change idea and plan a first test using the PDSA tool.

Objectives

Participants will:

- develop an understanding of a Plan-Do-Study-Act (PDSA) cycle
- scope a change idea to the "right" size for a test
- complete a PDSA form to prepare to test a first change idea

Facilitation Notes

1. Introduction and Framing (3 minutes)

- Welcome participants and thank them for their work and patience in getting to this point.
  - Explain that the analysis of the problem they did to create the fishbone diagram and the possible solutions they explored while creating the driver diagram were part of the preparation for this step, the PDSA cycle.
  - Explain that the PDSA cycle is the heart of improvement science and will be used in the majority of their team meetings going forward.

2. Background (5 minutes)

- Distribute copies of the *Participant Handout* (page 95 of this chapter).
  - Read the goal for the activity.
  - Ask the participants to read the philosophy section of their handout and spend one minute reflecting on it with a partner.
- If participants need framing, you may ask if they have ever experienced the implementation of a large-scale change that didn't live up to expectations or, alternately, if they have ever been involved in piloting a change on a small scale.
- Tell participants that they are going to approach the change idea they developed in the previous session with this philosophy in mind.

continued on next page

- Show the change idea to the participants (it doesn't matter whether it is written on a white board, on chart paper, or printed and distributed, but participants need to know and reference it).

3. Scoping a Test (5 minutes)

- Ask participants to read the section of their handout titled *The Scope of Tests* on their own.
  - When they finish, ask them to use their change idea to answer the discussion questions (either as a whole group or in pairs).
- If you worked in pairs, quickly share out to the whole group.
- If there are any doubts that the change idea meets the criteria, you should discuss and consider ways to modify the change idea. Don't stop until the whole group is satisfied that the change is small enough. This may require a strong facilitator to push back on one or more areas of the bullet points. Even and especially if the team has other preferences, it is critical that the change is sufficiently small.

4. Example Change Idea (3 minutes)

- Tell participants that they are going to look at an example of a change idea to get an idea of what they can look like.
  - Explain that the example is taken from a real school where the improvement team wanted to find a way to increase students' ability to persist through difficulty. Three teachers at the school planned to have one-on-one conversations with a student to elicit barriers that prevented the student from reaching a goal and strategies the teachers could use to overcome those barriers.
- Tell participants that they will be looking at the conversation protocol the teachers prepared to give to the students during these conversations and the data-collection rubric they used to measure the success of the conversation.
  - Distribute the example documents (page 97 of this chapter) and have participants read them.
- Ask participants to share their reactions.
  - If these points don't come up in their reactions, elicit or encourage them to notice that the example: a) fits the scope of a good test; b) seems feasible to complete in one week; and c) includes a measurement scale that is practical but potentially informative.
- Offer participants a chance to ask any final questions about change ideas.

continued on next page

5. Exploring a Blank PDSA Document (5 minutes)

- Tell participants that now they will be looking at the PDSA form, the document that they will be working from during their future tests.
- Distribute the blank PDSA form or ask them to turn over their handout if you distributed double-sided copies (page 98 of this chapter).
- Explain that while the document may seem dense at first, it is easy to get the hang of. Walk them through the sections of the document one by one.
  - Direct their attention first to the top four rows, where they will be logging basic information about the cycle. Tell them that this basic information collection will become important to keep track of progress after several tests have been run and when successful changes are scaled to more students and classrooms.
  - Next, move on to the box labeled **1. PLAN.** Explain that this section is to be filled in prior to each test. The "Details" box is a space to record all the practical details about the test that they are planning *before* they implement it. This section also provides a place to align the questions they would like to answer with their predictions about what they think will happen and a choice of data they will collect to know if it did.
  - Box labeled **2. DO** is for recording observations, thoughts, and data during and immediately after the test is completed. Additional notes about what happened should be collected here. The data itself can be collected elsewhere and summarized on the PDSA form if necessary.
  - Box labeled **3. STUDY** is to facilitate reflection on the results of the test. Point out that they will fill out the STUDY section while looking at the data with their team. It involves looking back at each question, prediction, and the corresponding data to discuss how the change worked. The discussion of these rows should lead to a summary of what the team learned, to be written here.
  - Box labeled **4. ACT** follows the completion of box 3 and allows for the team to quickly decide on the next steps to be taken. Depending on the result of this test, they might abandon the idea, adapt it based on what they learned, or eventually adopt it on a wider scale.

6. Exploring the Example PDSA Document (5 minutes)

- Tell participants that to help clarify how this looks in practice, they will be looking at the PDSA form that corresponds to the example change idea they saw earlier.
- Distribute the example PDSA form (page 99 of this chapter).
  - Ask participants to work in pairs for three minutes to read through the example PDSA and make sense of how this test went.
  - Return to the larger group and invite the participants to share impressions of the document and the example.

continued on next page

7. Preparing Their Own PDSA Document (10 minutes)

- Tell participants that the moment has arrived for them to prepare for their first test. Ask them to take out the blank PDSA form and work as a group to fill out the top section and the PLAN box, using the example to guide them.
- When participants get to the data column they may need more guidance. The *Data-Collection Flowchart* (page 100 of this chapter) can be used indirectly to inform your strong facilitation or given to the participants to guide their thinking. Data can be informal, such as observations, checklists, or direct questions to students, and can include student work. The goal is to create measures that will answer the team's questions with a minimum of additional work.
- By the time they complete the planning section, they should be ready to do their first test. Check to see if they have settled on roles and responsibilities, thank them for their participation, and wish them luck.

continued on next page

NYC Department of Education

Continuous Learning

Participant Handout: Introduction to Plan-Do-Study-Act (PDSA) Cycles

Objective for the Activity

To understand and complete a PDSA form to prepare to test your first change idea.

Philosophy

By starting small, testing and refining changes before going to scale across the school, we can ensure our changes have maximum impact toward achieving our aim.

The Scope of Tests

The scope of each test (cycle) should be small, resulting in a quick and easy process. Things to consider:

- **Single Step:** Each PDSA cycle should involve only a small test of change. Instead of testing a lot of ideas at once, a teacher could test a single routine over the course of several weeks.
- **Short Duration:** Each PDSA cycle should be as brief as possible in order to quickly gain knowledge of whether or not your change idea works. The speed of your learning should take precedence over the scope of the change.
- **Small Sample Size:** A PDSA cycle typically involves only a small sample size (1–5 students, 1–3 teachers, or 1 school, depending on the test). As you gain more confidence that your change may lead to improvement, the change can be expanded to more students, more teachers, or more schools.

Group Discussion Questions:

- Does your first change idea fit within the scope described by the three points above?
- Can you carry out the test, collect measures, and meet to discuss the results in one week?

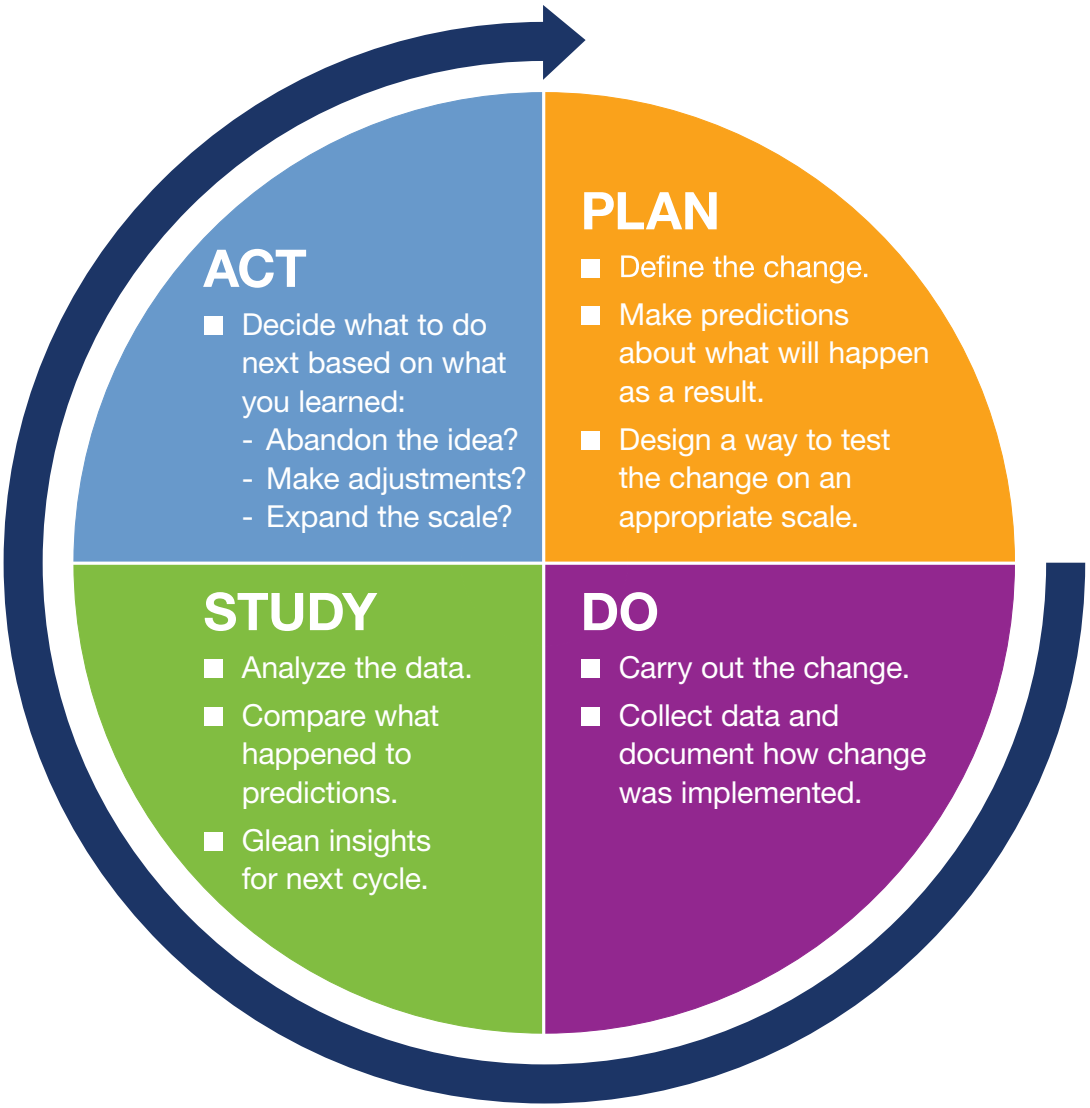
If you answered "no" to either of the questions above, what can you modify so that the change idea fits the appropriate scope?

continued on next page

Introducing the PDSA Cycle

The idea behind a PDSA cycle should feel familiar to teachers. Teachers plan lessons to address the needs of their students and see evidence of how well the lesson worked in their students' work, engagement, and understanding. When an instructional approach isn't working, teachers see the evidence immediately. This evidence informs everything from on-the-fly changes in the classroom to refinements in lesson plans and curricula. This feedback cycle is at the foundation of how teachers get better at what they do.

PDSA cycles are a more structured way for educators to go through this same learning process as a team.



continued on next page

EXAMPLE CHANGE IDEA: TEACHER–STUDENT GOAL-SETTING CONVERSATION

Goal-Setting and Planning Conversation Protocol

1. Let's talk about your last assessment. You got a score of _____. What do you think would be a reasonable goal for the next time you take the assessment?
2. What stands in the way of you reaching that goal? What is one main barrier?
3. How can you overcome this barrier? What is one specific strategy you can use to overcome this barrier?
4. Say your plan back to me. What is the barrier and what are you going to do when it occurs?

EXAMPLE DATA-COLLECTION FORM

Goal-Setting and Planning Conversation Protocol and Data-Collection Form

Student Name:

Start Time:
End Time:

Conversation Protocol:	**Notes:**
1. Let's talk about your last assessment. You got a score of _____. What do you think would be a reasonable goal for the next time you take the assessment?	
2. What stands in the way of you reaching that goal? What is one main barrier?	
3. How can you overcome this barrier? What is one specific strategy you can use to overcome this barrier?	
4. Summarize your plan for me. What is the barrier and what are you going to do when it occurs?	
On a scale of 1–5 with 1 = awkward and 5 = natural, how awkward was the conversation: Other notes/observations:	

PDSA Form

Test Title:		Date:	
Tester:		Cycle #:	
What change idea is being tested?		Driver:	
What is the overall GOAL of the test?			

1) PLAN **Details:** Describe the who/what/where/when for the test. Include your data-collection plan.			**2) DO** Briefly describe what happened during the test, surprises, difficulty getting data, obstacles, successes, etc.
Questions: Questions you have about what will happen. What do you want to learn?	**Predictions:** Make a prediction for each question. Not optional.	**Data:** Data you'll collect to test predictions.	**What were your results?** Comment on your predictions in the boxes below. Were they correct? Record any data summaries as well.

4) ACT Describe modifications and/or decisions for the next cycle; what will you do next?	**3) STUDY** What did you learn?

Activity: Introduction to Plan-Do-Study-Act Cycles *page 8*

PDSA Form

Test Title:	Goal-Setting and Planning Conversations	Date:	2/3/2016
Tester:	Perla	Cycle #:	1
What change idea is being tested?	Conversations with students to identify barriers and strategies for overcoming them	Driver:	Interview a student
What is the overall GOAL of the test?	Learn whether these conversations are feasible with middle school students to amke a plan after failing an assessment		

1) PLAN
Details: Describe the who/what/where/when for the test. Include your data-collection plan.

--We will each (3 teachers) find at least one opportunity to have a goal-setting conversation with a student after a student fails an assessment in the next 2 days
--Perla will create a data-collection sheet that includes both the protocol for the conversation and a place to record data and notes. each team member will record notes on the form and bring it to the huddle on Friday
--At the huddle we will assess whether the barriers identified are in students' control or out of their control. We will also assesss each of our predictions and decide what to do next.

2) DO Briefly describe what happened during the test, surprises, difficulty getting data, obstacles, successes, etc.

--All three conversations happened. One in class and two after class. 1 student seemed a little surprised by the conversation. All very easily engaged.
--In one case the strategy that the student mentioned didn't match the barrier ("get a peer tutor" when the barrier was "not enough time") and the teacher was unsure whether they should accept that strategy or push for a more related strategy. In the other 2 cases the teacher had to come up with an example of strategies because the student said "I don't know."
--Teachers often forgot to record the time that the conversations started and ended (Addtional notes on the data-collection sheet).

Questions: Questions you have about what will happen. What do you want to learn?	**Predictions:** Make a prediction for each question. Not optional.	**Data:** Data you'll collect to test predictions.	**What were your results?** Comment on your predictions in the boxes below. Were they correct? Record any data summaries as well.
1. How long will each conversation take?	Each conversation will take about 3 minutes	-Minutes of each conversation	One conversation lasted 2 min. The other two teachers forgot to record the time.
2. How many students will be able to come up with barriers? How many of the barriers will not be under the students' control?	All 3 students will be able to come up with a barrier. Only 1 will identify barriers within his/her control.	-# of students taht identify a barrier (step 2) -# of barriers that are out of the students control (step 2, mark either in/out of student's control)	0/3 students identified a SPECIFIC barrier.ALl students mentioned a reason they failed the assessment ("being lazy," "not understanding," "not putting in enough effort") butr did not identify a specific obstacle to passing the next time. 3/3 of their resasons for failure were within their control.
3. How many will be able to come up with plausible strategies to overcome the barriers?	All of the students that come up with a barrier under their control will be able to identify a strategy to address it	-# of in-control barriers with a strategy (step 3 of the protocol)	2/3 students came up with an appropriate plan fo rthe next step (peer tutoring, rewarding yourself, closing tabs)
4. How natural will the teachers find the conversations?	1/3 of the teachers will say that the conversations were naturla	-# of "4s and 4s" of teacher ratings of "awkwardness of the conversation" (collect in huddle)	All 3 teachers rated the conversations as 4 or 5, and ntoed that the conversations were "remarkably or surprisingly" natural.

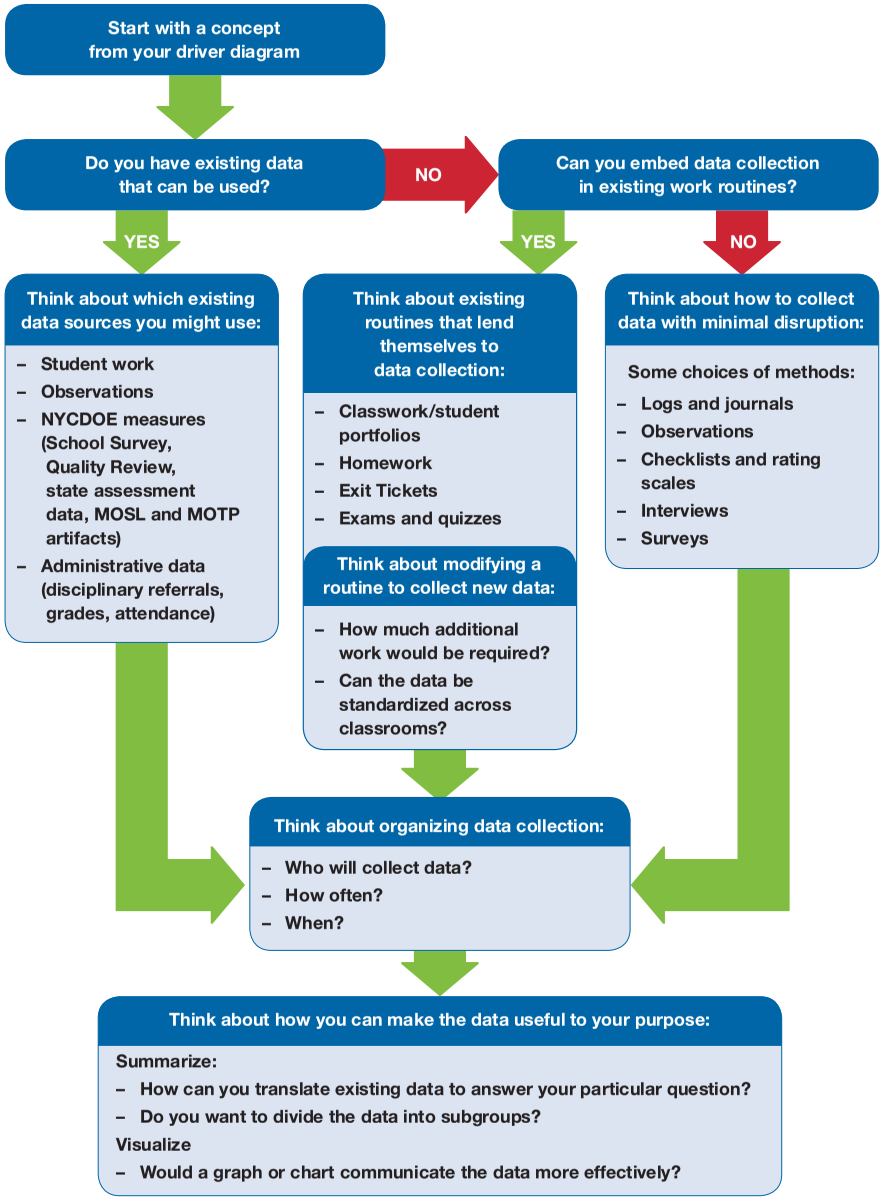
3) STUDY What did you learn?

-Goal-setting conversations were natural and doable in a short amount of time.
-Students couldn't identify specific, forward-looking obstacles that were specific.
-However, students did come up with pretty good strategies so maybe identifying barriers is not that important.

4) ACT Describe modifications and/or decisions for the next cycle; what will you do next?

Adopt in all 3 classrooms for one week and see if it changes the retake rate

Data-Collection Flowchart



Notes:

Activity: Debriefing a PDSA Test

(50 minutes)

Overview

This activity is meant to guide reflection conversations following the implementation of a test of a change idea. This conversation represents the *Study* and *Act* of the Plan-Do-Study-Act (PDSA) cycle, and this activity exists to support the consolidation of learning and the transition to useful next steps.

Pre-Work

- Think through agenda timing and number of tests/testers to include in one meeting.
- Limit the focus to one change idea per meeting (more can take too much time to share out).
- Multiple testers are OK, but you may need to condense the share-out to make time.

Facilitator Tips

- You may want to process the data and fill in the PDSA form in advance. Highlighting important results can help your team get to the heart of the conversation more quickly.
- Sharing out is for context building, connecting work to previous tests, and narrative building to carry the work forward; try to accomplish all three within 15 minutes.

Meeting Agenda

1. Frame Goal (5 minutes)

- Our goal is to turn our learning from this test into a decision about the next test.
- Remind team members about the overall goal and provide any necessary context from previous tests that the team will need to make sense of this PDSA. Much of this will be found in the *Plan* section of the PDSA form.

2. Share-Out (15 minutes)

- Ask the team member(s) who carried out the test to share what happened. Encourage them to talk about both the data and anecdotes of interest.
- Make sure you cover all areas of the *Do* section of the PDSA.

3. Discuss (20 minutes)

- Decide as a group what should go into the *Study* section of the PDSA.

continued on next page

- It should include your interpretation of the meaning of the data, as well as any other learning that took place.
- Pay particular attention to surprises and failures; they are the best opportunity to learn. If you encounter a surprise or setback, make sure you spend time figuring out what you think it means. Even if you can only hypothesize, write your guesses down. They will be useful later.

4. Decide (10 minutes)

- Use what you have learned to guide your decision about what to do next. Complete the *Act* section of the PDSA. Use the graphic on the next page to guide your thinking.

continued on next page

Based on the outcome of your test(s), choose one:

Adopt

Congratulations, your test was an unqualified success!

- The next step is to prioritize your focus between:
  - (a) trying the change idea in new contexts and/or at a larger scale, or
  - (b) moving on to the testing new change ideas

Leads to scaling.

Adapt

Partial success is the most frequent outcome of a test.

- Based on the outcome of this test (and previous tests), choose which of the three follow-up questions you want to pursue:

Abandon

Don't despair if your changes didn't work out as planned. Setbacks are the best learning opportunities.

- Don't abandon if you haven't learned from the failure; you should have a theory for why your change didn't create the results you expected.
- Use your updated theory (alongside your existing driver diagram) to help brainstorm new change ideas.

Leads to revising driver diagram.

Adapt

Is the next step to **optimize**?

- If the change idea seems to be working well with most students, consider working out the small kinks now, while you are testing on a small scale. It is much easier to refine and polish now than it is to do so after it is implemented across multiple classrooms/sites.
- *Rule of thumb: "When you become confident in your change, do two more tests to be sure."*

Is the next step to **troubleshoot**?

- If the change works for some students but not for others, or only creates part of the impact you expected to see, then you may want to focus on troubleshooting. How can you modify the practice to make it more effective? Think about small tweaks that can become the focus of the next test.
- Be care about making large changes. Testing a new big change while you are still figuring out the last change to your practice can overwhelm your capacity to learn and be counterproductive. Be respectful of your own time and don't take on too much.

Is the next step to **learn** about a change idea or test its feasibility?

- If the change in practice is something you are not very experienced with, it may be best to continue to test with an open mind. Make *your learning* the goal of these early tests, rather than trying to rush to the perfect solution. The earlier you gain a deep understanding of how the change works in practice and how it can meet student needs, the easier it will be to refine the practice.
- Pay close attention to your focal students. When we are trying something new we won't always be able to predict outcomes, and sometimes we measure the wrong things. By staying observant you may notice something that challenges your assumptions and offers a window into a deeper understanding of the practice and your students.

Leads to a new test.

Tool: Change Idea Checklist

"A set of general principles guide the approach: (1) wherever possible, learn quickly and cheaply; (2) be minimally intrusive—some changes will fail and we want to limit the negative consequences on individuals' time and personal lives; and (3) develop empirical evidence at every step to guide subsequent improvement cycles." (*Learning to Improve*, page 120)

In order to proceed with a change idea, you need to have a check in all/most boxes.

Change Idea:	Notes
1. Can we learn quickly and cheaply?	
☐ Can we see impact within a week?	
☐ Does *not* require additional money?	
☐ Does *not* require additional resources?	
2. Can the change be minimally intrusive?	
☐ Can the change take place within our own team?	
☐ Is not reliant on external stakeholders?	
☐ Does not require additional time to develop (e.g., a new meeting)?	
☐ Will not slow progress of current work?	
☐ Does not drastically change our current processes?	
3. Does the change idea avoid the common pitfalls? (see next page)	
☐ Pitfall #1: Concepts, not changes	
☐ Pitfall #2: More of the same	
☐ Pitfall #3: Has to be invented here	
☐ Pitfall #4: Utopia syndrome	

continued on next page

Common Pitfalls of Change Idea Selection

Pitfall #1: Concepts, Not Changes.

Change ideas are at a conceptual level, not articulating specific ways to make changes that lead to people doing things differently in each context and limiting learning. Concepts are helpful first steps in arriving at change ideas, but they need to get more specific before they are ready to be tested. For example:

- Help students manage their own learning **(concept)**
  - Have students engage in goal setting
    - 1:1 conversation between a student and the teacher about goal setting
      - 1:1 conversation where the teacher helps the student to: (1) identify a goal for the week; (2) anticipate potential barriers and obstacles; and (3) plan how to overcome the obstacles **(change idea)**

Pitfall #2: More of the Same.

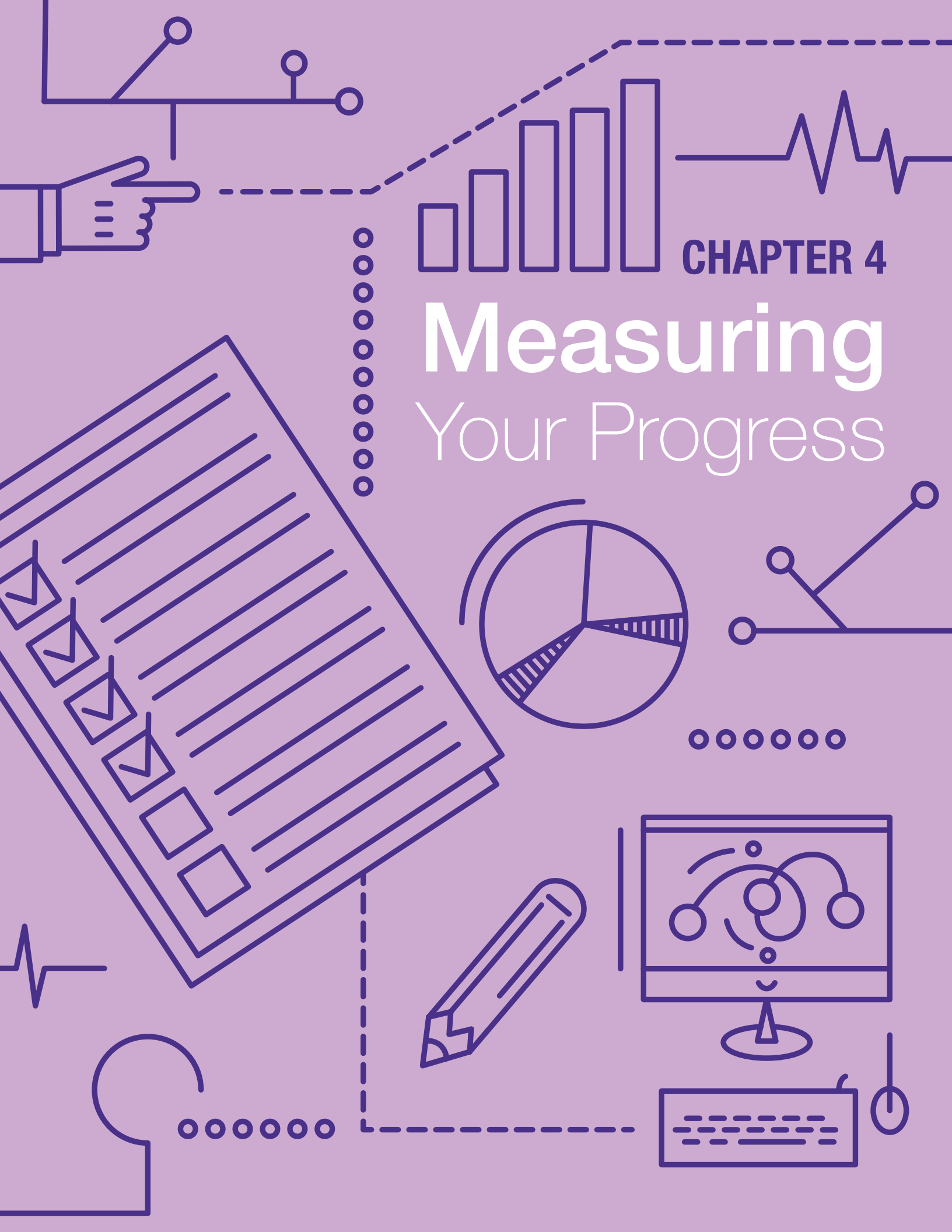
This issue would not be a problem if we had *more*—more people, more resources, etc. This approach does not solve the problem or bring about improvement because it leaves the structure of the system unchanged. These kinds of changes are reactive (like a patch), instead of a fundamental change to the way work is done. Sometimes, money and resources are a legitimate problem, but more often than not, inefficient use of these things is leading to the problems we see. Removing these inefficiencies first can help us understand the real need for more if it exists.

Pitfall #3: "Has to Be Invented Here" Syndrome.

Brainstorming and creativity exercises are an important way to develop change ideas; however, an overreliance on these methods can result in change ideas that have not been vetted and do not have true merit when it comes to research or what's already known or been done. Inventing new approaches from scratch is also a lot of work that can often be avoided by seeking others to learn from. Now that you know what kind of change you plan to make, you may be able to quickly find existing resources to work from.

Pitfall #4: Utopia Syndrome.

Many teams suffer from paralysis of action because change ideas tend to become very large and overwhelming. The team will then slip into planning then implementing, instead of testing to learn about how to implement well. It's important to start small. Ask, "What can we do by next Tuesday?"



CHAPTER 4

Measuring Your Progress

Activity:

> Choosing Measures for Improvement

Work with your team to turn your theory of improvement into a shortlist of potential measures that you could use to gauge your success over time, which can be used to make decisions about what kinds of evidence collection to prioritize.

Tool:

> Data-Collection Planner

Provides advice on how to backwards plan from key check-in points in the year to ensure you have the evidence you need to make critical decisions.

The purpose of this chapter is to identify the types of measurement and data that best inform and support your improvement work. It should be used after gaining experience running a few initial tests, unless your improvement project can't proceed without defining measures first.

CHAPTER 4

Measuring Your Progress

Quick Look:
Measuring Your Progress

What is the purpose of this chapter?	To identify the types of measurement that best support your improvement goal
When should it be used?	After gaining experience running a few initial tests, unless your improvement project can't proceed without defining measures first
Who should be involved at this stage?	• Improvement team leader • Improvement team members

I. Chapter Overview: Checking How It's Working

Introduction

Data and measurement are often loaded concepts, either wrapped up in standardized testing and teacher evaluation, or requiring specific expertise, knowledge of statistics, and complex software to analyze. Improvement science offers a different approach. At its heart, measurement is a tool for understanding. It gives clarity to what you are doing by serving as your eyes and ears as you approach change, and it should above all be personal and practical with the most helpful evidence often located nearby, *embedded* in your classrooms and daily routines. In this conception, measurement is also a guide. It tells you how your progress matches your predictions, who is being helped by your efforts (and who is being overlooked), and what you still need to do to reach your eventual goal.

Unlike traditional assessment in schools, the goal of measurement in improvement science is never evaluation or accountability of educators. Rather, its goal is to answer educators' most pressing questions as they work towards improvement. By creating accurate, reliable tools for collecting evidence of how a change is working, you can ensure your team has the right information to make strategic adjustments that lead to consistent, sustainable improvement.

This chapter is designed to help your improvement team develop the measures you need to support your decision making from the beginning of the improvement process to the end.

WHAT MAKES MEASUREMENT IN IMPROVEMENT SCIENCE UNIQUE?

Data in improvement science are…

- **Embedded in daily work**, making it an easy lift to add to regular routines.
- **Rapid**, providing instant or near-instant feedback for learning and improvement.
- **Based on predictions**, exposing gaps in understanding and providing opportunities to learn by predicting results in advance.
- **Informative**, revealing *how* a change is working, not just *if* it is working.
- **Responsive**, capturing small changes to help chart progress and uncover who the change is helping and who it isn't (and, if possible, why).
- **Yours**, owned by your improvement team and used in open, honest reflection aimed at improvement, not accountability.

Before diving in, it is important to consider a foundational principle of good measurement: the data we collect should suit the question we are trying to answer and the decisions we will make. Too often we use available data without thinking about whether they suit the question we have. Like using a hammer to tighten a screw, good data used for the wrong purpose can be unhelpful. For this reason, it is important to consider what questions you will need to answer before starting to collect data.

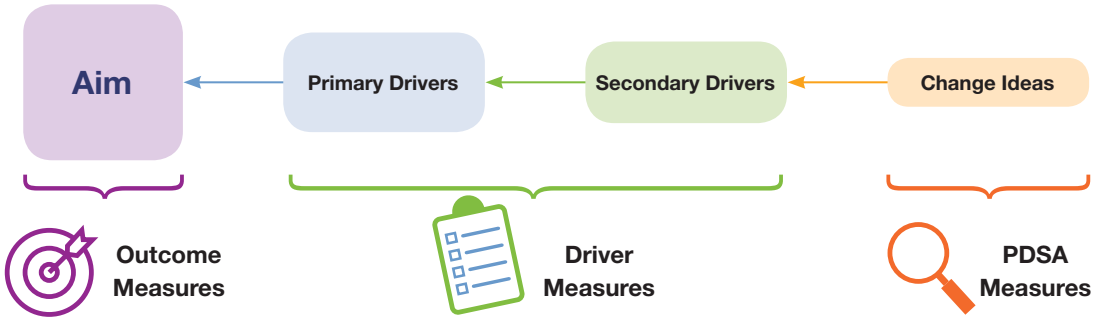
To help you ask the right questions and choose the right data, improvement science offers a "measurement system" made up of three types of measures. The measurements discussed below are intended to be layered onto the driver diagram created in Chapter 2; each measure will map to a different component of the driver diagram. By aligning the measurements you collect with your working theory of improvement, you will be able to gauge your results, as well as the processes that lead to those results, thereby making your progress and learning visible.

Ultimately, your measurement system will help you make decisions about what to measure and when, allowing you to be selective about what data you need and reduce the burden on your team.

WHAT IS WRONG WITH TRADITIONAL DATA?

Traditional data for assessment and evaluation have their purposes, but often fail to meet educators' needs in a number of ways, making them ill-suited for many of the decisions we make as we work towards improvement:

- Traditional data are often **singularly focused on outcomes**. They don't illuminate enough about the student thinking, behaviors, or classroom practices that can help achieve those outcomes. In other words, they can tell us whether we have achieved our goals, not how to get there.
- Traditional data are often **too slow** to be useful for teachers to make timely decisions, often collected at the end of a unit or school year when it is too late to inform changes.
- Traditional data often **answers other people's questions**, not the questions of the educators using them. As a result, they rarely lead to the kinds of insights that teacher-driven data can provide.
- Traditional data are often **high stakes and evaluative**, making safe, honest conversations more difficult and serving as an obstacle to reflection and learning.



Visualizing Your Measurement System: Three Tools for Understanding

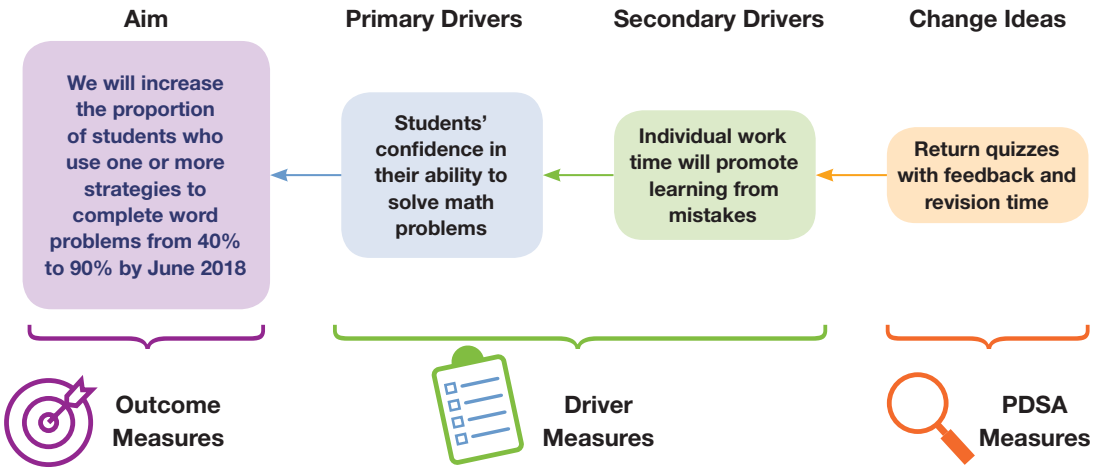
Improvement science benefits from three kinds of measures, each targeting a slightly different aspect of your effort. Think of them like three spotlights, each angled at critical parts of your pathway to improvement, illuminating data critical for decision making at that stage.

If your aim statement is S.M.A.R.T. then you already have an outcome measure. For help writing a S.M.A.R.T. aim statement, see page 67.

Outcome Measures. Outcome measures provide big-picture feedback on your progress. *Is the improvement project getting results? Are we accomplishing our aim?* As such, they serve as a "north star," anchoring your aim and allowing you to assess whether or not improvement is being made on the problem you have set out to solve.

Given their primary place in determining improvement, outcome measures are usually defined before the group begins testing. They should exist in terms that are clear for all to understand, motivating to strive for, and without much nuance or interpretation regarding whether or not they have been reached. Typically, a group will define their outcome measures at the same time as their aim statement. Likewise, just as you don't look up at the "north star" during every step you take, you don't need to evaluate your outcome measures after every PDSA test. Usually outcome measures are only assessed on a big-picture timescale: from yearly to quarterly depending on the specific problem.

Example Problem	**A math department wants to improve performance on the Algebra I Regents Exam and notices that many students aren't completing word problems**
Aim Statement	We will increase the proportion of students who use one or more strategies to complete algebra word problems from 40% to 90% by June 2018
Outcome Measure(s)	• Number of students using previously taught strategies on word problems on *Regents-aligned unit exams*; OR • Number of students receiving at least partial credit on all word problems on *Regents-aligned unit exams*

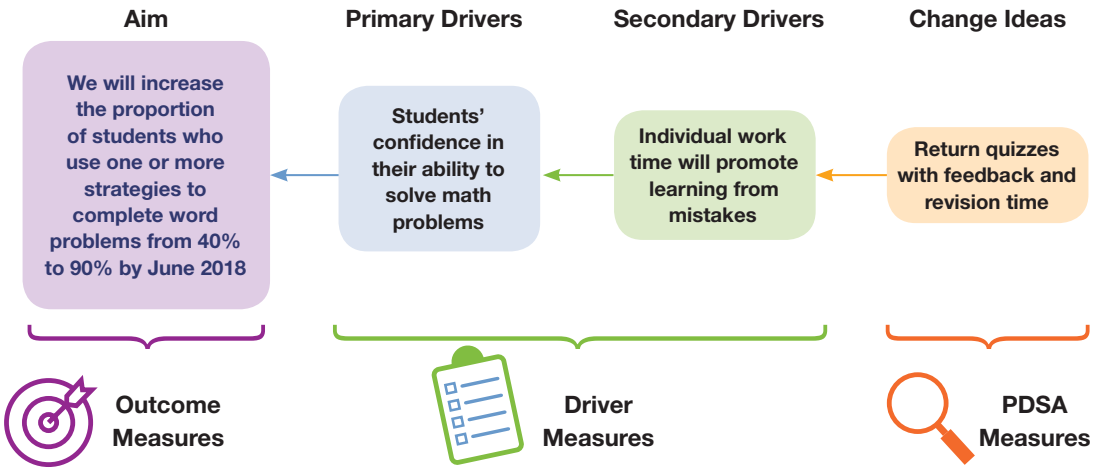


Driver Measures. Driver measures provide feedback on your particular approach to reaching your outcome measure. Where outcome measures may be influenced by many approaches, driver measures should be tied into the specific theory you have settled on for solving your problem. They should be aligned with the drivers on your driver diagram and, like those drivers, exist over a range of timescales from quarterly to monthly or monthly to weekly.

For example, **"long-term" primary driver measures** track directly with the *primary drivers* you identified in Chapter 2, providing orientation and guidance for the effectiveness of the big-picture theory you have chosen to pursue. They ask: *What outcomes do we expect from our theory when it is working?* Like outcome measures, "long-term" driver measures are usually collected on a relatively infrequent timescale: quarterly or monthly.

"Medium-term" secondary driver measures track directly with your *secondary drivers* and place us further within the details of the theory. These measures require drilling into your working theory of improvement, asking who and what is involved in effecting the change and how those results will be achieved. This type of driver measure gives regular feedback on the details of your change and therefore is assessed more frequently, on a monthly or biweekly basis.

Example Problem	**A math department wants to improve performance on the Algebra I Regents Exam and notices that many students aren't completing word problems**
"Long-Term" Primary Driver Measure	• Students' self-reported confidence in their ability to solve word problems; OR • Students' self-reported belief that with hard work they will get better at math
"Medium-Term" Secondary Driver Measure	• Number of open-ended math problems students attempt to complete on weekly homework; OR • Students' ability to verbalize strategies for problem solving



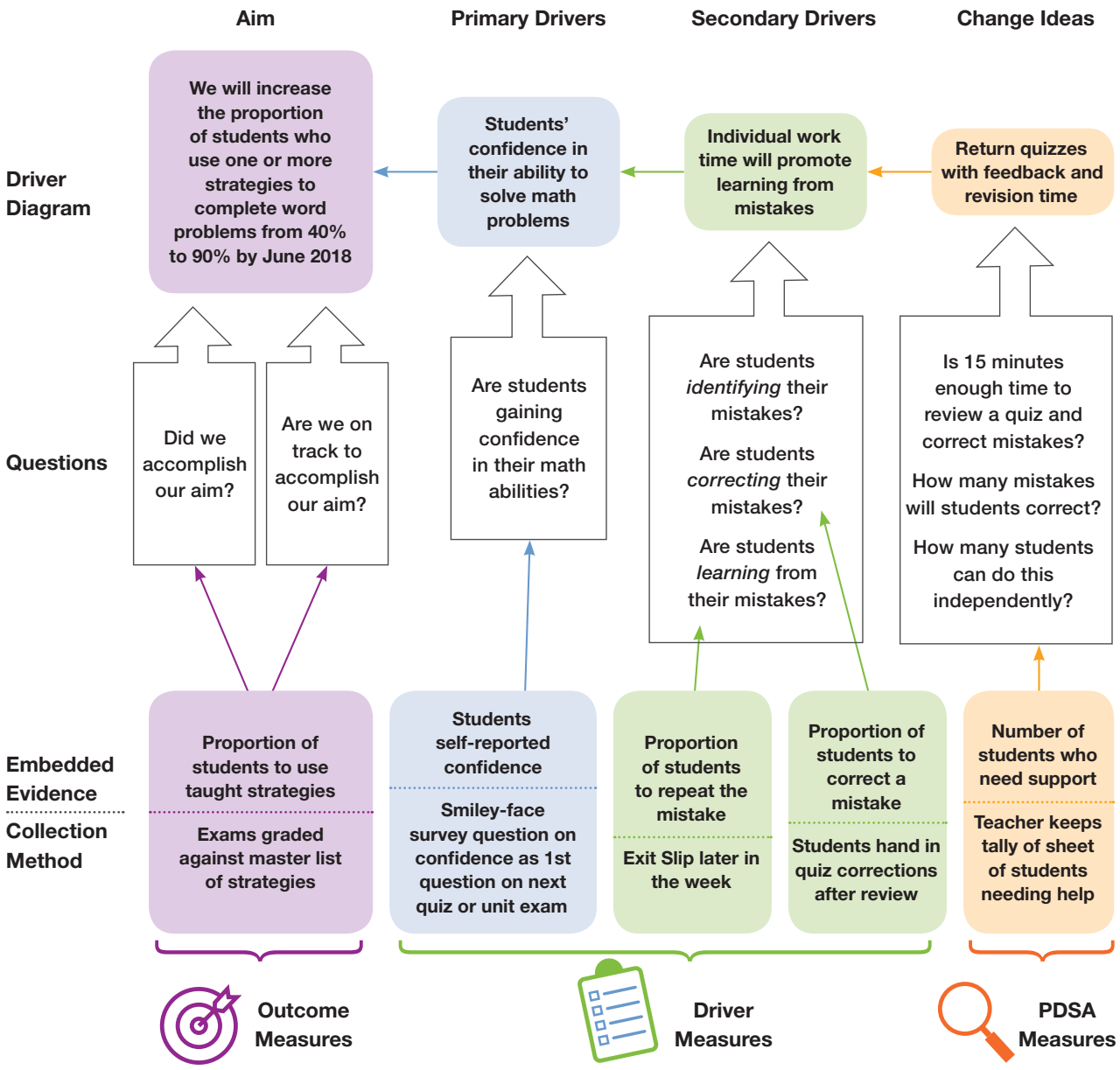
"Short-Term" PDSA Measures. "Short-term" PDSA measures get you into the practical nitty-gritty requirements that have to happen to enact your change: *How is your change going to occur? What steps do you need to take to enact your test? Is it feasible to implement your change within your current practice? How are students reacting to the change? Are the immediate consequences occurring as you envisioned?* Short-term measures record for whom the change is working and under what conditions. They can often be uncovered by examining results against predictions about what will happen as your change idea is implemented. These measures are the clearest example of the philosophy of "embedded evidence": they are pieces of evidence easily available on a day-to-day basis within a classroom or school.

Given their intensely practical nature, short-term measures require analyzing the steps you are taking to implement your change idea and thinking about how that change is working within the context. They can also be "disposed of" once you have answered one question in order to move onto another. They are typically collected on a daily or weekly basis and analyzed after each PDSA test.

Example Problem	A math department wants to improve performance on the Algebra I Regents Exam and notices that many students aren't completing word problems
Change Idea	Teach students to use a step-by-step revision protocol during in-class time to guide students through revisions of their quizzes
PDSA Measures	• Checklist of the number of students completing revisions on quizzes without teacher support; OR • Number of corrections completed per student; OR • Number of corrections completed per student after 15 minutes

Putting It All Together: Using Your Measurement System

As you work towards improvement, you will draw on each of these measures as needed to illuminate your progress. Teams typically begin by focusing on the information they feel is most urgent, choosing no more than one or two measures to collect. Later, as their improvement effort progresses, they can draw upon the ideas contained in their system to gradually add measures to track progress in different ways. Do not worry about sketching out a perfect measurement system in advance; we are used to hearing about finished studies with polished data showing clear results, but the reality is that identifying and selecting appropriate measures is often messy and incremental. Instead, give your team the freedom to choose, allowing it to focus on the types of measures that will be most beneficial in a given moment. In this manner, as your improvement moves toward your aim, you will gradually build a robust measurement system that authentically fits your needs.



II. Orientation: Self-Assess to Stay on Target

Where Are You in the Improvement Process?

Improvement science moves through several distinct phases. While the process is not always linear—often shifting back and forth between phases as your learning evolves and sparks new questions—identifying where you are within the work is critical to taking effective action.

As you begin *Measuring Your Progress,* we recommend you complete the following four steps from *Chapter Two: Creating a Theory of Improvement* and *Chapter Three: Testing Changes* to ensure you get meaningful results.

Prepare yourself for this step in the process by:

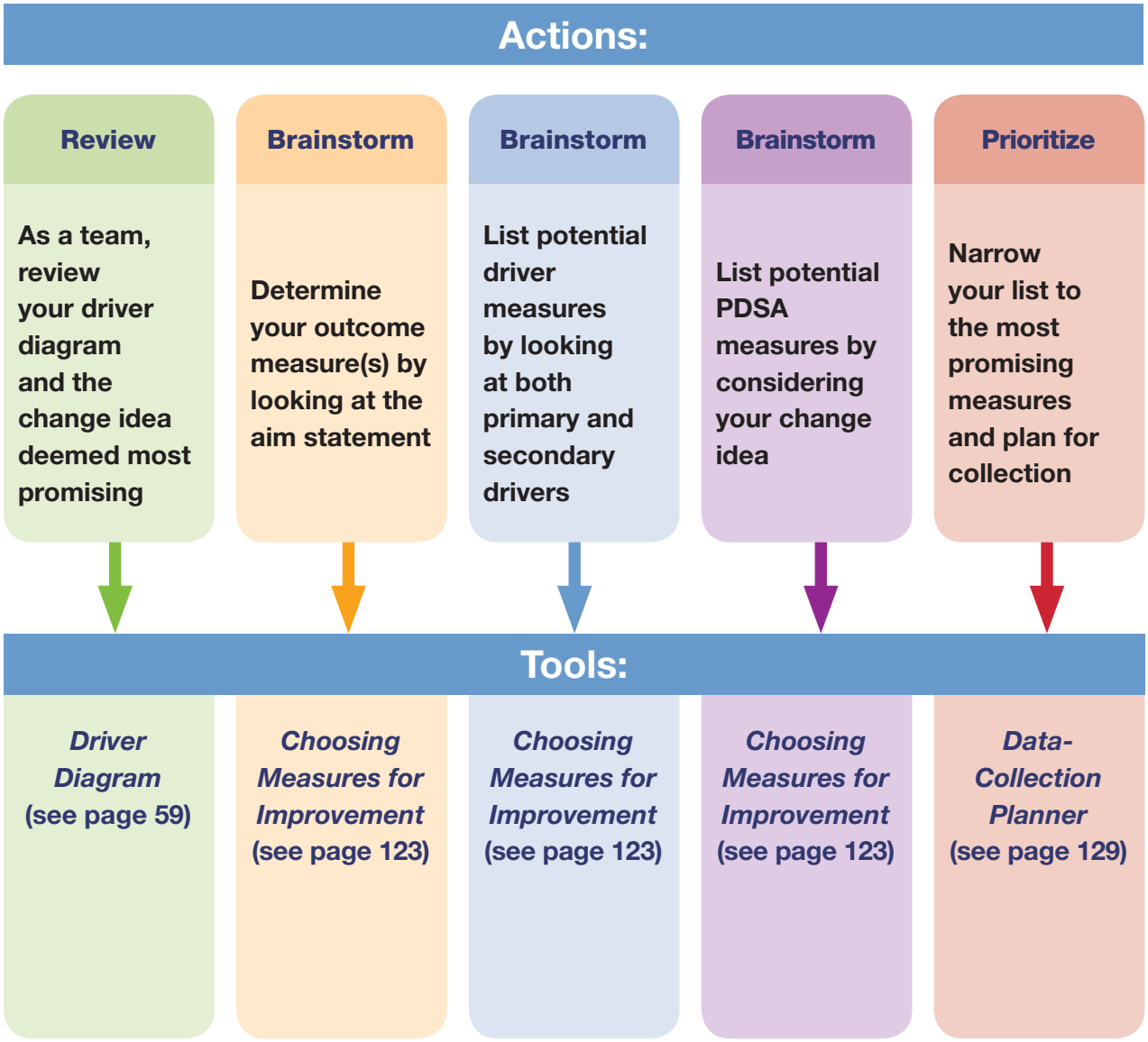
- ☑ **creating a problem statement** defining the problem that your improvement team will solve.
- ☑ **defining an aim statement** for your improvement and **completing a driver diagram** that has allowed you to come up with a theory of improvement for achieving it.
- ☑ **identifying clear and measurable change ideas** that you hypothesize will help you reach your aim.
- ☑ **completing 2–3 PDSA tests** (aka your first PDSA burst) is ideal for learning how the PDSA testing process can be supported by strong measures, although some improvement projects may require measures before starting.
- ☑ **reflecting on your PDSA burst**, drawing conclusions and recording learning and its implications for future work.

You will know it is time to proceed to the next chapter when you have:

- ☑ **identified existing data sources** that can be used to reduce the data-collection burden for medium, long-term, and outcome measures.
- ☑ **prioritized among the types of measures** that will best inform your improvement project, and which you feel make the most sense to try to collect in the short-, medium-, and long-term.
- ☑ **completed the *Choosing Measures for Improvement* activity and *Data-Collection Planner* tool** to consolidate your thinking on measurements for your improvement project, connecting the types of measurements you want to collect with the sources of data that correspond to them in the real world.

III. Coaching Steps

As the leader of your improvement team, you have several options for leading your team through this stage. The following coaching steps should help frame the steps you can take, and orient you to tools and activities that will help you.



IV. Frequently Asked Questions

The questions below represent common issues that come up when selecting types of measurement for an improvement project.

Q1 I am unsure of where to begin. Where might we look for measures?

A Choosing measures for improvement should always start with concrete predictions about what you expect to happen based on the changes you are making. However, once you have a general idea of those predictions, working backwards from a list of common data-collection instruments can be helpful to narrow towards a decision. For instance, if you are working to increase student persistence on challenging math problems by incorporating instruction on persistence and motivation into your lessons, and predict you will start to see improvement in challenging word problems, you may choose to look at the amount of time those students spend on a challenging problem during an in-class quiz. The following list contains just some of the places you may think about getting a practical measure from:

	Type of Measure		
List of ideas of potential starting points for choosing measures:	**Outcome measure**	**Driver measure**	**Short-term/ PDSA measure**
Classroom observations (using checklists, rubrics, or audio recordings)		✓	✓
Classwork/student portfolios		✓	✓
Homework			✓
Exit Tickets			✓
Exams and quizzes		✓	✓
Logs and journals		✓	✓
Checklists and rating scales	✓	✓	✓
Interviews	✓	✓	✓
Surveys of students, teachers, parents, etc.	✓	✓	✓
NYCDOE measures (School Survey, Quality Review, state assessment data, MOSL and MOTP artifacts)	✓		
Administrative data (disciplinary referrals, grades, attendance)	✓	✓	

Q2 What if a part of our driver diagram is hard to measure?

A It is quite common for improvement projects to contain hard-to-measure drivers of change such as "students feel a sense of belonging" or "students feel comfortable asking probing questions." In cases like these, it may feel intimidating to try to decide how to measure improvement, but you shouldn't let that stop you. Remember that it is all right to learn how to measure as you go.

Start by visualizing what it would look like if your changes are successful, then list potential "look fors" that can serve as early indicators of progress. You can use these "look fors" in a quick observational checklist, or simply talk to your students about how they have experienced the changes you are trying. These are both great places to start.

Quick, embedded measures like these are usually sufficient when you are trying new ideas on a small scale. They can tell you how a change is working and for whom. Later, when you have a bit more experience and know what it looks like to be successful, you can use that insight to measure for that success. For instance, starting with observations or conversations with students may reveal that some students benefit from jotting question ideas on a graphic organizer before they ask the questions out loud. These graphic organizers can be collected, and targeted students' jotted questions can be compared to the questions they ask during classroom discussions. This approach might evolve into a quick tally sheet to track a handful of students over time, revealing the gaps between thinking of a good, probing question and having the confidence to ask it.

Q3 Who should be included in decisions about measures? Whose responsibility is it to collect data?

A Determining what should be measured—the indicators that make the most sense for your particular improvement aim, drivers, and action steps—is a whole team decision. If you have a data specialist, this is a meeting they can lead or help organize, but the whole team should weigh in on both the types of measures appropriate for the project and the places and events that can be used to collect evidence of these measures. Ultimately, measures should align closely with your shared goals for what you want to accomplish, so it is important to be in agreement.

However, when it comes time to record the evidence and implement the procedures and tools needed for collection, it can be very helpful to delegate responsibilities to individual members. Just like any other task, collecting evidence requires effort outside of standard meeting times, and delineating roles is critical to ensure the work actually gets done. Once this evidence has been collected, a specialist who feels comfortable with spreadsheets, numbers, and basic statistical principles can be a big asset in analyzing and visualizing it.

Q4 How do I decide when to start collecting each of the measures?

A A good rule of thumb is to start collecting data for a measure when you expect to see impact. There will be some cases when small changes can lead to immediate impact on the outcome measure, for example. In those cases it can be helpful to start collecting data immediately. If the desired impact is further down the road or requires several steps to achieve, you can prioritize the shorter-term measures for a while. Just make sure you revisit the decision when you start to see impact in the shorter-term measures.

Ideally, we would always collect baseline data before making changes so that we can more easily measure impact. Where possible you should do so, but be aware of the time and energy required to collect and sort data. Educators' time is among the most precious resources in schools, and collecting low-priority data is not the best way to spend it. On the other hand, you don't want to make major decisions about the progress of a semester's work *without* good data on hand. Try to balance the value of the data you are collecting with the time commitment and decide accordingly.

Q5 Do I need to collect all of the different types of measures for my improvement project?

A Perhaps in an ideal world with unlimited time and resources, you might try to collect data on all the different types of measures; but in the actual world of education that is not desirable, and it is neither a requirement nor a recommendation. This chapter lays out all the different types of measurement that may be useful to you as a step toward understanding your options and making the best possible choice. However, the exact types you choose to rely on will depend on the specifics of your improvement project. A bit more detail is provided below.

Generally speaking, for all improvement projects you will want to collect data on your overall aim, i.e., on your outcome measures. This is important because it will eventually allow you to know whether or not your improvement effort has had the desired broad impact. Similarly, but on the opposite end of the measurement spectrum, your improvement team will collect evidence around your short-term PDSA measures as well. This will let you know that the tests you are implementing are meaningful. However, the decision as to which driver measures to collect will depend on the specifics of your project, such as the change idea and drivers where you are focusing, and how far along you are in the work. At any given point in time, at least one form of evidence will jump out as both fairly easy to collect and helpful to know—this is the measure you want to focus on.

Q6 Does this quick and informal approach to collecting evidence meet standards for good scientific research?

A While the practical approach to data collection can appear to stand apart from what we think of as good research, it is actually based on several core principles of scientific practice. When we think of scientific data, we often think of rigorously designed studies with complex statistical analyses. What we often leave out is that this degree of rigor is only applied *after* the messy and open-ended work of developing a strong, testable hypothesis. Randomized controlled trials, complex regression models, and the like are almost never used in situations where prior, less quantitative methods have not already established some evidence that the hypothesis is correct.

Another pillar of scientific methods that is often overlooked is the importance of replication of results. No study or data are ever considered definitive on their own, but are instead replicated multiple times across multiple contexts. The findings that are robust enough to stand up to multiple experiments are accepted; the ones that aren't are reconsidered or refined.

What this means for your work is that working from a clear theory and accumulating imperfect evidence on a small scale, then replicating your results with more students and across classrooms, is very scientific indeed!

Q7 I want to make sure my data are accurate. Any tips for gathering data to ensure the data accurately informs our project?

A Data gathered in improvement science has a different purpose from data gathered in an academic research context. Scientific researchers have developed complex, detailed, and rigorous schemes for measurement with the purpose of developing robust and universally applicable theories. By and large, those are not necessary here. Improvement science is focused on practice. Instead of worrying about comprehensive data collection or statistical rigor, concentrate on collecting evidence that will help you compare changes against your questions and predictions. The more closely your data is tied to your theory of improvement, represented by your driver diagram, the more informative it will be.

Additionally, it can help to look at specific student populations within your class. Minimize the effort required by focusing on changes in groups as small as two or three students. Target evidence that appears in regular classwork or teacher preparation and can be repurposed. Always err on the side of data and measurement that is natural, comprehensible, and in context.

When your data start to show impact and your confidence in your changes grows, then you can increase the rigor by adding a control group to compare two groups of students, or by using baseline measures before you try the changes in a new classroom or context. The first goal of your measures is to increase *your understanding* of the impacts of your changes; once you accomplish that, you can move on to more sophisticated measurement strategies.

Q8 When should the data be shared with the team and analyzed?

A Data help guide and clarify, but can easily overwhelm if not shared thoughtfully. Accordingly, you want to share each type of measurement at a time that corresponds to its purpose. For instance, outcome measures, reflecting big-picture progress, are not relevant on a day-to-day or even a month-to-month basis and will only be a distraction if shared on that timescale. Outcome measures should be shared at the beginning of an improvement as a baseline—and again at major milestones like the end of the school year—to determine the effect. Likewise, long-term and medium-term driver measures should be shared on the timescale that they are collected—quarterly-monthly and monthly-weekly, respectively. By combining the short-term PDSA measures shared in weekly or biweekly meetings with less frequent looks at measures of longer-term progress, you will create a balanced view on where you are making progress and where you aren't, and support the kind of nuanced decisions required to overcome the complex challenges our students face.

V. Facilitator Step-by-Step Guides

On the following pages of the handbook you will find facilitator guides for the following tools and activities:

- Activity: Choosing Measures for Improvement
- Tool: Data-Collection Planner

Use the guidance from the preceding pages alongside the facilitation notes to guide you through the use of each.

Activity: Choosing Measures for Improvement

Overview

Having the right evidence on hand at the moments when you have to make important decisions is critical to leading your team towards your aim. Once your team has arrived at the point where you are beginning to test changes to practice, it becomes necessary to think about how you will know if those changes are working. This activity leads your team through a structured brainstorming session to turn their working theory into predictions of how desired changes can be measured. From that brainstorming of potential measures, it becomes possible to prioritize evidence collection to meet your team's needs and decision-making timeline.

Objective

Through a guided session of reflection and collaborative brainstorming, participants will create a list of embedded evidence to inform the measurement of the team's progress.

Participants

- Improvement team leader
- Improvement team members

Participants

The team should have either:

- started testing change ideas (see Chapter 3 of the handbook), or
- set clear priorities for the drivers they plan to tackle first.

Materials

- A completed driver diagram, optionally in two versions:
  - A "reduced" version displaying only the change ideas and drivers you are currently working on or will be adding in the near future. It should look like a horizontal row of the "full" version that connects the aim statement to the current change idea, although all drivers impacted by the current work should be included. See examples throughout this chapter. It should be displayed on a white board or chart paper with space for adding sticky notes.
  - (Optional) A "full" version with all drivers and change ideas included.

continued on next page

- Small sticky notes or stickers (or other props for distributing and counting votes).
- (Optional) A copy of the *Data Collection Flowchart* (included here).
- (Optional) The list of criteria from the top of page 126, printed or on chart paper.

Guiding Questions

- How will we know if the changes we are making are an improvement?
- What would success look like?
- What evidence should I collect for immediate decisions, and what evidence should I plan to collect for judging longer-term progress?

Facilitation Notes

1. Introduction and Framing (5 minutes)

- Welcome your team and review the objective and guiding questions of the activity.
- Explain to your team that this session will build upon the work they have done creating a working theory of improvement (their driver diagram). That thinking will organize this session's work as the team determines potential data to collect and starts to prioritize among them.

2. Warm Up (5 minutes)

- Prompt participants to think of one example of data that they have found useful or informative.
- Quickly share what the kind of data was and give one reason why it was helpful to them.
- Thank participants for sharing and, if possible, name and recognize any diversity in the kinds of data that were shared.
- Explain that this activity will ask them to brainstorm a wide variety of data sources to track progress of a wide variety of learning, behaviors, processes, and norms. Ask them to be creative and not limit themselves to "traditional" data sources.
- Clarify for participants that the purpose of the data sources they will be talking about are not meant to be evaluative; instead, they should serve two purposes:
  - help them track the progress they want to make.
  - help them answer their questions or doubts.

3. Review Theory of Improvement (10 minutes)

- Tell participants that an important principal of good data use is that it is never ad hoc, but based on a clear theory of what we expect to happen. Remind them that they have already created that theory by making a driver diagram.

continued on next page

- (Optional) Show participants the "full" version of the driver diagram to remind them of the more holistic view of their theory of improvement, containing the elements that they are not currently working on, but could eventually.
- Check for clarifying questions about the content of the diagram.
- Place the part of your driver diagram you will be addressing (the "reduced" version described in the activity prerequisites) on chart paper, at the center of a table that can be accessed by all participants or drawn on a white board.

4. Define What Success Looks Like (15 minutes)

- Tell participants that they have finished with the grounding and are ready to get started.
  - Explain that the best way to measure for progress is to start from an idea of what success could look like, so the first step of the activity will involve collectively defining success, where they will see it, and how they will recognize it.
  - Draw participants' attention to the driver diagram and explain that you are interested in all kinds and degrees of success, and that they should use the diagram to help them think about early and intermediate success as well as eventual goals.
- Break into pairs and brainstorm "look-fors" of success on sticky notes.
  - After brainstorming 5–8 ideas per pair, ask them to take turns placing "look-fors" on the corresponding location on the driver diagram. When similar ideas are named, group them together.
- Take a moment to review and ask participants to notice any kinds of data that they hadn't thought of. Ask them to look for additional places on the driver diagram where similar data-collection strategies might be applied. Add new sticky notes for new ideas that come up.
- Take one final moment to check for anything that needs to be consolidated into groups and give participants a chance to make any final additions.

5. Selecting the Best Measures for Improvement (10 minutes)

- Tell participants that the purpose of this activity is not to start collecting every kind of data that has been named, but rather to use their brainstorming to select and prioritize the data that will be most helpful *over the next few months*. The rest of the ideas they have shared will be preserved as a "measurement system" that they will be able to refer back to when the work progresses to a place where more or different data is needed.
- Tell them that a final decision won't be made today, but that their voice will be important in making it. The final step of today's work will involve identifying a handful of measures that stand out from the rest as potentially beneficial to their improvement work.

continued on next page

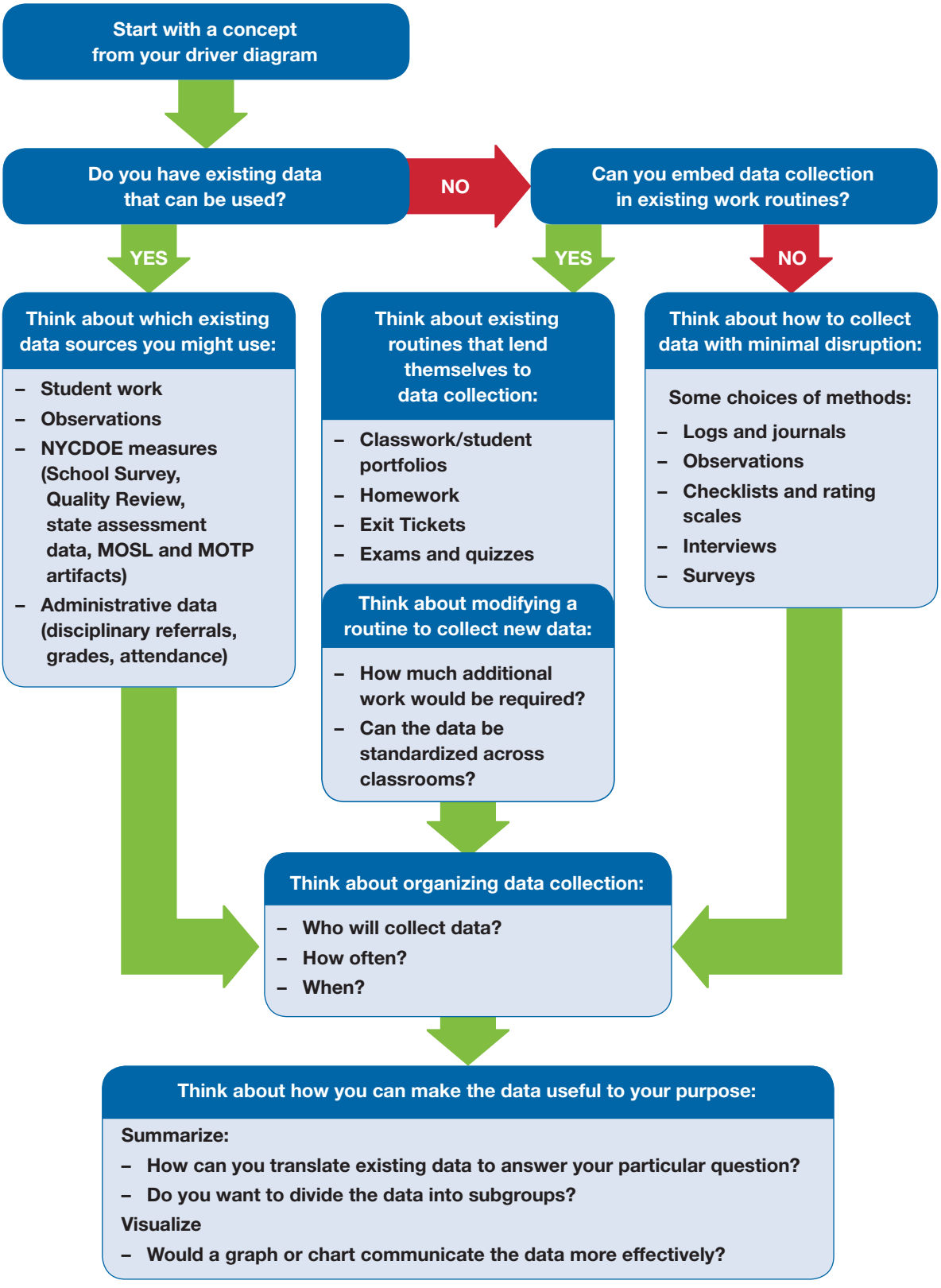
- (Optional) Share the following criteria for strong embedded measures (based on the guidance of improvement science). Good data doesn't need to meet all of these criteria to be useful, but it can be useful to think about the value these bring:
  - **Embedded in daily work**, making it an easy lift to add to regular routines.
  - **Rapid**, providing instant or near-instant feedback for learning and improvement.
  - **Based on predictions**, exposing gaps in understanding and opportunities to learn by predicting results in advance.
  - **Informative**, revealing how a change is working, not just if it is working.
  - **Responsive**, capturing small changes to help chart progress and uncover who the change is helping and who it isn't (and, if possible, why).
  - **Yours**, owned by your improvement team and used in open, honest reflection aimed at improvement, not accountability.

  Ask participants to quickly vote on 2–4 measures that they think are most important for guiding their improvement work in the short- and medium-term.
  - If disagreements that aren't critical arise, tell participants that this list shouldn't be considered final and that you will note the disagreement for later discussion.

6. Closing (5 minutes)

- Collect all documents for your team's records. These will serve as foundations for future work.
- Share what you can about next steps for the team and yourself.
  - If they are continuing PDSA testing, issue a reminder about agreed timelines and meeting dates.
  - If you plan to discuss this with school leadership or use the *Data-Collection Planner* tool (in this chapter) to continue to think through the team's data-collection needs, mention that and if possible give a timeline.
  - Ask for interest in taking a more hands-on role in designing or working with data.
- Thank your team for their contributions.

Data-Collection Flowchart



Tool: Data-Collection Planner

Overview

Making decisions based on appropriate data for the questions at hand can make the difference between a teacher team that generates insight and student success and one that does little more than spin its collective wheels. However, the potential benefits that data bring are balanced by the time and effort required to collect, process, and interpret the data. Collecting the wrong data or burning out your team with onerous amounts of data work is counterproductive. Thinking about the costs and benefits of your data collection plans in advance is critical for ensuring that the data collection and use become sustainable parts of your work. This planner will help you make informed decisions about what data you need and how to collect it.

Objective

Settle on a plan for collecting measures to guide your improvement team through this work. The plan will include details on the measures that are needed, the collection process, and the analysis and interpretation of the results.

Participants

- Improvement team leader
- (Optional) Improvement team members

Prerequisites

The team should have created a list (or "system") of potential measures that could be used to track the improvement process. See the *Choosing Measures for Improvement* activity in this chapter for more information on how to create your measurement system.

Guiding Questions

- What data would be the most valuable to have on hand?
- When will we need to collect data in order to inform key decisions?
- How can we most easily collect these data?
- Who should take which role to make the data-collection process as seamless as possible?
- For our team and improvement work, what is the appropriate balance between the benefits of having useful data and the teacher time that is required to collect it?

continued on next page

Step 1: Draft A Timeline For Your Work

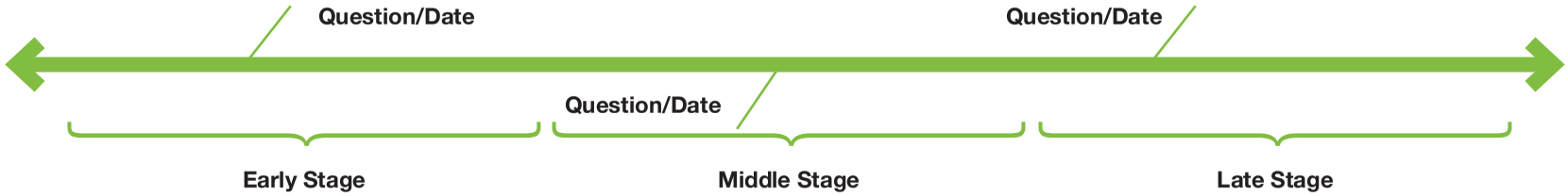
Starting with your current change idea(s), project a realistic timeline for how you expect the work to develop. Rather than starting with fixed dates, think instead about three stages of this work and the questions you should be asking during each one. Using the guiding questions and examples provided, write the critical questions you will have at each stage in the space below (or on chart paper or a white board). Aim for two to four questions for each stage. You can prioritize them later.

Early stage	Middle stage	Late stage
***How* is our change working?**	***For whom and under what conditions* is our change working?**	**Is our change successfully *moving us toward our aim (or driver)*?**
Early on we ask questions that are open-ended and exploratory to truly understand our change, such as: ● What happens in the classroom when we structure a lesson this way? ● How do our students experience this new approach to discipline? ● Can teachers manage this small-group work and the rest of the class at the same time?	Later we pay attention to the variation and outcomes to try and understand how to make the change work better and more consistently, such as: ● Will this approach work equally for bilingual speakers of Chinese and Spanish? ● Will adding modeling and paired practice help the students who have been struggling to engage?	As we grow more confident with our change, we start asking questions about whether the improvement is occurring as we predicted in our theory, such as: ● Will the structured opportunities to use their home language in class increase our ELLs' sense of belonging? ● Will the structured opportunities to use their home language in class lead ELLs to greater understanding of grammar of both languages?
Write your questions below:		

continued on next page

Step 2: Set Loose Dates

Using the questions from Step 1, come up with a loose date for when you would like to have data on hand to answer each question. Consider when you will be meeting with your team or school leadership. Consider when you anticipate moving from one phase of the work to another. Consider whether you will want a midyear check-in or end-of-year review of the work. If it is helpful, jot these questions and dates on a rough timeline of the school year (or beyond). Don't worry about which data you will need just yet; focus only on the questions you need to answer.



Step 3: Attach Possible Data Sources to Your Questions

Steps 3 and 4 involve prioritizing potential sources of data to answer the most critical questions that you will have over the next several months. These decisions should be made based on two sometimes-conflicting criteria: first, the ability of the data to answer your critical questions; and second, the real-world practicality of collecting that data. Because of the balancing that has to be done, it is best to do this one data source at a time. Focus on the middle and late stages, since data sources in the early stages often change quickly, and it is rarely necessary to plan for them in advance. Use the system of measures you have created (in the *Choosing Measures for Improvement* activity) and the examples of common data sources below to **choose one data source** that is well suited to answer one of your critical questions. It may be helpful to think about where the data sources fall on the timeline, but don't add them just yet!

Early stage	Middle stage	Late stage
***How* is our change working?**	***For whom and under what conditions* is our change working?**	**Is our change successfully *moving us toward our aim (or driver)*?**
Data sources at this stage are often: ● Qualitative, such as anecdotes, observations, or interviews. ● Student work that is easily collected, such as Exit Tickets. ● Added, refined, and/or discarded to suit your immediate needs in PDSA testing.	Data sources at this stage are often: ● Numeric or rubric based, to facilitate comparisons across groups of students. ● Related to the objectives of the change idea or a driver. ● Collected in a routine and scalable way.	Data sources at this stage are often: ● Designed to measure many students over time. ● Rigorous, using benchmarks and possibly using control groups. ● Related to primary drivers or the aim statement.

continued on next page

Step 4: Consider and Plan for Data Collection

The next step deals with the reality that data collection can be time consuming and require multiple tasks and handoffs between team members. It helps to be clear about and plan for all the tasks involved before you start. To do so, take the one data source you chose in Step 3 and use the prompts below to help decide what tasks are involved in designing, collecting, preparing, and sharing each data source. Record these by jotting down a quick list of all the necessary steps for your data source.

When you finish, repeat Steps 3 and 4 until you are satisfied that you have enough data sources to prioritize among your options and start planning next steps and roles.

Design	Collect	Prepare	Share
Will you need to…	Will you need to…	Will you need to…	Will you need to…
• …find existing data tools to copy or adapt? • …write an initial draft? • …do a practice run with a colleague or student? (helpful for testing survey and interview questions) • …share with colleagues for feedback? • …refine based on feedback?	• …discuss plans to fit data collection within existing routines of your team? • …collect baseline data? • …determine when, how, and to whom your team will submit the data? • …allow for additional feedback and refinement of the data tool?	• …make time for the handoff of data between team members or admin? • …input the data into a spreadsheet? • …do a preliminary analysis before sharing? • …prepare comparisons over time, or across student groups? • …create graphs, charts, or visuals for sharing with your team?	• …schedule a separate meeting, or use time in an existing meeting? • …pre-think possible implications and next steps? • …decide who will present the data and/or lead the discussion? • …liaise with school leadership about your results, learning, and progress so far?

continued on next page

Step 5: Prioritize and Add to Timeline

This penultimate step is where you pull together all of your thinking into a rough plan. Seeing all of the steps laid out on a calendar is a good way to think through the practical implications of your choices and make decisions about what data you are going to prioritize. (See the attached example timeline on the next page for an idea of what this may look like.) During this step you should:

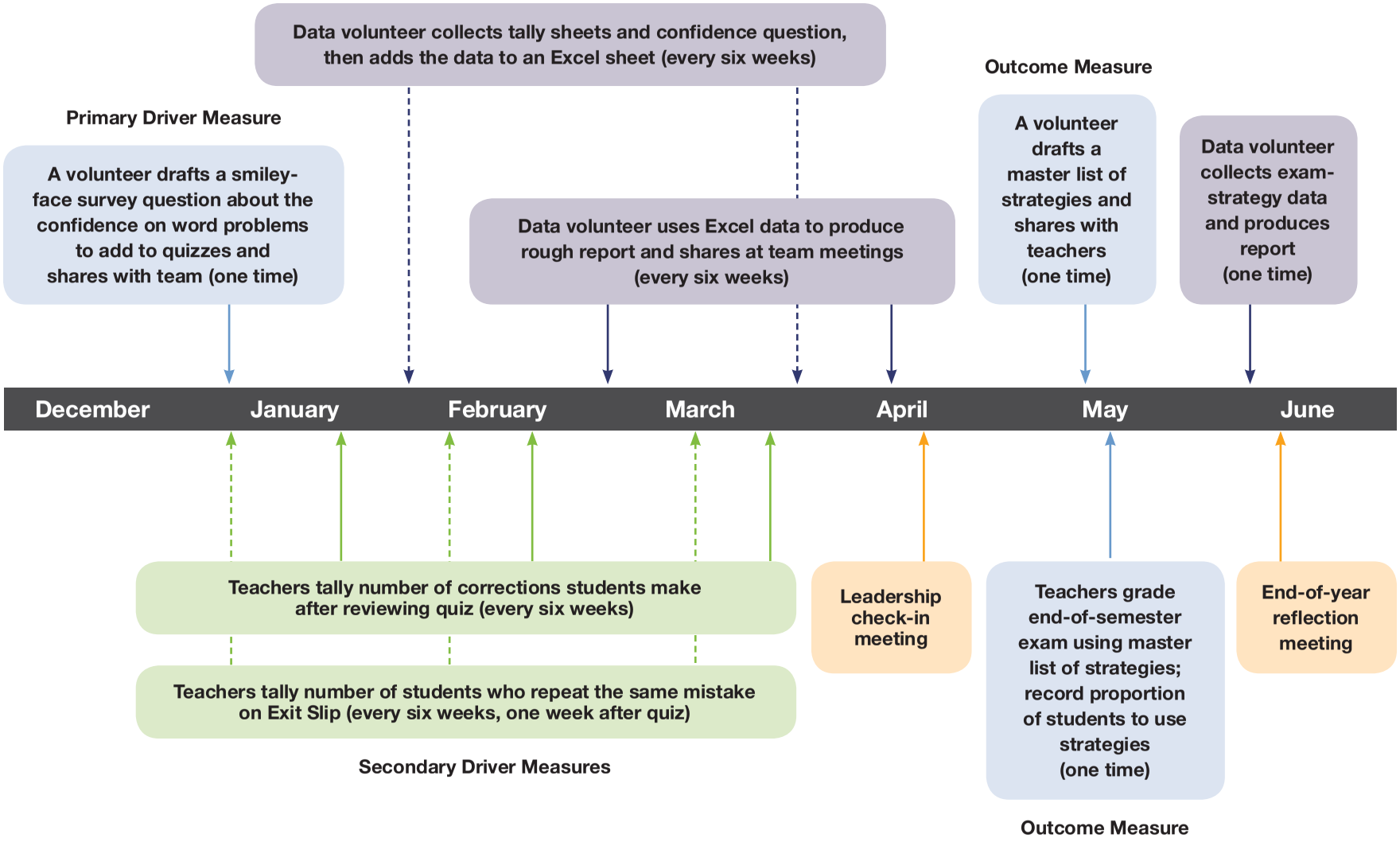
- Add each task to your timeline, working backwards from the dates you chose for sharing with your team or school leadership. Add other important dates such as holidays or state testing. Feel free to adjust dates that no longer feel realistic. Consider using different colored pens or sticky notes to distinguish the data sources. You may also add names of people who may do each.
- Look at the timeline and all of the tasks and think about the value of each of the data sources for your team's decision making over the course of the next several months. Compare that value with the time spent and the burden of completing all the steps you have laid out on the timeline. Decide on 1–2 data sources that are relatively important and relatively manageable.
- If there are additional data sources that you may need but pose a burden to collect, you may want to rethink some of the steps, the calendar, or who is involved. Consider asking other members of staff for support or calling in outside expertise to guide you. Don't forget to involve school leadership in these decisions.
- Remove any data sources from your plan if they seem overwhelmingly burdensome. You can always return to them later when they are a higher priority or if you find a more practical way to collect them. Make sure you save your notes so you can return to your thinking later.

Step 6: Next Steps

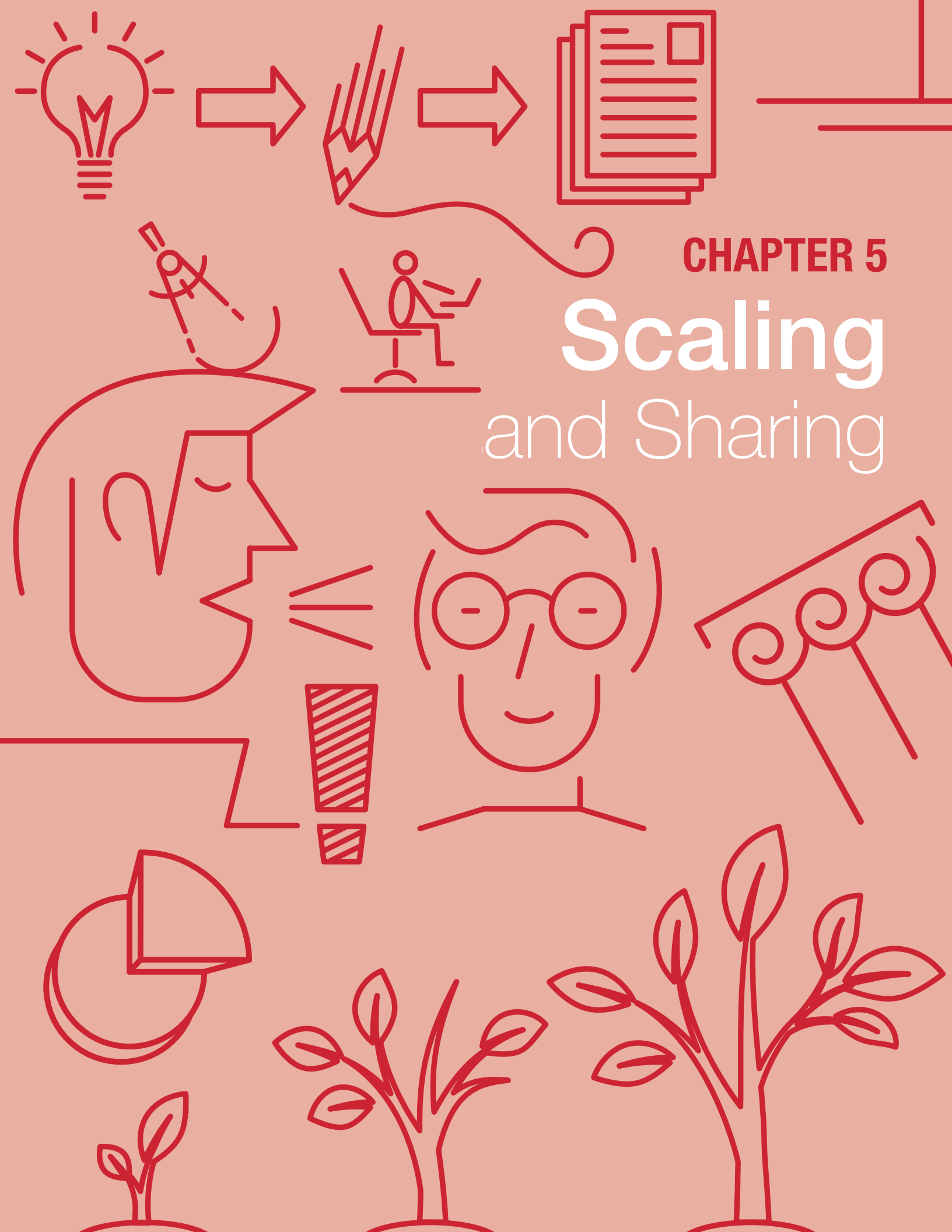
- Decide on next steps that need to occur to get the ball rolling on the 1–2 data sources you have selected.
- You may want to call a meeting to discuss the decisions you have made, think through roles, create a shared calendar of steps, and generate buy-in among your team members. Be clear and transparent about the decisions you have made at each step, because the more involved team members are on the thinking behind these tasks, the easier it will be for them to make good use of the data.

Example Data-Collection Timeline

*This example timeline is built to reflect the example measurement system used throughout Chapter 4 of the *Improvement Science Handbook*. See the diagram on page 114 of the chapter for additional context on the measurement system attached to this timeline.



Tool: Data-Collection Planner *page 6*



CHAPTER 5

Scaling and Sharing

Activity:

> Scaling Pre-Mortem

Work with your team to preview the scaling process and anticipate potential challenges before they occur.

Tools:

> “What Next?” Leadership Reflection

Provides support for navigating the nonlinear nature of improvement work by connecting common challenges and suggested next steps.

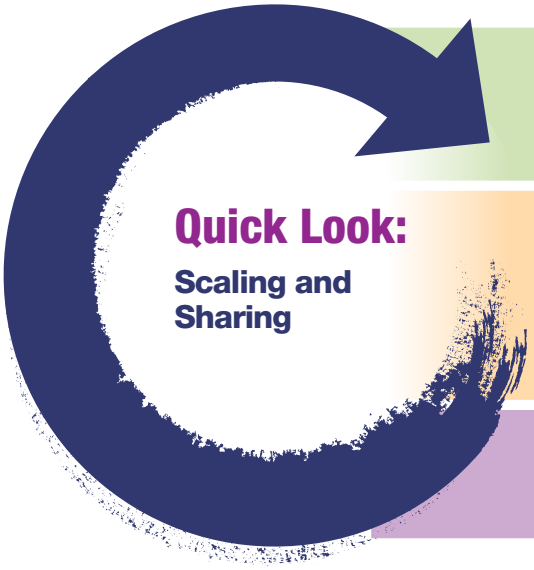
> Storytelling Toolkit

Provides guidance on turning the successes and insights that have come out of your work into a document or a narrative that can be used for sharing, spreading, and sustaining your success.

The purpose of this chapter is to understand when and how to scale a successful change. It should be used after you have run two or more PDSA cycles and you have a change idea you are confident is ready to be tested across broader contexts.

CHAPTER 5

Scaling and Sharing



Quick Look:
Scaling and Sharing

What is the purpose of this chapter?	To understand when and how to scale a successful improvement test
When should it be used?	After you have run two or more PDSA cycles and you have a change idea you are confident is ready to be tested across broader contexts
Who should be involved at this stage?	• Improvement team leader • Improvement team members

I. Chapter Overview: Overcoming the Scaling Problem

Introduction

Education has a scaling problem. On a micro-level, within classrooms and teacher team meetings, promising practices are developed every day as teachers and leaders work toward solutions to the problems they face. However, these local successes are not shared with others in a systematic way. Instead, promising practices are adopted "whole cloth," often with little time to prepare or margin for error. It makes for a frustrating pattern, familiar to anyone involved in education: a new idea is identified, lionized, frantically implemented on a large scale, and then abandoned when it fails to meet the particular and varied needs of students and schools. Going straight to scale in this manner drains time, resources, and energy from already taxed schools, demoralizes educators who feel overburdened by the pace of new demands, and amounts to what researcher Anthony Bryk has called "the chronic problem of promising reform."

This chapter outlines a more effective approach. Here, identifying a successful change idea—even one that leads to a remarkable improvement—is just a first step in understanding how to make that improvement happen consistently and effectively across contexts. Instead of expanding a promising solution quickly, we return to the initial PDSA mindset, focusing on low-stakes testing, regularly accessible evidence, and the inevitability of setbacks and dead-ends. This allows us to slowly introduce the change idea to new and varied contexts, building our expertise as we go. The result is a movement to scale defined by deliberation, where widespread adoption is the result of widespread adaptation and teams continue to tweak and refine their change ideas to work consistently across different classrooms, grades, and schools.

PDSA Testing Ramps: Four Keys to Progress

The central concept behind scaling through rapid testing is the PDSA Testing Ramp, a logical extension of the basic PDSA cycle discussed extensively in *Chapter Three: Testing Changes*. Where a PDSA cycle focuses on testing a single change idea, a PDSA Testing Ramp represents a series of those cycles strung together, allowing a team to grow the impact of their work by moving between tests aimed at **optimizing** their change idea for a given scale and context, and **ramping** it up to a growing range of users and contexts. These phases provide a rhythm to moving an improvement up a PDSA Testing Ramp as your team shifts between periods of optimization and growth. While the precise timing of your progression depends on the results of your tests, the following four key ideas will help guide your team when using PDSA Testing Ramps:

For a deeper dive into terms such as ramping and optimizing as well as strategies, see page 143 of this chapter.

Perfect the small scale first. Use the PDSA process to build a firm foundation around your change idea. Each change idea should be tested on the smallest scale possible—optimizing implementation with one or two students or a single class, confirming its impact by collecting embedded evidence, and *getting consistent results during successive tests*—before conversations about moving forward to the next level of the scale.

Move up the ramp incrementally. Once you have identified an effective change idea that you are confident is reliable in one context, you are ready to begin thinking about opportunities to expand it into new places. Prioritize your learning and the collection of evidence early on. Each step up in size or change in conditions should be followed by an appropriate period of optimization where you become confident that the change idea will work in its new context and population of users.

Gain expertise by expanding into varied conditions. When you increase the number of users affected by the change idea or try it in a new context, your team will increase its practical understanding of the problem. This growth of knowledge creates the necessary expertise to continue expanding and optimizing the change idea. As you expand the boundaries of your change, capture the larger scope of influence or your team's learning by updating your driver diagram, reflecting its role as a living document.

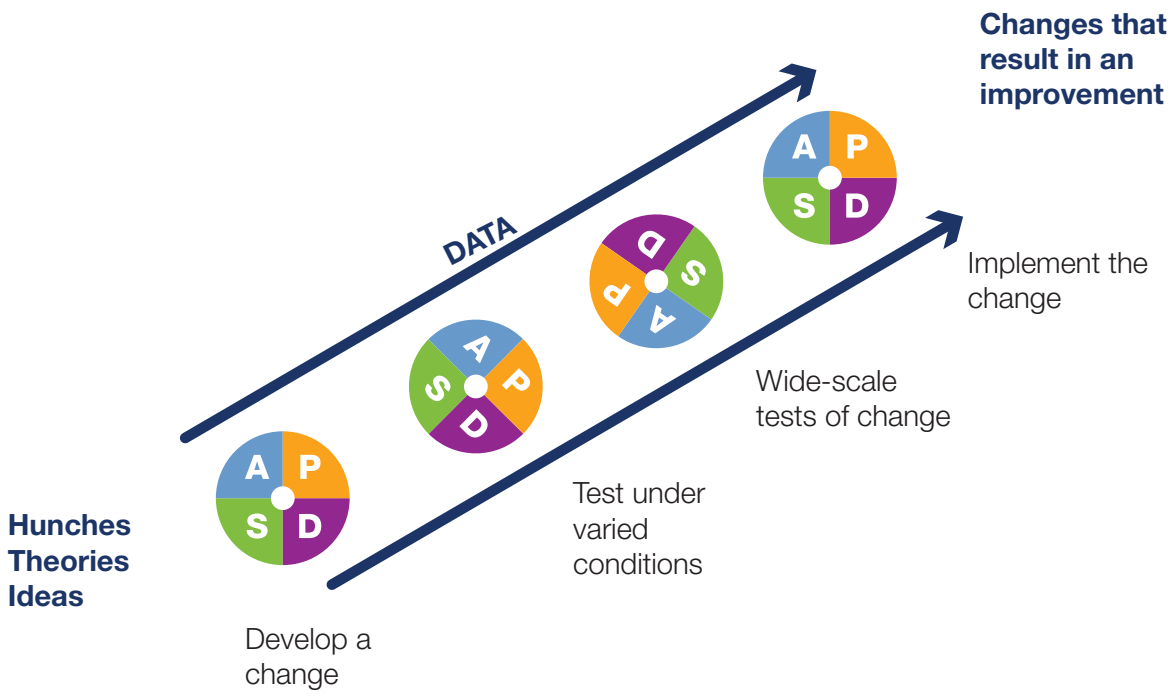
Strategically involve new collaborators to implement your changes. As your testing continues, the process of moving it up the ramp will also help seed it in new areas. Use the process of refining your idea to slowly bring new members of the school community in contact with your team's work and build excitement. However, be sure to provide space and time for new members to become familiar with the change idea at a small scale before they fully adopt it.

While these four ideas provide critical context to scaling, they are just general descriptions of how the ramping up of change ideas tends to work. Think of them as guidance to support your decision making during this new approach to scaling ideas, not as substitutes for your best judgment.

What PDSA Testing Ramps Look Like in Practice

Each change idea has a different trajectory during its journey to scale. This can be intimidating, as there is no consistent path to follow—your team must be comfortable operating without precise guidance or the certainty of success—but the ramping process will also provide excitement as you break genuinely new ground and become leaders of change within your school. Given the inherent unpredictability of testing, the following example is presented less as a guide and more as single possibility that represents common circumstances you might encounter when you begin to bring your change idea to scale.

PDSA Testing Ramp in Practice



Example PDSA Testing Ramp: Increasing Math Persistence

STEP 1: Initial Feasibility Tests	
Aim:	We will increase the proportion of students who use one or more problem-solving strategies to complete algebra summative assessments from 40% to 90% by June 2018.
Change Idea:	Return quizzes with feedback and time for revisions.
Sample Size:	3 students
Number of PDSA Cycles:	3 cycles
Result:	Success!

A teacher team explores the causes underlying why students freeze up when they encounter challenging math problems and, based on their working theory of improvement, comes up with an idea. What if they provided in-class time for students to make revisions on their quizzes so that they could have more practice using problem-solving strategies to persist through challenging math problems? During their **initial PDSA test**, one teacher offers 15 minutes of time to three students and suggests that they use the time to review quizzes and make revisions. Although the students appear grateful for the time, they only read over the quiz feedback without making corrections. Realizing that the instructions were perhaps not obvious enough, **the teacher runs a second test**, this time making it clear that the 15 minutes are for the students to complete the revisions and providing explicit steps for the students to follow. During this second test, the team notices that the number of revisions students completed increases from zero to three. **To see if they can replicate the results, they run a third test** and further polish the way they monitor and support students during revisions. To the team's excitement, the revision rate increases to four per student, and the students start to use the practiced strategy in other classwork. The team decides it's time to scale up! In these small-scale tests, teams typically look at more informal or qualitative data to inform questions around how the change idea works, allowing curiosity and instinct to lead. In this case, they simply count the number revisions a student makes, decide a "high-quality" revision should entail making changes more substantive than simply fixing a computation error, and keep their eyes open to see if students show greater persistence outside the 15 minutes of revision time.

STEP 2: Ramping Up by Testing with More Students	
Change Idea:	Provide 15 minutes of in-class time to work on teacher feedback.
Sample Size:	9 students
Number of PDSA Cycles:	1 cycle
Result:	Learning!

After the success of their initial change idea, the team decides to ramp up by increasing the number of students in the test from three to nine. **During their first test with nine students**, they provide the same 15 minutes of time and prompt students to make revisions. But they realize that a third of the students require significant coaching to make revisions—and without that coaching, students rarely revise the questions that involve the most important skills to practice. This leads the team to update the change idea to include more targeted guidance: instead of offering students general feedback, the teacher will offer only three pieces of skill-based feedback to create more focus. In medium-scale tests such as these, teams often pay more attention to the differences between students or contexts, trying to understand *for whom and under what conditions* the change works.

STEP 3: Optimizing by Testing for Stability and Reliability	
Change Idea:	Give students 3 pieces of skill-based feedback and provide 15 minutes of in-class time for revisions and focused strategy practice.
Sample Size:	9 students
Number of PDSA Cycles:	3 cycles
Result:	Success!

During the next phase of the team's work, the team continues to optimize the change idea. They refine it to deal with the unexpected results experienced when expanding to nine students by tweaking the design to give more targeted feedback. **The first time they try this refinement**, it leads to clear improvement in the quality of revisions, especially after one teacher on the team supports one struggling student by giving her the answer to a particularly hard word problem and asking her to focus just on the strategy. This tweak helps the student overcome her anxiety and look at the task differently. **Over the next two tests**, the team makes revealing the answers to word problems a standard part of revision process and, seeing how interesting students find the practice, starts encouraging students to find *multiple strategies* that lead to the same correct answer. Thus, an improvised solution to a challenge faced by one of the students—*for whom the change wasn't working*—becomes a powerful insight that can drive further tweaks and refinements.

STEP 4: Ramping Up by Testing with the Whole Class	
Change Idea:	Give students 2–3 pieces of skill-based feedback; model and lead 15-minute revision and strategy practice activity.
Sample Size:	24 students (whole class)
Number of PDSA Cycles:	2 cycles
Result:	Success!

After their success with nine students, **the team decides to ramp up and introduce the change idea to the whole class**. The expertise the teachers have gained in running the previous test has prepared them for the additional modeling and differentiation that will likely be required for the larger group. They also reduce the minimum amount of feedback they have to provide each student to ease the preparation workload. **By the second test, the activity is running smoothly**: 20 of the 24 students are completing "high-quality" revisions, and over half the class is showing improvement on Exit Tickets and subsequent quizzes. In these large-scale tests, teams are typically looking for evidence of effectiveness, trying to collect slightly more rigorous measures to demonstrate the impact of the change.

STEP 5: Optimizing at Scale	
Change Idea:	Give students 2–3 pieces of skill-based feedback; model and lead 15-minute revision and strategy practice activity.
Sample Size:	24 students (whole class)
Number of PDSA Cycles:	2 cycles
Result:	Learning, then success!

After their success at this scale, the team further optimizes the change idea for the whole class by providing aligned practice problems for students who either finish early or whose quiz required fewer revisions in the first place. Working at scale also provides the opportunity to test the hunch that adding a few minutes of pair-sharing or group discussion might reinforce the students' focus on strategies. **The two tests are met with mixed results, unfortunately**; the sharing isn't consistently high quality and is demanding on the teacher. This test convinces the team that *scaling by subtraction* is wiser than adding yet another moving part to a successful strategy, so they pare the practice back to its essential elements and declare this change a success. The team has demonstrated that they could use revisions to help students apply strategies to persist through and solve difficult problems, and, most importantly, that dedicating time to this skill has a real, positive effect on their students' learning.

Next Steps

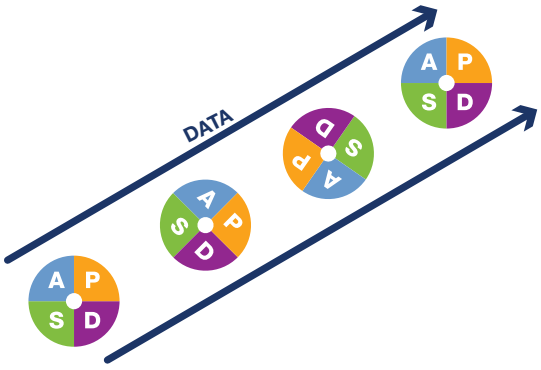
This is the end of the story of this team's ramp, but not the end of their improvement journey. From here, the team could move in many directions, such as: returning to their theory of improvement and choosing a complementary change idea to test; using something they learned along the way to spark new investigation into the problem and generate new change ideas; or continuing to ramp up the change idea by *spreading* it into a new context. The key terms below and the *"What Next?"* tool provide support for navigating these decisions.

Envisioning Your Way up a PDSA Ramp: Three Dimensions of Successful Scaling

Testing ramps provide the structure for tackling the learning and implementation challenges that occur along several dimensions of improvement. By naming the kind of improvement you are aiming for in each test rather than trying to do all at once, you simplify the task and increase your chances of success. As you think about your own PDSA ramp, make use of the following descriptions to narrow your focus for each part of the ramp.

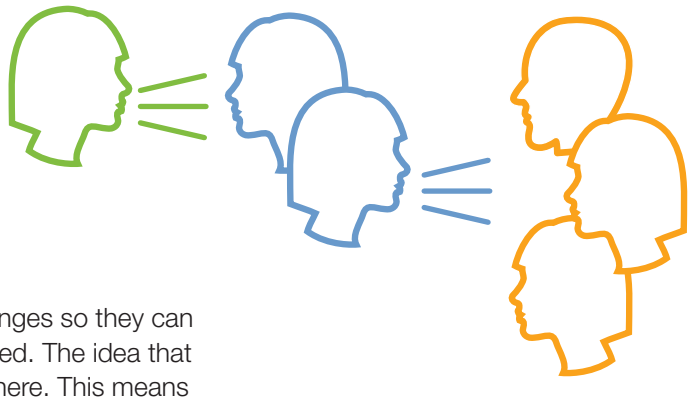
Ramping refers to the process of deliberate scaling up of a change idea. Presented as an alternative to implementing at scale, the term recalls the superiority of wheeling a heavy object up a ramp rather than trying to use brute force to lift it. In practice ramping is done through PDSA tests that alternate strategically between periods of:

a) testing with more users,
b) testing in new contexts,
c) testing to **optimize** the change idea within its current context and scale, and
d) **spreading** a successful change idea to others.



Optimization refers to the critical step of slowing down scaling to refine the change idea within a context or population of users it has been introduced to. It is much smarter to uncover the inevitable flaws and growing pains of a new practice while it is still a manageable size, rather than waiting until you are doing it with 30 students at once or across a whole department! Once you have successfully optimized your idea in one context, then you are better prepared to continue ramping.

Spreading refers to the related process of expanding a change idea beyond your improvement team, either throughout the school as a whole or to the district beyond. The distinction is important because spreading outside of your direct control presents new and different challenges. These include:



a) The shift requires you to simplify the changes so they can be more efficiently understood and learned. The idea that we can "scale by subtraction" is helpful here. This means distinguishing between the pieces of your change idea that are nonnegotiable regardless of context and the ones that can be adapted to suit new contexts.

b) Be prepared to delegate responsibilities and enlarge your focus to include the necessary learning of the new people implementing the change. The spread of a change idea can never outpace the expertise in carrying it out! Provide the time and support that your colleagues need through new cycles of optimization.

c) Start to document your learning through narrative. Stories are the quickest and most memorable way to share your successful practice. Collecting the stories as they happen will give you a powerful tool for spreading your success.

The Tools

The tools and frequently asked questions in this chapter will help your team visualize the process of scaling a practice, providing further opportunities to think about the kinds of decisions you will be facing and strengthen your understanding of when and how to scale a promising change idea. Each tool is designed to help with different aspects of the ramping process. Use the descriptions below to decide which is right for you.

Scaling Pre-Mortem is an activity that allows your team and important stakeholders to preview the scaling process and anticipate potential challenges before they occur. It is best for teams that have a change idea or change ideas that have been successful at a small scale and show enough promise to warrant serious thought into what it will take to turn this into a school-wide practice.

***"What Next?"* tool** is a stand-alone tool designed to help an improvement team navigate the nonlinear nature of improvement work. It lays out several common challenging situations—from a change idea whose impact has plateaued to loss of team buy-in, or tests that provide unexpected insights—and provides approaches to help the team move forward and maintain (or regain) the momentum of the work. It includes numerous references to other tools and chapters of the handbook that can be helpful in getting a team unstuck.

Storytelling Toolkit is for a particularly important—and often overlooked—aspect of spreading and sustaining your work: telling your own story. Telling the story of your work allows you to tie together the many meetings, in-class changes, decisions, and moments of learning into a coherent narrative that will keep your team bought into the work and help inspire others. Humans have long organized themselves around shared stories, and there are many moments when working on your story can benefit the work of your team.

This toolkit provides guidance on turning the successes and insights that have come out of your work into a document or a narrative that can be used for a variety of purposes. Whether your goal is to share a practice that works, to create a narrative for sustaining the mindset of improvement in your school, or to create a document for sharing your progress with people outside your school, this toolkit provides structure, tips, and guidance to get you started.

II. Orientation: Self-Assess to Stay on Target

Where Are You in the Improvement Process?

Improvement science moves through several distinct phases. While the process is not always linear, often shifting back and forth between phases as your learning evolves and sparks new questions, identifying where you are within the work is critical to taking effective action.

As you begin *Scaling and Spreading*, we recommend you complete the following four steps from both ***Chapter Three: Testing Changes*** and ***Chapter Four: Measuring Your Progress*** to ensure you get meaningful results.

Prepare yourself for this step in the process by:

- ☑ **creating a driver diagram**
- ☑ **completing a minimum of two PDSA tests**, and reflect on them using the *Post-Test Reflection*
- ☑ **completing the *Choosing Measures for Improvement* activity** in *Chapter Four: Measuring Your Progress*
- ☑ **identifying a change idea** that has led to success with students at the initial small scale

This is the last chapter of the handbook. Where do I go from here?

Embrace the process. Improvement science is practice driven: there is no theory that can substitute for experience. Continue to learn, test, and grow your understanding of the problem. If you get stuck, consider using the *"What Next?"* tool from this chapter to decide on next steps.

Deepen your understanding. Improvement science has a huge body of literature. Inspire your practice by continuing to explore the nuances and strategies for implementing improvements:

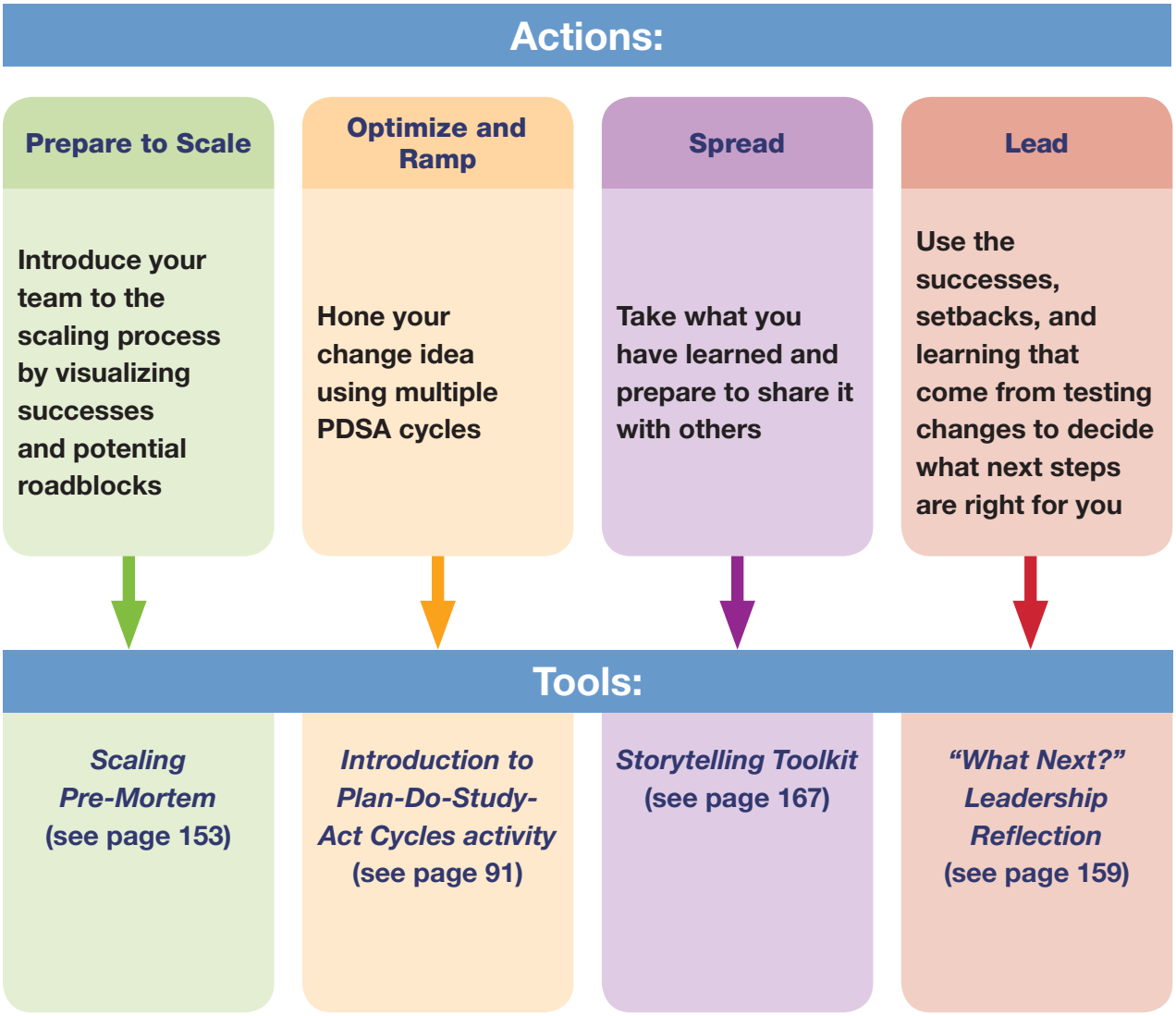
- The Carnegie Foundation for the Advancement of Teaching: https://www.carnegiefoundation.org/
- *Learning to Improve* by Anthony S. Bryk, Louis M. Gomez, Alicia Grunow, and Paul G. LeMahieu
- University of Michigan MOOC: https://www.edx.org/micromasters/michiganx-leading-educational-innovation

Some of improvement science's origins lie outside of the field of education, and some resources are easily translatable and useful:

- *The Improvement Guide* by Gerald J. Langley, Ronald D. Moen, Kevin M. Nolan, Thomas W. Nolan, Clifford L. Norman, Lloyd P. Provost
- Institute for Healthcare Improvement: http://www.ihi.org/Pages/default.aspx

III. Coaching Steps

As the leader of your improvement team, you have several options for leading your team through this stage. The following coaching steps should help frame the steps you can take, and orient you to tools and activities that will help you.



IV. Frequently Asked Questions

The questions below represent common issues that come up when scaling a test during an improvement project.

Q1 How do I know if I am "moving up the ramp" at the right pace? What are some signs that I am moving too quickly? What are signs I am moving too slowly?

A You should always refine a change idea *before* scaling. It is much easier to optimize when working at a small scale. When in doubt, follow this rule of thumb: do two more tests to establish stability and reliability; you do not want to miss the opportunity to become more confident in your change. Signs you are moving too quickly up the ramp include inconsistent results, internal doubts about the effectiveness of the change idea in new contexts, vague or incomplete tools that are part of your change idea, confusion or difficulty surrounding roles involved in implementing the change idea, and/or lack of complete measurement about the effectiveness of the change idea.

On the flipside, improvement science thrives on feelings of insight and progress, and you do not want to allow your project to stall out by dwelling in the relatively safe zone of a well-established PDSA cycle. A change idea is ready to move up the ramp when your confidence (based on evidence collected, not enthusiasm!) that it will work in new contexts is strong. Signs you might be moving too slowly include three or more repeated tests that return near identical pieces of data or evidence, the timing between PDSA tests grows to 2–3 weeks, or you find yourself using the tool as a part of your regular routine but have not yet tried it with other subgroups. Additionally, if you end up feeling that you are spending more time than the benefits of a change idea can justify, that is a sign that you may need to speed up testing.

In general, the speed of expansion should match your evidence-based confidence in the effectiveness of the change. If you have doubts, expand slowly; if you find yourself with a bevy of evidence that your change idea is effective, move forward.

Q2 How do I determine what to test next? What "direction" should I point my ramp?

A You should let your experience and the data guide you. You should move in the direction that has the greatest likelihood to either benefit your students or teach your team how to do so. It may help to glance back at your driver diagram to consider your long-term goals. Several critical characteristics to think about when evaluating different areas are summarized in the chart on the next page.

Choose to test...	If...
Where you expect minimal difficulty	The idea is unproven or the tester is inexperienced
With students with different characteristics	You want to learn what adaptations your change idea might need for different contexts
On a larger scale	You are interested in learning how to manage the change with more students at once, or what it takes to be effective at a larger scale
Where you suspect it might fail	You have a strong, consistently successful practice that you want to try to "break" before you scale it
Where your questions are small and specific	It is early on and you want to refine your understanding of how to make the practice work
Where your questions are large and intimidating	You want to test the limits of where the change idea will work, or gain insight into where the change idea falls short

Q3 What do I do if my change idea does not work outside of its initial context?

A There is no single magic answer to educational problems; this makes it highly likely that at some point in the scaling process your change idea will encounter a context where it is no longer effective. This is not a sign that your improvement project is a failure nor that you should abandon your change idea. Rather, it must instead be taken as an opportunity to learn more about your problem. Setbacks like these allow your team to refine your understanding of the problem, creating opportunities to either adapt your original idea to fit the nuances of the new setting or develop a parallel change idea that answers the new needs. In particular, reflect on whether the failure resulted from a method by which you optimized or an intrinsic part of your core idea underpinning your improvement. If you find that a new method you used to optimize led the change idea to be less successful in the next context, then strip away any optimization so that you can start anew from the core idea. Your improvement project will grow more robust from thoughtfully and methodically grappling with these setbacks. Ultimately, your long-term goal should be to use these moments of learning to develop multiple change ideas into a collection of practices that can help you support different students in different situations in different ways.

Q4 As I move up the ramp, can I test more than one change idea at a time?

A The first time you begin to scale a change idea, you should focus on one change idea at a time. At this initial stage, you do not want your team or the work to get pulled in too many directions at once. However, as your improvement project continues to expand into new settings—and your change idea is forced to adapt to the new challenges you find there—it is almost inevitable that multiple critical questions will arise. In these cases, each new change idea should have its own "ramp." Testing multiple change ideas at one time is fine—often necessary—but it is important to test them independently, allowing each to establish its own efficacy. In these cases, split the work so you can maintain focus on one issue at a time. Remember to move slowly. If we try to take on too much at once, we lose the ability to manage the changes, collect evidence, and track our progress at the same time.

Q5 What types of changes will I need to make to my measurement strategies as I scale?

A A larger-scale test often requires tweaks to evidence-collection strategies. Make sure you have prepared to collect evidence at the larger scale before moving up the "ramp." Generally speaking, small-scale tests can use more informal, qualitative data because the data you collect should answer your questions about how the change works. You should feel free to let your curiosity lead you at this stage and not focus exclusively on effectiveness.

Medium-scale tests should pay more attention to differences between students and contexts. We know that not all changes will impact all students equally, but if you understand for whom and under what conditions a change works, you will be better equipped to differentiate support or decide which additional changes to try.

By the time you are testing large-scale changes, you will have already collected some evidence of effectiveness. At this point you want to make sure you are being rigorous enough to demonstrate improvement by measuring baseline data and change over time. You don't want to spend 3–4 weeks testing something only to find that your measurement strategy produced unhelpful data.

Q6 It sounds like ramping gives the team a lot of freedom to determine the direction of the work. How involved should school leadership be in this process?

A It's true that this process gives teachers on your improvement team a lot of agency. This is by design, since the people closest to the changes being made are the best placed to turn the insights that come out of the PDSA cycles into further improvements.

That said, involving school leadership is important and can happen in a number of ways. The initial goal-setting and periodic reflection are important points for leadership to plug in, as are any major changes in direction of the work. The work of your improvement team should always align with the school's larger goals, and leadership should be kept abreast of the work as it evolves to ensure that this is the case.

Additionally, if your team's learning leads you toward potential tweaks to existing school practices and structures, leadership should certainly share in that decision and help you decide what evidence should be collected to determine if these small-scale tweaks are successful before they are scaled.

Finally, as you scale up to larger and more complex changes, or spread to more contexts, the practices themselves and the data you will have to collect will have to become more formalized. Here, leadership is important for providing support and making decisions about centralizing data-collection efforts.

Q7 Do you have any advice for handing off a change idea to a new teacher or staff member? What about to a new building or context?

A When handing off a change idea to a new teacher or staff member, it will often take more than one PDSA cycle for them to learn the change and tweak it to fit their context. Do not get discouraged if adoption isn't immediate or perfect; adjustments by these new members are valuable for your team's learning and can be made into PDSA ramps of their own. To smooth the handoff process, ensure that potential adopters understand the core elements and nuances of the improvement as they build their "how-to" knowledge around the specific steps required to implement the change idea. It is equally important for them to understand the background, rationale, and logic behind the improvement, which can help them understand the sense of urgency and need. This can often be done by talking less about the pilot team's immediate experience (as exciting as that may be), and more by providing stories to help them feel the impact of the practice on users' routines and the school's capacity. As always, leave plenty of room for questions and reflections, as this will both encourage participation and uncover new areas of insight.

V. Facilitator Step-by-Step Guides

On the following pages of the handbook you will find facilitator guides for the following tools and activities:

- Activity: Scaling Pre-Mortem
- Tool: “What Next?” Leadership Reflection
- Tool: Storytelling Toolkit

Use the guidance from the preceding pages alongside the facilitation notes to guide you through the use of each.

Activity: Scaling Pre-Mortem

(90 minutes)

Overview

It is an exciting moment when your team has developed a practice that creates positive results for your students, and it is tempting to abandon the iterative testing cycles that developed the new practice and rapidly scale it up. Resisting that temptation is helpful for avoiding common implementation pitfalls, but continuing testing cycles is not always enough to guarantee successful implementation at scale. This activity involves teams in predicting the factors that could lead to both a successful and a failed scaling effort of their change idea. It is called a pre-mortem, rather than a post-mortem, because it involves diagnosing the causes of our work's success or failure in advance, and helps visualize the ways in which ramping up to scale is different than the testing we have done so far. The activity finishes by turning participants' predictions into a set of action steps for avoiding pitfalls and maximizing chances of success.

Objective

To complete a pre-mortem of your effort to scale up a successful change idea, identifying in advance several potential reasons why the effort may succeed or fail, and turning these into a list of implications and action steps that will guide your work in the months ahead.

When to Use

- [ ] You have a change idea that has been successfully developed through testing and shows clear promise, and
- [ ] You are planning to take that change idea from its early testing ground and expand it across your school community.

This activity also has value as a way to preview the scaling process for a group of stakeholders. If you are new to using PDSA ramps to iteratively scale up a new practice, this activity can help introduce your team to the process and give team members a safe space to lay out their concerns.

Adapted from a talk given by Huggy Rao at the 2016 Carnegie Summit on Improvement in Education

continued on next page

Number of Participants

It is important to involve all important stakeholders in this process to avoid blind spots. You should consider including:

- all members of the improvement team
- other members of the school community who may become more involved as the practice spreads (optional)
- school leadership (optional)

Materials

- Copies of your driver diagram
- Details of your change idea
- Graphic organizers (attached), including extra copies of the final page

Facilitation Notes

1. Introduction and Framing (5 minutes)

- Welcome participants and review the objective of the activity.
- Congratulate them on their work to get to this point; the fact that they are engaging in this activity means that they have had success in developing a change idea into a successful practice, and the potential of that practice is why they are here.
- Read participants the following:

  "There are distinct challenges that occur in the transition from working on a small scale to implementing on a large one. As work grows beyond a size where a small group can control all the details, the pitfalls and threats that were previously caught and dealt with can more easily go unnoticed and derail a project. Often these predictable challenges go unpredicted until it is too late and valuable time has been lost.

  "Today's activity is called a pre-mortem, rather than a post-mortem, because we are going to diagnose the causes of our work's success or failure ***in advance****. By doing so, we will have a clearer picture of what we can do to ensure our work is successful."*

- Outline the four parts of the agenda for participants:
  1. Review their theory of improvement
  2. Break into two teams to anticipate causes of success and failure
  3. Share these stories of success and failure
  4. Discuss implications and plan action steps

continued on next page

2. Review Your Theory of Improvement (5 minutes)

- Share your team's theory of improvement (driver diagram) with participants. Ask them to spend 2–3 minutes discussing in pairs or small groups the following guiding questions:
  - Why did we choose this change idea(s) to accomplish our aim?
  - What are the benefits—both short- and long-term—of our chosen change idea(s)?
  - What other drivers and change ideas might be helpful as we expand to new contexts?
- Ask for volunteers to share out one or two ideas from their small discussion that might be helpful to prime the larger group's thinking.

3. Split Into Teams (5 minutes)

- Tell participants that the next step in this activity involves splitting into two teams: the optimists and the pessimists. The first team will craft a story of successfully scaling an implementation, while the second team will craft a story of a failed attempt to scale and implement. Both will use the same promising change idea as a starting point.
- Assign teams or allow participants to self-select, then tell them they are going to spend 3–4 minutes quietly brainstorming causes of success or failure of the effort to scale the change idea. Ask them to:
  - be realistic and choose significant (not small) and likely issues.
  - include partial successes and failures along the way.
  - try to represent multiple types of challenges that frustrated/were overcome.

4. Crafting Stories in Teams (35 minutes)

- Ask the two teams to start working together to craft a step-by-step story of the journey from today's promising change idea to an eventual success or failure.
- Tell them to use the ideas they have brainstormed as a starting point, but not to limit themselves to those ideas. At the top of the graphic organizer is a list of example issues to jumpstart their thinking.
- Remind them that the more realistic the story is, the more helpful it will be for anticipating real challenges.
- If you have included stakeholders who haven't been involved in testing or trained in improvement science, you should check for understanding of PDSA tests and of the term "burst" to describe using multiple PDSA tests to refine and optimize a practice. Make sure everyone in the room understands these concepts. See Chapter 3 of the handbook for further reference.

continued on next page

- Encourage the teams to use the graphic organizers to record key elements of the story, and remind them that they will be coming back together to share in approximately 30 minutes.

5. Share Stories with Whole Group (20 minutes)

- Bring the two teams back together and explain that the purpose of this next step is to compare two perspectives of how your work might go.
- Teams will take turns telling their stories to the whole group, as a team, or through representatives.
- The listening team members should take notes on any details that resonate with them. These notes will be the foundation of the final part of the activity.
- Offer the listening team the opportunity to ask clarifying questions, particularly around the reasons why successes/failures occurred in the story.
- Switch roles so that the second team shares and the first team listens, repeating the same steps.

6. Collect Implications and Next Steps (20 minutes)

- The final step of the activity is to draw out the implications for the team's ongoing work that have been raised over the course of the activity. Lead an open discussion, taking notes as you go or delegating notetaking responsibilities. Make sure the following three steps are all completed:
  - Invite the group to share any of the issues—either positive or negative—that they think have implications for their scaling effort. Encourage participants to explain their thinking, and allow others to respond.
  - Prioritize from among the ideas in order to decide which of the issues are the most important to focus on. Decide among your team how many are high priority.
  - Decide on action steps connected to each high-priority issue, including when these steps should be taken and who will take them. Feel free to use a white board or chart paper to help participants make connections between each implication and the action steps they agree on.
- When you are finished, make sure your notes include all decisions made thus far, and thank participants for their participation.

Scaling Pre-Mortem Graphic Organizer

Instructions: Work together with your team to craft a step-by-step story of your team's scaling journey as if it already occurred. Start from today's change idea and detail how and why you eventually succeeded or failed.

- Brainstorm potential issues you predict you may face as you scale and use these as a starting point. Use the list of examples below to aid your thinking.
- Be realistic about the issues that will be faced in the story; the more realistic they are, the more useful they will be for anticipating real challenges.
- Use this graphic organizer's guiding questions to help record key elements of the story as you go. It is broken down into "bursts" of PDSA tests. Use these to describe multiple consecutive tests of a similar scale and in a similar context. When the scale increases, testing moves to a new context, or the change idea(s) is modified, you should record this as a new burst.
- Don't skimp on the details; they will make your story more compelling when you share.

Example issues that schools may face/overcome as they scale up a practice:

- Adapting to new content areas or grade levels
- Finding time, or unrealistic timeframes
- Challenges collecting data for measuring progress
- Communicating the importance of the change
- Managing testing outside the improvement team
- Adapting to diverse needs of different students
- Investing others in the work
- Feasibility for early-career teachers
- Alignment with other school programs
- Involving or informing parents
- Managing skill transfer to other teachers
- Alignment with other leadership priorities

Change Idea	Aim

PDSA Burst #1

Describe the change in scale or context (e.g., new classroom, different grade, different subject, etc.)	How many tests will happen in this burst?
Will it succeed? Will it fail? Why?	
What refinements will you make? Will you pivot in a new direction? Where will you go next?	

continued on next page

Activity: Scaling Pre-Mortem *page 6*

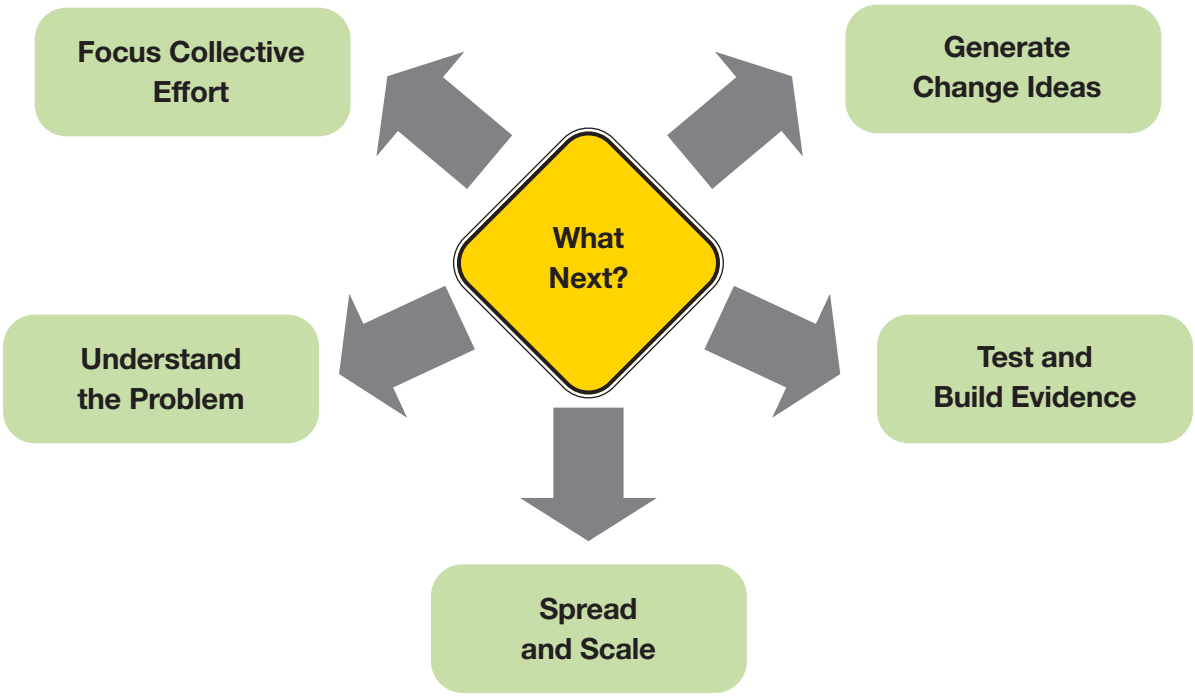
PDSA Burst #_____

Describe the change in scale or context (e.g., new classroom, different grade, different subject, etc.) *Include any refinements to the change idea!*	How many tests will happen in this burst?
Will it succeed? Will it fail? Why?	
What refinements will you make? Will you pivot in a new direction? Where will you go next?	

PDSA Burst #_____

Describe the change in scale or context (e.g., new classroom, different grade, different subject, etc.) *Include any refinements to the change idea!*	How many tests will happen in this burst?
Will it succeed? Will it fail? Why?	
What refinements will you make? Will you pivot in a new direction? Where will you go next?	

Tool: "What Next?" Leadership Reflection



Adapted from the Carnegie Foundation for the Advancement of Teaching

Overview

The improvement process is rarely linear and predictable, and there are often moments over the course of a school's improvement journey when doubts emerge about what to do next. To help leaders of an improvement team navigate these moments, this tool lays out common challenges and a menu of possible action steps to meet those challenges. Leaders of the improvement team should use this tool as a guide for their own thinking as they weigh their options for what to do next.

When to Use

- At natural pause points in the school year, such as just before or after major school holidays and breaks
- When the changes you are testing plateau or run out of steam
- When you learn something that raises questions about the work
- When you want to renew team members' engagement with the work

continued on next page

How to Use

This tool lays out five broad directions for taking the work, each containing tips on when this direction may be appropriate and details of what next steps could look like. Team leaders, either independently or with members of their team, should take a moment to reflect on where they are, then read through the proposed action steps. By comparing available options and turning these into a shortlist, team leaders will be better equipped to make the right decision for their teams.

Step 1: Self-Assess

Before deciding what your team's next move should be, it is important to take a moment to make sure you are clear on exactly why you are feeling stuck in the first place. Take a moment to recall the steps and the decisions that have brought you here. Using the guiding questions below to help:

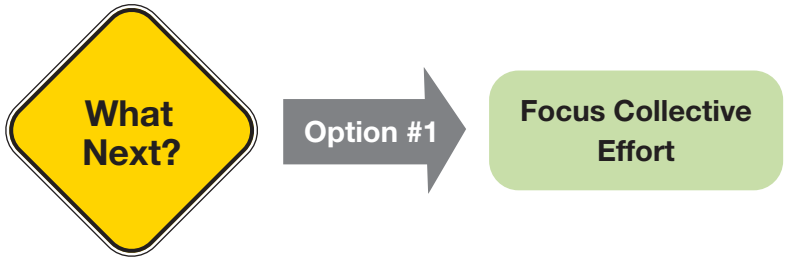
- What is the state of our work? Where did we start and where are we now?
- What are the needs of our team?
- What aspect of the work feels stuck, and what have we tried to get unstuck?
- When we think about the path that exists between us and the accomplishment of our aim, what parts of that path feel most unclear or challenging?

After thinking about these questions, read through the five options described in Step 2 of the tool. Make notes of the choices that seem like the best fit for your team and the place you find yourselves. When you are finished, feel free to use the guiding questions in Step 3 to help you action plan.

Notes:

continued on next page

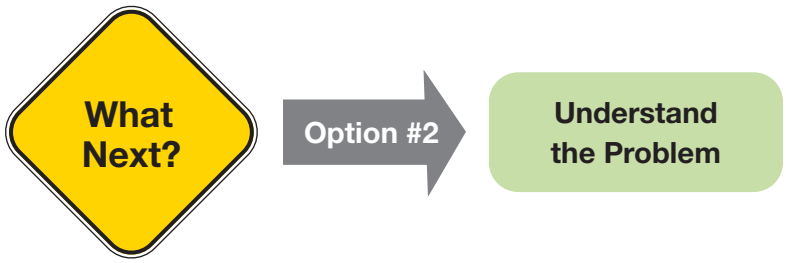
Step 2: Explore Your Options



Every so often, it is important to step back from your work on the problem itself to spend some time on the process you are following and the people who are doing the work. Make time to talk about long-term goals, uncover and discuss problems, get on the same page about the current direction, or modify the way you hold meetings, share documents, and support each other. Benefits include renewing buy-in and agency in team members, and increased clarity and efficiency in future work.

When this is helpful:	How to do it:
• We've lost sight of the forest for the trees! • The team isn't as motivated as it was a couple months ago! • The team is divided about which direction they want to go! • Winter/summer/spring break is coming up, and we aren't sure how to keep up momentum!	Assess long-term progress. • Review data, the documents you have created, and the decisions you made along the way. Lean on the experience of your team. Try to understand the trajectory of your work thus far and your team's needs going forward. Have a team reflection meeting. • Collect the team's honest impressions about what they have accomplished, the challenges they have encountered, and what they have learned. A structured share-out is a great way to address any underlying issues and renew buy-in. Collect stakeholders' input. • Incorporate multiple perspectives to broaden your thinking, check your assumptions, and generate new ideas.

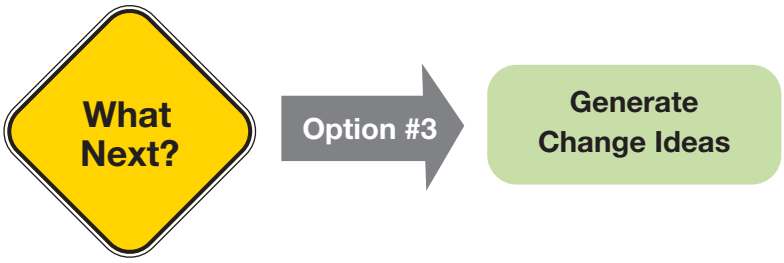
continued on next page



When trying to solve complex, layered problems, it is inevitable that you will encounter parts of the problem that you didn't predict or know deeply. Stepping back to learn more is not an admission of defeat; it is a step toward better and more comprehensive solutions. Embrace the improvement ethos that says "our understanding of the problem is definitely incomplete and possibly wrong" by continuing to study your problem.

When this is helpful:	How to do it:
• Our change ideas aren't producing any real impact. • Our change ideas had a lot of impact initially, but we have hit a plateau. • We were surprised by the results of a test; we think something else is going on here and want to learn more.	Analyze problem using different tool. • See Chapter 1 for more tools to investigate the problem from a different angle. Investigate the variation among students. • Consider the individual students or groups of students that your current approach isn't helping. Look also at the students who are succeeding and compare. Try and explain the difference. • Don't guess at why students struggle, ask them! Student perspectives can uncover parts of their experience you may have overlooked; see the *Empathy Mapping* tool in Chapter 1. Consult experts or do "desk research." • Chances are you are not the first people to face this problem. Take some time to read about what others have done. • Be picky. Choose to invest your time in resources that match your school's particular needs.

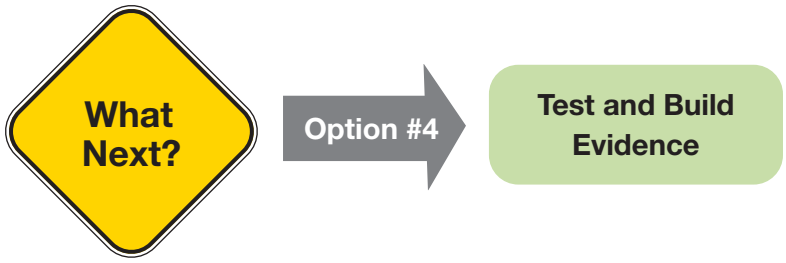
continued on next page



Sometimes we run out of momentum because we are too invested in our current approach to follow our instincts and try something new. Take advantage of the agility that testing small changes affords you and turn your team's current best ideas into changes that you can start testing.

When this is helpful:	How to do it:
• Our change idea is too small and its impact seems insignificant. • We are uncovering lots of connected problems and don't know what to prioritize. • We've uncovered something interesting that may unlock future improvement.	Review theory of improvement and learning (PDSA forms). • You will have learned a lot about your problem by trying to change it. Update your fishbone or driver diagram with your team to see how your thinking has changed. This is often enough to spark ideas about next steps. See Chapter 2. Research approaches used by others. • You don't have to invent it all yourselves. Ask your peers, consult the research, read a book, or look into professional development offerings. Brainstorm and select change ideas to try. • Turn your deeper understanding into action steps. Gather stakeholders and brainstorm change ideas you can test.

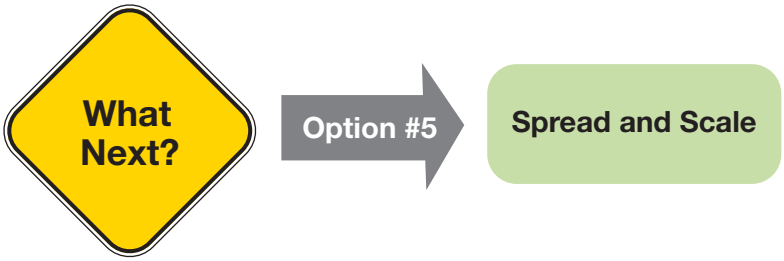
continued on next page



Kurt Lewin said that "if you want truly to understand something, try to change it." Methodically testing your best ideas is the core of improvement and puts you in a win-win situation. Either your idea succeeds and you've helped your students, or your idea fails and you've created a valuable learning opportunity for you and your team. Testing also increases teacher agency and can cut back on whole-team planning meetings by shifting the work toward execution and reflection on what happened.

When this is helpful:	How to do it:
• I'm not sure if our change ideas are working. • We have tons of change ideas and can't choose among them. • We've got (testing/parent-teacher conferences/observations/etc.) coming up, and we don't have time to spare.	Collect evidence of the change's effectiveness. • Explore how, for whom, and under what conditions a change is working. Use the evidence and insight that comes with it to determine next steps. • Dedicate fewer meetings to talking about the problem and give agency to teachers to start testing changes to solve it. Optimize a practice through PDSA tests. • Continue gaining experience with and refining a change idea. Make sure it works consistently before scaling or moving on. Improve data collection to build confidence in your change idea. • Work on measuring your impact using the tools in Chapter 4.

continued on next page



You've got something that works! That's the best kind of problem to have, but it can still be daunting. Turning a promising practice into a polished and vetted school-wide approach takes time and work. Take it step-by-step to give yourself time to test in different contexts, give others the time to learn, and develop your own expertise to scale your practice effectively across your school community.

When this is helpful:	How to do it:
• Our change ideas have produced a breakthrough and we don't know where to go with it. • Our change idea is working where we've tested it, but it might be a fluke. • The team members have all made progress; now it's time to share the practice with others.	Test in different contexts. • Use the PDSA testing process to see if your successful changes work outside of the initial proving grounds. See Chapter 5. Simplify before sharing. • Distinguish critical components from useful adaptations. Learn which parts of your practice are optional and simplify. The more simply your hard-won expertise can be expressed, the easier it is to spread to others! Tell your story! • Everyone loves to hear a success story. If you've got one, write it up! Working as a team to craft a narrative about the successes you have created is a great way to celebrate your efforts, and will help you spread your success and sustain it over time. See Chapter 5.

continued on next page

Step 3: Action Plan

Once you have completed Step 2 and selected a few options that feel right for your team, use the following guiding questions to think through next steps:

- Which of these steps most closely lines up with my team's most pressing needs?
- What resources (handbook or outside resources) can help?
- Who should be involved in the decision? How should I present the options/decision to the team?
- What are next steps for me as team leader? What are next steps for the team?

Notes:

Storytelling Toolkit

"Storytelling is the most powerful way to put ideas into the world."

—*Robert McKee*

"Stories are memory aids, instruction manuals, and moral compasses."

—*Alex Krotoski*

"A good story cannot be devised; it has to be distilled."

—*Raymond Chandler*

Purpose of Storytelling

As the changes you are carrying out in your school begin to grow beyond their initial testing grounds, a subtle shift in the work tends to occur. Now that you have started to spread the good ideas you have developed, the people who will be carrying them out begin to matter as much as the ideas themselves. As this shift occurs, the stories you tell about your work will become an invaluable tool for keeping the work going and growing. Stories are valuable to improvement work because they:

- memorialize the work and experiences of your team and the students you are supporting.
- efficiently convey the purpose and trajectory of the work to others.
- support cross-school collaboration and sharing.
- package and share your change ideas with others.
- perpetuate elements of your school's working culture and knowledge over time.

Purpose of This Tool

Any writer will tell you that a blank page can be an intimidating thing. This tool provides steps, advice, and guiding questions to support you in preparing to tell the story of your improvement team's work. In sharing a story, you will be representing your team and the broader school community. This tool provides guidance on incorporating your team's viewpoints in order to make the story you tell a collective one, and to craft a story that effectively communicates to your desired audience, whether they be teachers within your building or at other schools, parents in your community, colleagues that you work with directly, or educators from across the country.

continued on next page

When to Use This Tool

A good time to think about starting work on your team's story is either after you have created a successful change that has been scaled and adopted as an ongoing practice within your school, or after your work has led to a discovery or shift in your team's thinking about your students or the problem. Natural pause points, such as the end of a school year or before an event where you will share your work, are also good times to use to think about storytelling.

Step 1: Reflection

The work of your improvement team has likely taken several twists and turns and is full of detail and nuance. All of this can be invaluable to telling your story, but too much of it can be superfluous and distracting, depending on the audience(s) and overall message you want to get across. Taking the time to reflect on everything that has happened as well as the goals of your storytelling is a critical first step.

Decide How to Include Your Team

The writing of your story can be an individual or a group process, but the story of the efforts of a group of educators should include the input of all of its members. The perspectives of different members of your team will enrich the story, and participation in the process will build ownership among your team members, amplifying its value for them. Be careful to balance inclusivity with the efficiency of the process, so you don't wind up with "too many cooks in the kitchen" when it comes to key decisions about what to include or cut.

Using the following list of suggested approaches as starting points, take a moment to decide how you want to include your colleagues in the crafting of your story.

1. Start by reflecting on your work as a group. Review any artifacts you created along the way. As a group, discuss things that made you proud, things you learned, challenges you faced, and lessons to carry forward.
2. Reflect along the way. If you don't have an immediate deadline, it can help to have periodic check-ins to compile ideas organically as they occur over time.
3. Ask team members how they already describe the work when they speak of it with others or with each other. You can also task team members to come up with 30-to-60-second "pitches" to share and use as fodder.
4. Create a working group to represent your team or school, and use the rest of the team to provide feedback.

Choose from these approaches, mix elements from more than one, or come up with your own approach. Make your decision based on your knowledge of your team and your school.

continued on next page

Reflect Using Guiding Questions

It is much easier to make big decisions, solicit feedback, and refine your story before you put pen to paper to start writing. Critical decisions about the intended audience and overarching message will determine the shape and content of the rest. Use the following guiding questions, alone or with team members, to reflect on your trajectory before writing:

- Reflect on where you started and where you are now. What has changed?
  - Why were you tackling this problem in the first place? What sparked this effort?
- What have you learned?
  - About the problem you are facing?
  - About your students and their needs?
  - Were any assumptions challenged?
- What progress has been made?
  - For whom has the progress been greatest?
  - What artifacts/evidence best capture progress?
  - What remains challenging or unfinished?
- What was the experience of doing this work?
  - For team members and teachers?
  - How did students experience this? What have they told you?
  - Has the improvement science process contributed anything new to school culture?
- Who is the audience of your storytelling?
  - What is the most useful for them to hear?
  - What context do they need to understand it?
- Do you want your audience to adopt a practice you have developed?
  - What are the critical steps?
  - What tools or artifacts do they need to do so?

Step 2: Documenting Your Story

Decide What Form Your Story Is Going to Take

Once you have finished reflecting on your journey, shared your ideas with your team and school leadership, and settled on your story's essential elements, it is time to think about the form the story will take. Think about your audience(s), your time and resources, and the skill set of your team as you decide on a format. Common choices include written case studies, PowerPoint presentations, videos, or posters.

continued on next page

Choose from the Following Story Components

Review the following list of suggested components to include in your story, and pick and choose the ones that enable you to best convey the message you have chosen to the audiences you have in mind:

- ☐ **School introduction:** Help your audience orient themselves by telling them a little about your school and improvement team.
- ☐ **Problem:** What is the problem, or the corner of the problem, you are tackling? Make a case for why it is worth spending time on.
- ☐ **Single student vignette:** Use a single student to be the exemplar of both the challenge and the progress you have made. A portrait of one student can quickly bring your story to life.
- ☐ **Change idea(s):** Describe one change (or complementary changes) that has been successful or led to key learning.
- ☐ **Impact so far:** Describe the goals you have met. What are the indicators you can point at to show progress?
- ☐ **Data display:** Display just one piece of data that helps tell your story. One chart or graph is the perfect complement.
- ☐ **Measures:** Share your measurement strategy. It reveals how you define progress and helps others learn from your example.
- ☐ **Rationale (or theory):** You may want to position this piece of the work within a larger project. Show the driver diagram, or specific pieces of it, like a single row.
- ☐ **A how-to guide** with two separate parts: Like any good lesson plan, it should balance concise instructions with important nuance. Taking the time to separate these is critical to making it usable to other educators!
  - ○ **Steps and guidelines:** These are a handful of necessary steps. There are the core elements that are always used.
  - ○ **Common pitfalls and potential adaptations:** These are the optional tips and tricks you have learned through implementation. Think of this as advice from a "helpful teacher down the hall."
- ☐ **Protocols/rubrics/tools:** Share the documents you have created so that others can try your change idea themselves.
- ☐ **What you want to learn next:** Improvement is ongoing. Where has this experience led you? What are the next steps?

Step 3: Revise, Revise, Revise

- Revision is an essential part of storytelling; nobody publishes a first draft! Ask a member of the team or a teacher down the hall for suggestions. Revise for clarity, then ask again.
- Remove any identifying student information such as names or individual characteristics.
- Finally, make sure you get approval for the final version from your principal.

NYC Department of Education

Continuous Learning

Improvement Science

HANDBOOK