

Continuous Improvement in Education: A Toolkit for Schools and Districts

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Continuous Improvement in Education: A Toolkit for Schools and Districts

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This toolkit is designed to help school- and district-based practitioners engage in a continuous improvement effort. It provides an overview of continuous improvement and focuses on the Plan-Do-Study-Act cycle. It includes tools and resources that practitioners can use to implement a continuous improvement effort in their own schools, districts, or agencies.

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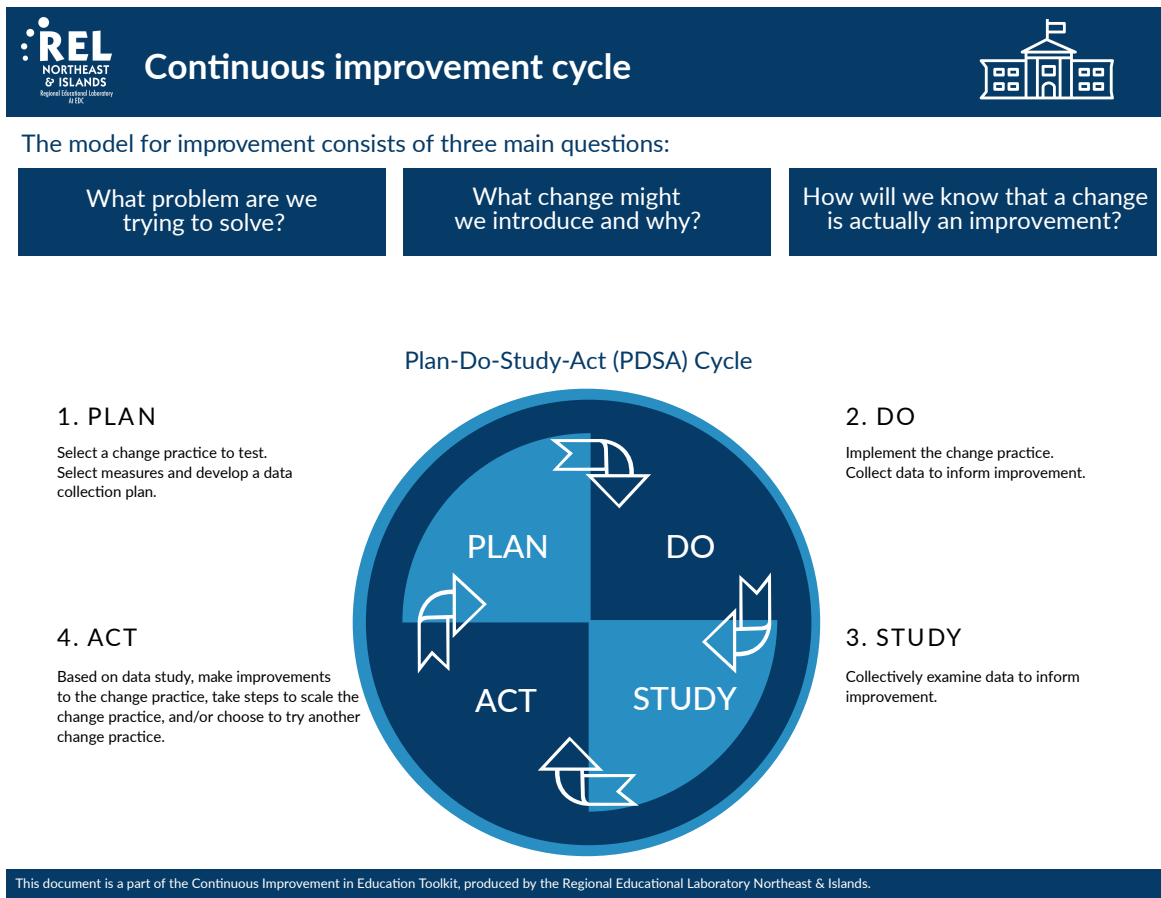
INTRODUCTION TO THE TOOLKIT

Continuous improvement is based on the principles that making sustainable change takes time and involves collective effort; is context specific; and requires constant adaptation, data collection, and learning (Bessant & Caffyn, 1997; Bhuiyan & Baghel, 2005; Langley, Moen, Nolan, Nolan, & Norman, 2009). Continuous improvement engages key players in a system to focus on a specific problem of practice and, through a series of iterative cycles, identify and test change practices (new approaches, tools, or strategies used to address the problem), make predictions, collect data about the change practices, and study the potential influence of those change practices on outcomes of interest (figure 1; Bryk, Gomez, Grunow, & LeMahieu, 2015). Through these cycles the members of the system build their capacity to test proposed change practices; refine those change practices based on evidence; and increase the scale, scope, and spread of a change practice over time (Langley et al., 2009).

Continuous improvement is premised on three core principles about how sustainable change is achieved:

- Change takes time and involves collective effort (Bryk et al., 2015; Katz, Earl, & Jaafar, 2009).
- Change is context-specific and therefore requires constant adaptation, data collection, and learning (Bryk et al., 2015).
- Focusing on a series of small changes, combined with ongoing evidence collection and review, can lead to large-scale change (Derrick-Mills, Sandstrom, Pettijohn, Fyffe, & Koulish, 2014; Hawley, 2006; Park, Hironaka, Carver, & Nordstrum, 2013; Snow, Dismuke, Zenkert, & Loffer, 2017).

Figure 1. The continuous improvement effort



Source: Authors' creation.

This toolkit is designed to orient school principals, district staff, teachers, and other practitioners to the principles and practices of continuous improvement. It draws on the Model for Improvement (Langley et al., 2009) and employs Plan-Do-Study-Act (PDSA) cycles to implement and test change practices. The overarching goals of the toolkit are to:

- Build the capacity of education practitioners to use continuous improvement as a systematic approach for identifying areas for improvement, implementing intended improvements, collecting data related to implementation, studying those data, and using the evidence in decisionmaking.
- Provide accessible, practitioner-friendly guidance and tools to help education practitioners apply continuous improvement in their schools or school districts.

It is not designed as a facilitator’s guide but is meant to be available in its entirety to everyone participating in the improvement effort.

Intended users

This toolkit is intended for a team of education practitioners (an Improvement Team) to use throughout a continuous improvement effort. Additional users might include state-level education agency staff who are leading a continuous improvement effort with a group of schools or districts or in their own organization. The Improvement Team may include as few as three practitioners or as many as a dozen. If the team is much larger, engaging in productive conversations can become difficult. But there is no hard and fast rule about the right number of participants, and users can adapt the practices in the toolkit to meet the needs of different group sizes and contexts. Other key participants may include individuals who have knowledge of the school’s or district’s data and familiarity with how to display and use those data, as well as individuals with content knowledge who can provide expertise on the topic of interest. However, a content expert is not necessary for the team to begin its work. Rather, the appropriate expertise may be accessed once the team decides what to focus on. Part I provides more detail about the roles and responsibilities of Improvement Team members.

Why continuous improvement?

The continuous improvement processes described in this toolkit can help education practitioners agree on specific challenges they face, identify change practices that can address those challenges, implement those change practices, study their implementation and outcomes, and decide whether the change practices are worthwhile and should be implemented or scaled up in their specific contexts. Most of the continuous improvement methods in use today stem from work by W. Edward Deming and others in industry in the mid-20th century (Deming, 1993) and remain prevalent in manufacturing and other industries to improve products, processes, and services (Bhuiyan & Baghel, 2005). Continuous improvement approaches have also been widely used in healthcare for decades (Berwick, 1989; Kenney, 2008; Marjoua & Bozic, 2012). More recently, education and human service areas such as child welfare, education, early care and education, behavioral health, and public health have turned to continuous improvement approaches to improve outcomes for children, families, and adults (Derrick-Mills, 2015; Fryer, Antony, & Douglas, 2007; National Child Welfare Resource Center for Organizational Improvement and Casey Family Programs, 2005; U.S. Department of Health and Human Services, 2011). In education, improvement science has been used, for example, to improve college credit accumulation in math and to reduce teacher turnover (Bryk et al., 2015).

The value of continuous improvement—and the challenges and limitations

While continuous improvement holds promise for supporting change in education, there is limited empirical evidence on the outcomes of continuous improvement in education. However, a few studies have attempted to examine the relationship between continuous improvement approaches, such as the PDSA cycle, and outcomes in medicine. One such study, a randomized controlled trial conducted in primary care facilities in the Netherlands, found that facilities that employed continuous improvement practices undertook and achieved more of their own improvement goals than did facilities that did not use the same systematic processes (Engels et al., 2006). This is a positive finding, but more rigorous research is needed that examines the efficacy of the approach in general and specifically in improving outcomes for schools and students.

A review of 73 empirical studies in medicine found that the research on continuous improvement reveals more about the lack of fidelity to formal continuous improvement approaches than about the outcomes of continuous improvement efforts themselves (Taylor et al., 2013). Only 47 of the studies documented the continuous improvement process in enough detail to warrant analysis, and only 20 percent of those documented multiple cycles of iterative change. The review concluded that key principles of the PDSA cycles are rarely adhered to and that there is much room for improvement in applying and using that process.

The review and other research suggest that across disciplines the success of continuous improvement efforts depends on several factors: organizational leadership that understands how to integrate continuous improvement across multiple levels (Robbins & Finley, 1995; Shortell, Bennett, & Byck, 1998), effective process management and staff engagement (Fryer et al., 2007), training and resources focused on disciplined approaches to implementation and learning by doing (Bryk et al., 2015), and increased commitment and capacity to regularly collect and use data (Derrick-Mills et al., 2014; Langley et al., 2009).

Overview of the toolkit

Part I of this toolkit provides guidance for the Continuous Improvement (CI) leader and steps to take before embarking on a continuous improvement effort. Part II provides content (readings, tools and templates, and videos) for a series of meetings that guide an Improvement Team through the process of identifying a common problem, generating a series of evidence-based change practices to test and study, testing those change practices, collecting and analyzing data, and reflecting on and using evidence to identify next steps.

How the toolkit should be used

Rather than reading the entire toolkit before the process begins, the Improvement Team should progress through the toolkit during implementation of a continuous improvement effort. It is useful to have a leader to guide the group and ensure that the appropriate materials and content are available for each meeting. The leader can be a principal, an administrator, a curriculum coordinator, a school counselor, a teacher, or any another team member. This person is referred to as the “CI leader,” but tasks designated to the CI leader can be completed by another member or members of the team. It is also possible for multiple people to share the CI leader role. The CI leader—along with a core group of participants, which may include a school leader, a teacher leader, and possibly one or two additional stakeholders—should read and engage in Part I and develop a familiarity with the process described in Part II before bringing together the team. The content of Part I, which consists of five steps described below, is designed to ensure that the key stakeholders are ready to engage in the continuous improvement effort, that all relevant stakeholders are engaged, and that barriers to success are addressed before embarking on the

effort. The activities are designed for the core group, including the CI leader and select other participants, after it has considered the school's, district's, or organization's readiness to follow through on a continuous improvement effort.

Part II is designed so that Improvement Team members read the appropriate information as they proceed through the continuous improvement effort together, meeting by meeting. The meetings guide the team through the continuous improvement effort and a series of PDSA cycles. Each meeting is presented in a similar way: a list of what team members need to do to prepare for the meeting, a list of materials needed for the meeting, a pre-meeting reading, a proposed meeting agenda, details of the meeting activities, and suggested next steps. Most meetings should last approximately 90 minutes; two meetings should last approximately 120 minutes.

The toolkit provides a step-by-step process for an Improvement Team to follow over the course of the school year, beginning in the summer and continuing until the end of the school year. However, when the process begins is flexible, as is how long it lasts. The toolkit offers some guidance about the calendar and the number of meetings, but these are recommendations, not requirements. In general, the team should use the toolkit as is appropriate to its needs.

Grove Elementary School example case

The fictional Grove Elementary School is used as an example case throughout the toolkit to illustrate key points. It provides the context for completed examples of several activities, such as the fishbone diagram template and the PDSA planning template. The case is described in the pre-meeting reading for Meeting 1 and Meeting 2 and through video and activities. Meeting 1 also presents other scenarios that demonstrate how continuous improvement might be relevant in different contexts and with different problems.

Videos

There are five videos that accompany the toolkit. Links to these videos are provided in the toolkit. Each video is three to four minutes long and is designed to be used during the meetings to prompt the group during an activity or to initiate a discussion on a specific topic. The videos integrate the Grove Elementary School example case referenced above.

Additional tools

The toolkit includes 10 templates and flow charts to help practitioners engage in continuous improvement. These are a template for a continuous improvement calendar; an infographic of the continuous improvement effort; a fishbone diagram template and completed example; a driver diagram template and completed example; a PDSA planning tool template and completed example; an Excel-based run chart template to support the presentation of data; an adapt, adopt, or abandon flow chart to guide decisions about next steps in implementing change practices; a template for outlining a change practice; a template for communicating about a change practice and a completed example; and a template for implementation planning. These materials are provided as screenshots in the toolkit and are available for download at <https://ies.ed.gov/ncee/edlabs/projects/project.asp?projectID=4591>.

PART I. PLANNING A CONTINUOUS IMPROVEMENT EFFORT

Before an Improvement Team comes together to embark on a continuous improvement effort, it is important for the CI leader, along with a few other core participants, to preview the content of the toolkit and to have a general understanding of the elements of continuous improvement and Plan-Do-Study-Act (PDSA) cycles. This section outlines five steps for the CI leader and the few additional core participants to take before the first meeting:

- Step 1: Assess the school’s or district’s readiness to engage in a continuous improvement effort.
- Step 2: Determine the overall focus of the continuous improvement effort.
- Step 3: Recruit Improvement Team members.
- Step 4: Identify Improvement Team member roles and responsibilities.
- Step 5: Plan the Improvement Team calendar.

Steps 1–3 may happen more or less concurrently. They are described here as discrete steps, but they inform one another. For example, while assessing the readiness of the school or district is necessary before moving forward, the CI leader will have likely identified a focus while assessing readiness. The main idea is to engage in the preparations described here before the first meeting.

Materials needed

- Handout 1—Checklist for assessing readiness for a continuous improvement effort* (p. I-5)
- Handout 2—Preliminary data inventory worksheet* (p. I-8)
- Handout 3—Checklist for recruiting Improvement Team members* (p. I-11)
- Handout 4—Improvement Team member roles and responsibilities* (p. I-13)
- Handout 5—Continuous improvement calendar* (p. I-16 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf)
- Handout 6—The continuous improvement cycle* (p. I-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout6_CI-cycle.pdf)

Step 1. Assess the school's or district's readiness to engage in a continuous improvement effort

To build the foundation for a continuous improvement effort, it is important to take stock of school or district resources and of educators' readiness to make meaningful improvement toward achieving the goal and identify where capacity needs to be built. This step should be conducted by the CI leader but should involve other stakeholders, such as relevant school and teacher leaders. Readiness should be assessed using the following seven questions, which are also described in *Handout 1—Checklist for assessing readiness for a continuous improvement effort* (p. I-5).

Is there broad agreement on the need to change practice in the school or district?

Broad agreement or critical mass on the need for change is necessary to create momentum for a continuous improvement effort. In one school a critical mass may mean that almost all the veteran teachers agree on a focus that provides impetus for the rest of the staff to get on board. In another school it may be just the principal, assistant principals, and instructional coaches who need to agree. The specific climate of the school will determine who needs to be on board for the continuous improvement effort to be successful.

Are there enough ideas about how to respond to the need for change?

Agreeing that change is needed is important but not sufficient to ensure readiness. It is also important for participants to have ideas about how to respond to the need for change. Have school leaders and teachers discussed the issue or problem previously, and do they have ideas about how to address the issue, based on research or knowledge of successful efforts elsewhere? Have the right participants engaged in those discussions? While the Improvement Team will identify practices or processes to implement as part of its formal process, it is useful to take some time during the planning phase to ensure that there are relevant ideas, practices, or processes to draw on in developing the practices the Improvement Team will implement as part of the continuous improvement effort.

Does the school or district have a culture of collaboration, learning, and change?

Ask these questions about the school's or school district's culture:

- *How does the work get done (or not get done) in the school or district?* Some schools and districts are very top-down in management style, while others use teacher teams and teacher leaders to engage in distributed leadership. Structures that enable staff to work together and foster a culture of collaboration are important for a successful continuous improvement effort.
- *What are the prevailing attitudes toward change?* Attitudes about change can range from fatigue and apathy, resulting from constant change and efforts that do not deliver results, to empowerment and interest in pursuing new ideas. For a continuous improvement effort to succeed, participants should be open to examining a problem from different angles and be willing to change practices to address the problem.

While a school or district culture that already supports collaborative work can contribute to the potential for success of a continuous improvement effort, engaging in continuous improvement can also help build the kind of collaborative culture described here.

Does the leadership support the continuous improvement effort?

The types of leadership support that are needed vary depending on the situation. If the CI leader is a teacher, assessing leadership support likely requires talking to a principal or administrator. If the CI leader is a principal, leadership support from the district office may be necessary. When assessing leadership support, consider not only general encouragement to engage in the continuous improvement effort but also more concrete support. Are relevant leaders prepared to provide the resources necessary for the effort to be successful? For example, will they not only encourage the work but also provide the staff time necessary to implement the effort? See below for more on the types of resources needed.

Are there adequate resources to support the continuous improvement effort?

The Improvement Team will need resources to engage in the continuous improvement effort. Key resources are time to fully engage in the process and money or other resources related to supplies and staffing. This may include time on the professional development calendar; space for the Improvement Team to work; and schedule flexibility to allow team members to visit one another's classrooms, secure substitutes, or engage in other work beyond the traditional scope of their day-to-day responsibilities. In the absence of adequate resources, school or district practitioners who are interested in implementing a continuous improvement effort, particularly those with authority to reallocate resources, should work toward creating the structures or systems needed to engage in continuous improvement.

Do potential Improvement Team members have basic data literacy skills, and are appropriate data available or accessible?

Collecting, reviewing, interpreting, and acting on data are integral parts of continuous improvement. Assess potential Improvement Team members' skills, experience, and confidence in collecting, examining, and using data, then determine whether training or practice opportunities are needed to build their data literacy skills. Sources of data and uses of data are covered in detail later in this toolkit. Focus on the availability of data that the team will collect later rather than on the data themselves. Step 2 provides more information on conducting an inventory of available data.

What are potential barriers to successful implementation of the continuous improvement effort?

Take stock of the anticipated or possible barriers to change that exist in the school or district. It is important to anticipate the organizational, social, and resource obstacles that the Improvement Team may encounter throughout the process so that it can take these factors into account as it moves forward with the continuous improvement effort.

Use *Handout 1—Checklist for assessing readiness for a continuous improvement effort* (see next page) to help determine whether the school or district is prepared to engage in a continuous improvement effort and to identify where capacity needs to be built to fully benefit from the work.

How ready is the Improvement Team to engage with data?

Data literacy is a collection of skills and knowledge for working with data to inform decisionmaking. Data literacy includes effectively collecting, organizing, presenting, interpreting, summarizing, and critiquing data in ways that result in actionable understanding (Gummer & Mandinach, 2015; Mandinach & Gummer, 2013).

Consider what skills the team has in data terminology, data context (that is, who, when, and how data are collected), and critical data review. If they need to develop additional skills, consider including selections from the following resources as homework before or between meetings:

Bocala, C., Henry, S. F., Mundry, S., & Morgan, C. (2014). *Practitioner data use in schools: Workshop toolkit* (REL 2015–043). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands.

McEwan, E. K., & McEwan, P. J. (2003). *Making sense of research: What's good, what's not, and how to tell the difference*. Thousand Oaks, CA: Corwin Press.

Popham, W. J. (2010). *Everything school leaders need to know about assessment*. Thousand Oaks, CA: Corwin Press.

Handout 1. Checklist for assessing readiness for a continuous improvement effort

Use this checklist to help determine whether your school or district is prepared to begin a continuous improvement effort and what you may need in order to get ready. Mark each checkbox where you and, if appropriate, other relevant stakeholders agree that your school or district meets the criterion. Consider convening a small group to discuss and assess readiness according to these seven criteria. If a few boxes remain unchecked, focus on building readiness in these areas either prior to convening the Improvement Team or as the team’s first tasks. If many boxes remain unchecked, work with relevant stakeholders to build readiness prior to beginning a continuous improvement effort. As you consider the readiness topics, keep these questions in mind and take notes as appropriate: On what evidence can we base these answers? What additional information do we need to collect? How might we adjust our resources, culture, timeline, approach, or activities to increase readiness?

- Broad agreement on the need to change practice in your school or district
 - There have been discussions in the school or district about the overall focus.
 - A critical mass of people agree that change is necessary to address the overall focus.
- Enough ideas about how to respond to the need for change
 - Participants have ideas about how to respond to the issue or problem that has been identified.
 - There are examples of practices and processes, from research or knowledge of successful efforts elsewhere, that may be applicable to address the issue or problem.
- School or district culture of collaboration, learning, and change
 - Structures are in place for staff to collaborate in the school, or a culture of collaboration exists.
 - There is a culture of learning and openness to change.
 - There is interest and willingness among participants to engage in continuous improvement.
- Leadership support for the continuous improvement effort
 - The principal or other school or district leaders are aware of the proposed continuous improvement effort.
 - Leadership is willing to provide time and space for the Improvement Team to engage in the continuous improvement effort.
- Adequate resources to support the continuous improvement effort
 - Resources have been identified (such as release time, meeting space, or personnel).
 - Improvement Team members’ schedules allow for meeting and working on the continuous improvement effort.

Resources needed: _____

- Basic data literacy skills of potential Improvement Team members and availability and accessibility of appropriate data
 - Sufficient data on the overall focus can be collected.
 - The Improvement Team is comfortable and experienced working with data.
- Potential barriers to successful implementation of the continuous improvement effort
 - Barriers that might hinder the continuous improvement process: _____

Notes: _____

Step 2. Determine the overall focus of the continuous improvement effort

Before building an Improvement Team to engage in a continuous improvement effort, it is important to identify a general issue, or overall focus, for the work. Educators using this toolkit probably have particular interests or concerns that they believe are appropriate to address through a continuous improvement effort. Because engaging in continuous improvement processes can be time consuming, having an overall focus from the beginning will help the team move forward with the continuous improvement effort and get to implementing the change practices more quickly. An example of an overall focus is math achievement or school climate. The overall focus helps direct and define the continuous improvement effort but is not too specific or narrow a problem and related aim, both of which the team will define in early meetings. The overall focus also helps determine the appropriate people to include on the team, such as a district math coach if the overall focus will be math achievement.

Two elements are important in determining the overall focus: examining relevant data and soliciting input from multiple stakeholders.

Examining relevant data

A CI leader and core team considering implementing a continuous improvement effort likely already have an idea for an overall focus, which has led them to consider continuous improvement. For example, the CI leader and core team may derive the initial focus based on the school or district strategic plan, goals, or prior issues. They may have already looked at data that have informed the determination of an overall focus. However, the continuous improvement effort should be guided by data, so the CI leader and core team should take time to identify and examine relevant data that will help define the overall focus of the continuous improvement effort. It may be useful to conduct a preliminary data inventory (see *Handout 2—Preliminary data inventory worksheet* on p. 1-8) to identify existing data related to the overall focus of the continuous improvement effort. Having a preliminary understanding of existing data as well as of the baseline from which the Improvement Team will be working, such as the percentage of students who score proficient on a state assessment or the average number of student absences each month, will help in defining and communicating the overall focus.

There will be more opportunities to collect and examine data after the first meeting, but at this point in the process the goal is for the CI leader to be able to prepare a brief statement (a few sentences) about the overall focus of the continuous improvement effort to share with potential members of the Improvement Team as part of the recruitment process. Once the team begins to meet, the issue to address will become more specific, as the team discusses the overall focus and reviews relevant data. Below is an example of a brief statement related to the Grove Elementary School example case. The overall focus does not need to reference specific data, but the statement should be grounded in data; in other words the CI leader should be able to back up the statement based on the initial review of the data. These data will be important as the team crafts the problem and sets the aim. In addition, the data will be important in determining whether the changes the team implements yield improvements related to the problem or issue they have identified. However at this stage, identifying elementary math achievement as the issue to address is enough for recruiting team members.

OVERALL FOCUS FOR GROVE ELEMENTARY SCHOOL: Student achievement in elementary math is an area of concern, based on recent state achievement results. Our continuous improvement effort will focus on this issue.

Soliciting input from multiple stakeholders

The CI leader should also engage in conversations with key stakeholders who represent multiple perspectives. These conversations will help the CI leader discern readiness to engage in continuous improvement and ensure that enthusiasm and potential for change exist for the overall focus. For example, when speaking to teachers about elementary math achievement, the CI leader may discover that teachers believe the issue is related to the implementation of a new math curriculum and the teachers' and students' capacity to engage with it. This discovery may lead the Improvement Team to define the overall focus more specifically on the math curriculum while keeping the state assessment results an outcome of interest.

Complete *Handout 2—Preliminary data inventory worksheet* (see next page) to identify existing data related to the overall focus of the continuous improvement effort.

Handout 2. Preliminary data inventory worksheet

Use the worksheet on the next page to list sources of data that you currently have access to or that you wish to have access to in order to identify the overall focus of the continuous improvement effort and to support further data review with the Improvement Team. Consider a variety of data sources, such as:

- *Standardized assessments.* For example, state or district assessments, Advanced Placement tests, college admissions tests, and standardized progress monitoring assessments.
- *Other student achievement or progress measures.* For example, formative assessments, end-of-unit tests, teacher-developed assessments, student work samples, screening and progress monitoring measures, and class reading lists.
- *Nonacademic student data.* For example, attendance data, discipline referrals, retention records, behavioral assessments, and student class schedules.
- *Data on curricula and instruction.* For example, classroom observations, lesson plans, and teacher journals or logs.
- *Other data sources.* For example, school climate surveys, data from professional development sessions, and interviews with or surveys of families, teachers, and administrators.

Use this worksheet to identify relevant existing or needed data. For each source, consider:

- *For whom do we have data?* For example, for all grade levels, only grades 6–8, and so on.
- *When and how often are the data collected?* For example, literacy screening assessment scores for all students from September and then monthly only for students receiving literacy interventions.
- *Where are the data located?* For example, a student information system or a district database.
- *How do we currently use these data?* For example, scheduling students into classes or informing instruction.

What relevant data do we already have or do we need? _____

Data source	Description (For whom? When and how often collected? Where located? How do we currently use?)	Have or need
		<input type="checkbox"/> Have <input type="checkbox"/> Need
		<input type="checkbox"/> Have <input type="checkbox"/> Need
		<input type="checkbox"/> Have <input type="checkbox"/> Need
		<input type="checkbox"/> Have <input type="checkbox"/> Need
		<input type="checkbox"/> Have <input type="checkbox"/> Need
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		<input type="checkbox"/> Have <input type="checkbox"/> Need
		<input type="checkbox"/> Have <input type="checkbox"/> Need
		<input type="checkbox"/> Have <input type="checkbox"/> Need

Summarize: What relevant data do we already have or do we need? _____

Step 3. Recruit Improvement Team members

The recruitment stage enables the CI leader to communicate to potential Improvement Team members the purpose of the work and to articulate expectations of participation. It is also an opportunity to collect important information from potential team members about their concerns, ideas, and interest to engage in the work. *Handout 3—Checklist for recruiting Improvement Team members* (see next page) outlines the steps to take in recruiting participants.

Handout 3. Checklist for recruiting Improvement Team members

This checklist outlines the steps to take in recruiting participants for the Improvement Team. As a guideline, the team should be large enough that multiple perspectives are represented but small enough that group discussions are feasible and productive. Team members should include people who will actually test the change practices the team identifies.

___ Identify potential Improvement Team members.

- Who cares about the overall focus?
- Who is affected by the overall focus?
- Who can positively affect the overall focus?
- How can we encourage diverse perspectives on the overall focus (veteran and new teachers; general and special education teachers; administrators and teachers; parents, students, or community members)?
- Who will attend and actively participate in the meetings?
- Who will actively participate in collecting data and testing change practices?

___ Prepare for conversations with potential Improvement Team members.

- Fill in and print *Handout 4—Improvement Team member roles and responsibilities* (p. I-13).
- Be prepared to briefly describe, in three to four sentences, the overall focus to be addressed, including sharing any related data.

___ Have one-on-one or group conversations to recruit Improvement Team members.

- Contact potential team members at least two weeks before the first meeting.
- Explain the potential overall focus to be addressed.
- Give potential team members an opportunity to react to and provide input on the overall focus area.
- Share the goals of the continuous improvement effort.
- Set expectations for participation (share *Handout 4—Improvement Team member roles and responsibilities* (p. I-13).
- Identify and discuss any barriers to the person's participation (scheduling, workload, interest, supervisor support) and how to overcome them.
- Based on this discussion, if the person appears ready, willing, and interested, ask him or her to commit to attending the meetings and participating in the effort.

___ Explain that specific roles for Improvement Team members will be designated during the first meeting.

Step 4. Identify Improvement Team member roles and responsibilities

All Improvement Team members will participate in planning and testing potential change practices, and some will fill important roles during and between meetings. Team members should understand what they are committing to and what role they will play in the continuous improvement effort. Assigning specific roles for team members ensures that the work is distributed and that no one person is overly burdened. The work includes everything from scheduling and facilitating meetings to managing the data to securing a meeting space. When identifying and recruiting team members, think about the specific tasks and related skills that are needed and intentionally recruit individuals who have the capacity and interest to take on specific roles. These roles include:

- *CI leader.* The continuous improvement effort will be most successful when there is an individual or small team of people who champion the work and ensure that work continues in the face of any challenges. The leader or leaders will do the initial recruitment, data or information collection, and other work to kick off the effort and will communicate with school or district leaders throughout the process. The leader also has an important role in maintaining the morale of the group and periodically helping the group celebrate progress.
- *Meeting facilitator.* A single person can facilitate all the meetings, or the work can be distributed such that a different person has responsibility for each meeting or a pair of people have responsibility for the full year. Whatever the approach, it is valuable to designate a meeting facilitator for each meeting.
- *Data manager.* It is valuable to have one person responsible for consistently organizing and presenting the data that the Improvement Team collects during each PDSA cycle. This toolkit provides some resources to help with that responsibility, but consider who has the capacity, and ideally some data savvy (including knowledge of spreadsheets), to take on this responsibility.
- *Recorder.* A lot of important discussion and documentation of ideas will need to be captured in each meeting. Designate one person or rotate responsibility for taking notes and storing them in a shared location so that ideas and decisions are documented consistently.

Handout 4—Improvement Team member roles and responsibilities (see next page) highlights key roles and their corresponding responsibilities. The document is designed to be distributed to Improvement Team members as part of the recruitment process and to be shared during the first meeting so that everyone is aware of team member roles and responsibilities.

Handout 4. Improvement Team member roles and responsibilities

This handout provides descriptions of the key roles and responsibilities of all Improvement Team members.

All Improvement Team members

Improvement Team members commit to engage in the continuous improvement processes, including Plan-Do-Study-Act (PDSA) cycles. The four-step PDSA process includes the initial phase of defining the problem and identifying and generating a change practice or set of change practices (in other words, the particular processes or tools to adapt, modify, or implement), as well as testing the change practices in the classroom or school, collecting data, and studying the data to inform further modifications. The team will have diverse membership to ensure that varied perspectives support the change effort.

Responsibilities of Improvement Team members include:

- Participating in meetings (see calendar for dates, times, and locations). Regular participation is required. The team will set its goal for participation together.
- Reviewing meeting materials before meetings.
- Participating in a defining the problem activity.
- Participating in defining the change practices to be implemented.
- Committing to piloting the change practices in their own classroom or context or to supporting use of the change practices among appropriate educators.
- Collecting data related to implementation in advance of data discussions, as needed.
- Participating in discussions about data and implementation that will lead to decisions on whether to adopt, adapt, or abandon change practices.

Continuous Improvement leader (CI leader)

The CI leader champions the effort and takes overall and consistent responsibility for the continuous improvement effort. Other team members may lead some of the tasks and facilitate meetings.

Responsibilities of the CI leader (with support of others, as appropriate) include:

- Reviewing the full content of the toolkit before commencing work with the Improvement Team.
- Assessing the school's or district's readiness to engage in the continuous improvement effort.
- Recruiting participants and communicating directly with all participants regarding the project, including checking in on their progress.
- Managing the calendar for the project, coordinating meetings, and facilitating (or assigning facilitators for) each meeting.

- Collecting preliminary data on the potential problem that the Improvement Team will address.
- Communicating with other school- or district-based staff about the project.
- Identifying and working with the data manager.
- Identifying and securing any training or capacity building related to implementing the change practices that the Improvement Team decides to test. This may require outside resources or support.
- Periodically allocating time throughout the continuous improvement effort to acknowledge and validate the progress that the Improvement Team is making.

Meeting facilitator

The meeting facilitator takes responsibility for one or all meetings (to be determined by the Improvement Team), including preparations for the meeting and management of the actual meeting.

Responsibilities of the meeting facilitator include:

- Reviewing the agenda and content of the meeting before it occurs.
- Preparing any materials or activities required for the meeting.
- Ensuring that Improvement Team members have all materials required for the meeting.
- Coordinating and facilitating the meeting.

Data manager

The data manager is responsible for managing the data collected by Improvement Team members and related to implementation.

Responsibilities of the data manager include:

- Supporting the CI leader in managing data collection.
- Providing expertise related to data collection and analyses and building the capacity of Improvement Team members in data collection, analysis, and use.
- Leading data analysis, with support from others, and working with the CI leader to summarize and present data to the Improvement Team.

Recorder

The recorder is responsible for taking meeting notes and storing them in a shared location so that discussions and ideas are documented.

Responsibilities of the recorder:

- Taking notes during meetings.
- Saving the notes in a timely manner in a shared location that is accessible to all Improvement Team members.
- Keeping track of change practices and changes implemented.

Step 5. Plan the Improvement Team calendar

At the outset of the continuous improvement effort it is useful to plan, to the extent possible, when and how the Improvement Team will meet. If the team members begin the year with all the meetings on their calendars, it will be easier to ensure that the meetings take place and that the work between meetings is accomplished. Although this toolkit provides materials and agendas for 10 meetings, the exact number of meetings will depend on the number of PDSA cycles the team undertakes. It is better to plan for more meetings and then cancel ones that are not needed. Also consider whether structures are already in place, such as professional development or common planning time sessions, that could be used for these meetings.

Before the first meeting the CI leader should outline the details of when and how often the group will meet using *Handout 5—Continuous improvement calendar* (see next page or https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf, which includes an editable PDF). The team will probably want to finalize meeting dates during the first meeting, but it would be helpful to enter potential meeting times before the first meeting so that they can be shared with the team. At the end of the first meeting the Improvement Team will discuss next steps and the calendar of meetings.

Handout 6—The continuous improvement cycle, which follows *Handout 5* (and is available at https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout6_CI-cycle.pdf) can be used to communicate both the basics of continuous improvement and the specifics related to each step of the Improvement Team’s work.

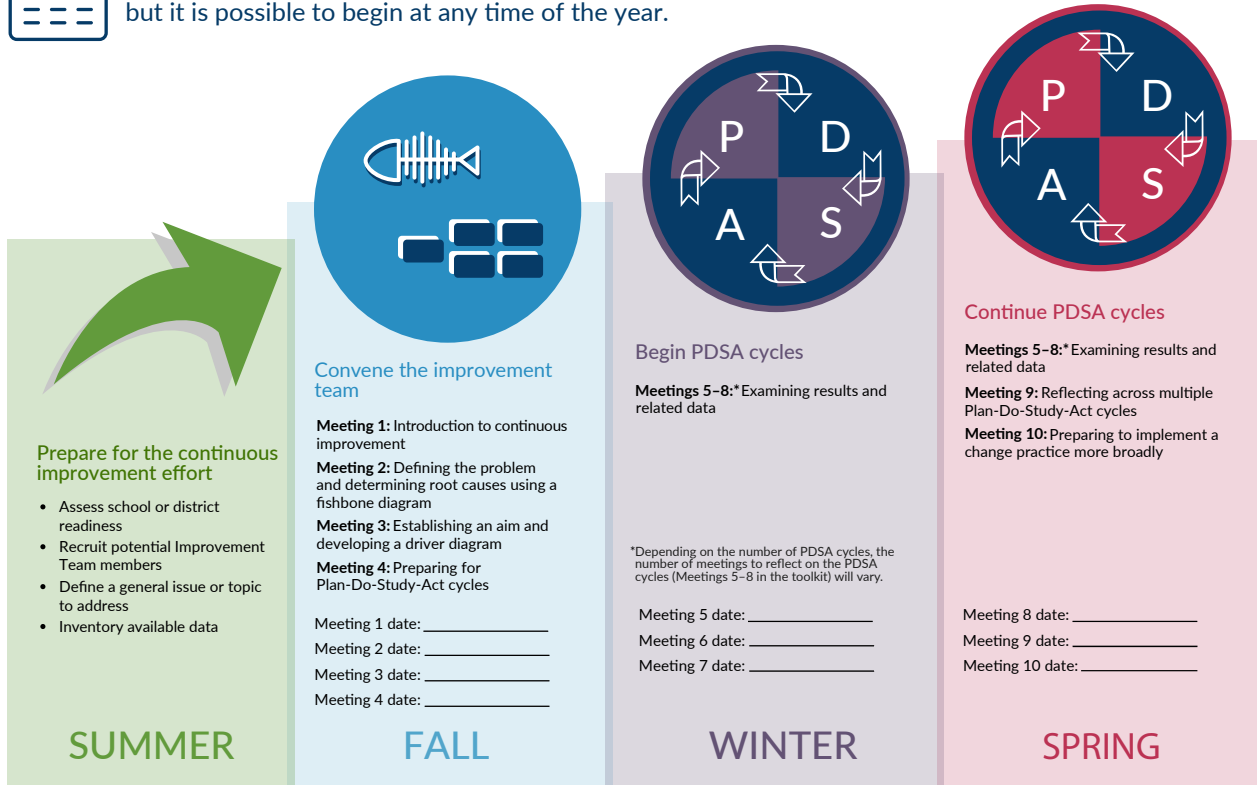
Handout 5. Continuous improvement calendar



Continuous improvement calendar



Many schools begin continuous improvement cycles in the summer, but it is possible to begin at any time of the year.



This document is a part of the Continuous Improvement in Education Toolkit, produced by the Regional Educational Laboratory Northeast & Islands.

Handout 6. The continuous improvement cycle



Continuous improvement cycle



The model for improvement consists of three main questions:

What problem are we trying to solve?

What change might we introduce and why?

How will we know that a change is actually an improvement?

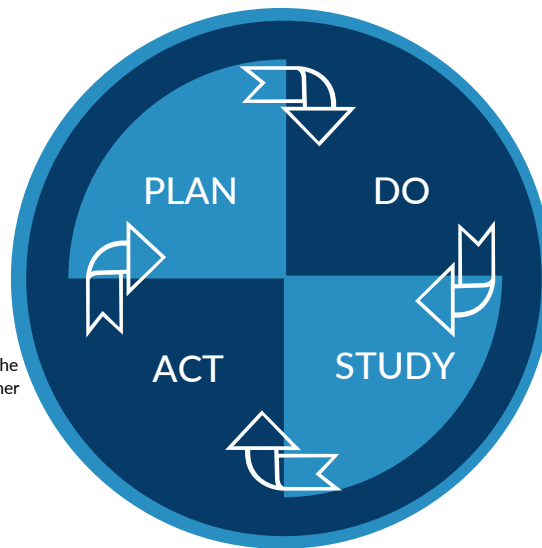
Plan-Do-Study-Act (PDSA) Cycle

1. PLAN

Select a change practice to test.
Select measures and develop a data collection plan.

4. ACT

Based on data study, make improvements to the change practice, take steps to scale the change practice, and/or choose to try another change practice.



2. DO

Implement the change practice.
Collect data to inform improvement.

3. STUDY

Collectively examine data to inform improvement.

This document is a part of the Continuous Improvement in Education Toolkit, produced by the Regional Educational Laboratory Northeast & Islands.

Review of actions to take to prepare for a continuous improvement effort

- *Assess readiness.* Use *Handout 1—Checklist for assessing readiness for a continuous improvement effort* (p. I-5).
- *Take an inventory of available data.* Use *Handout 2—Preliminary data inventory worksheet* (p. I-8). Then prepare a brief statement about the overall focus of the effort, as in the example provided in step 2. The statement should be no more than a few sentences and should capture the overall topic the Improvement Team will address.
- *Recruit the Improvement Team.* Use *Handout 3—Checklist for recruiting Improvement Team members* (p. I-11), and use *Handout 4—Improvement Team member roles and responsibilities* (p. I-13) to discuss with potential team members.
- *Fill in Handout 5—Continuous improvement calendar* (p. I-16 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf) to the extent possible.
- *Send Improvement Team members a PDF of this toolkit and ask them to complete the pre-meeting reading,* which provides background on continuous improvement, offers an overview of the PDSA cycle, and introduces the Grove Elementary School example case that appears throughout the toolkit. Also ask them to review *Handout 6—The continuous improvement cycle* (p. I-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout6_CI-cycle.pdf).

PART II. IMPROVEMENT TEAM MEETINGS

This part of the toolkit provides content (readings, tools and templates, and videos) for a series of meetings that guide the Improvement Team through the process of identifying a common problem, generating a series of evidence-based change practices to test and study, testing those change practices, collecting and analyzing data, and reflecting on and using evidence to identify next steps. The toolkit provides materials and agendas for 10 meetings, but the exact number will depend on the number of Plan-Do-Study-Act cycles the team undertakes.

Meeting 1. Introduction to continuous improvement

This is the first meeting of the Improvement Team. It will orient team members to continuous improvement and Plan-Do-Study-Act (PDSA) cycles (which are described in the pre-meeting reading and explained in more detail in Meeting 4), discuss the focus for the work, discuss roles and responsibilities, and begin to plan the calendar. The team will also watch the first video, which briefly tells the story of a group of teachers and their principal who collaboratively engaged in a continuous improvement effort.

Preparations

CI leader

- Send a PDF of the toolkit to Improvement Team members.
- Ask Improvement Team members to complete the pre-meeting reading (see next page), which provides background on continuous improvement and an overview of the PDSA cycle and introduces the Grove Elementary School example case that appears throughout the toolkit, and to review *Handout 6—The continuous improvement cycle* (p. I-17).
- Prepare a brief statement on the focus of the continuous improvement effort. The statement should be no more than a few sentences.
- Prepare *Handout 4—Improvement Team member roles and responsibilities* (p. I-13) and *Handout 5—Continuous improvement calendar* (p. I-16 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf) for your specific context.
- Assign someone to take notes if a recorder has not already been designated.

Improvement Team members

- Complete the pre-meeting reading (see next page), which provides background on continuous improvement and an overview of the PDSA cycle and introduces the Grove Elementary School example case that appears throughout the toolkit, and review *Handout 6—The continuous improvement cycle* (p. I-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout6_CI-cycle.pdf).

Materials needed

- Pre-meeting reading: Background on continuous improvement* (p. II-3)
- Handout 2—Preliminary data inventory worksheet* (p. I-8)
- Handout 4—Improvement Team member roles and responsibilities* (p. I-13)
- Handout 5—Continuous improvement calendar* (p. I-16 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf)
- Handout 6—The continuous improvement cycle* (p. I-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout6_CI-cycle.pdf)
- Handout 7—Continuous improvement scenarios and guiding questions* (p. II-9)

Pre-meeting reading: Background on continuous improvement

Overview of continuous improvement

What is continuous improvement and why is it relevant for schools and districts?

Continuous improvement is premised on three core principles about how sustainable change is achieved:

- Change takes time and involves collective effort (Bryk et al., 2015; Katz, Earl, & Jaafar, 2009).
- Change is context-specific and therefore requires constant adaptation, data collection, and learning (Bryk et al., 2015).
- Focusing on a series of small changes, combined with ongoing evidence collection and review, can lead to large-scale change (Derrick-Mills et al., 2014; Hawley, 2006; Park, Hironaka, Carver, & Nordstrum, 2013; Snow, Dismuke, Zenkert, & Loffer, 2017).

Continuous improvement processes engage key players in a system to focus on a specific problem of practice and, through a series of iterative cycles, identify and test change practices, make predictions, collect data about the change practices, and study the potential influence of those change practices on outcomes of interest, such as student attendance or math performance (Bryk et al., 2015). Through these cycles the members of the system build their capacity to test proposed change practices; refine those change practices based on evidence; and increase the scale, scope, and spread of a change effort over time (Langley et al., 2009). Different terms such as “improvement science,” “quality improvement,” and “performance management” are used to represent continuous improvement philosophies and practices. Continuous improvement models and approaches include the Model for Improvement (Langley et al., 2009), Six Sigma (Harry & Schroeder, 2005; Kwak & Anbari, 2006), and Plan-Do-Study-Act (PDSA) cycles (Bryk et al., 2015), among others. What these approaches have in common is that they offer a systematic process through which practitioners can engage in identifying needs, defining the problem, implementing new or modified practices, collecting data, and reflecting. In addition, continuous improvement approaches can help practitioners implement existing evidence-based strategies by examining the results of the strategies at regular, short-term intervals in their own context. The continuous improvement process provides a set of tools and routines for adapting and refining evidence-based strategies to address local needs.

Most of the continuous improvement methods in use today stem from work by W. Edward Deming and others in industry in the mid-20th century (Deming, 1993) and remain prevalent in manufacturing and other industries today to improve products, processes, and services (Bhuiyan & Baghel, 2005). Continuous improvement approaches have also been widely used in healthcare for decades (Berwick, 1989; Kenney, 2008; Marjoua & Bozic, 2012). More recently, education and human service areas such as child welfare, education, early care and education, behavioral health, and public health have turned to continuous improvement approaches to improve outcomes for children, families, and adults (Derrick-Mills, 2015; Fryer et al., 2007; National Child Welfare Resource Center for Organizational Improvement and Casey Family Programs, 2005; U.S. Department of Health and Human Services, 2011). Continuous improvement approaches have been used in healthcare to improve customer service to patients, reduce medication errors, reduce the number of ventilator days for intensive care patients, and reduce patient waiting time (Langley et al., 2009). In education, improvement science has been used, for example, to improve college credit accumulation in math and to reduce teacher turnover (Bryk et al., 2015).

While the research on the effectiveness of continuous improvement in education is limited, continuous improvement holds promise as a way to support schools and districts in engaging in systematic processes to support change practices that have the potential to improve teaching and learning.

What is the Model for Improvement?

The Model for Improvement refers to the three essential questions that guide the continuous improvement process:¹

- *What problem are we trying to solve?* For a school, district, or organization to improve, key participants must set clear and specific goals derived from a clear articulation of a problem or issue that requires attention. In defining the problem, participants identify an objective (the aim statement) that they intend to accomplish through the continuous improvement effort. The aim statement should target a specific population, be time specific, and be measurable. The aim statement goes beyond the overall focus that the CI leader has identified as part of pre-planning and recruitment. An example is provided in the box to the right to illustrate the difference between the overall focus and problem statement.
- *What change might we introduce and why?* Continuous improvement requires key participants to develop, test, and implement change practices. Selecting, testing, and implementing these change practices—for example, by trying out new protocols or processes—are at the core of continuous improvement.
- *How will we know that a change is an improvement?* An essential part of continuous improvement is examining whether the change practice has in fact addressed the problem and made some meaningful improvement. Clear and specific measures to capture both the processes and the outcomes are therefore at the heart of continuous improvement. As quality improvement experts often say, “Some is not a number, and soon is not a time” (Berwick, Calkins, McCannon, & Hackbarth, 2006). Thus, the Improvement Team sets measurable targets and then collects and analyzes data to determine whether progress is being made toward those targets.

What is the right context for implementing continuous improvement?

Continuous improvement can be used with a team of practitioners who have a common challenge, which can be quite broad, such as below grade-level math performance among all or a subgroup of students, or more specific, such as low student engagement in literature discussions. Employing the strategies that are part of continuous improvement can help the Improvement Team, which may include teachers, curriculum coordinators, content coaches, principals, and others, further refine the problem and generate ideas to address it. In a school or school district, educators face many problems for which continuous improvement may be appropriate.

Key terms

Overall focus. A brief statement of the broad issue the Improvement Team will address. It could be as general as a focus on elementary math achievement or more specific, based on a review of the data. *Example: Student achievement in elementary math is an area of concern, based on recent state achievement results.*

Problem statement. A brief statement of the specific and measurable problem that the Improvement Team will address. *Example: Students in elementary grades are below proficient in math, and low-income students are disproportionately represented among those students.*

Aim statement. The specific goal, developed in response to the problem statement, that guides the improvement effort. It should describe what the Improvement Team wants to achieve and should be specific and measurable. *Example: The percentage of students performing at proficient or above will increase by 10 percent, and the gap between low-income students and their peers will decrease.*

Change practices. The interventions or specific practices selected to address the problem and achieve the aim. These interventions or practices will be tested during the continuous improvement effort. *Example: Teachers use sentence starters to prompt math discourse.*

1. These three questions were adapted from the “Model for Improvement,” which was developed by Associates in Process Improvement and adapted by the Institute for Healthcare Improvement (Institute for Healthcare Improvement, 2015).

Plan-Do-Study-Act cycles

While the questions in the Model for Improvement guide the overall continuous improvement effort, PDSA cycles provide the structure to support the developing, testing, and studying of change practices. The PDSA cycle is a four-step process that is useful in guiding continuous improvement to test a change practice in a real-world setting. Once the Improvement Team has defined the problem and set an aim, it can use the cycle to guide rapid learning through four steps that are repeated as part of an ongoing cycle of improvement:

- *Plan.* After the Improvement Team has set an aim and generated possible change practices to test, the plan step provides the opportunity to further define a specific change practice to test and establish more specific targets or objectives. Such objectives may include formulating a theory about why the specific change practice selected might make a difference or hypothesizing about what outcomes are expected. During this step the team will also define the metrics for assessing implementation and outcomes of the specific change practice.
- *Do.* This step involves implementing the plan and collecting data. During this step a specific change practice is tested, and data are collected. Some initial data analyses may also take place during this step.
- *Study.* In this step participants use a guided protocol to examine the data and consider the extent to which the specific targets or objectives for the previous step were met. During this step the Improvement Team compares the data with the predictions or hypotheses put forward in the Plan step to see whether there are signs of progress toward the aim or problems or areas worthy of further consideration or modifications.
- *Act.* This last step integrates all the learning that was generated throughout the process, which can be used to adjust the tools or processes being tested or to further the objectives or targets; to formulate new theories or predictions; and to make changes to the overarching aim. In this step participants may be ready to implement the change practice more broadly, or they may require another test in a different context or with other variables. Then the cycle begins again.

Often, multiple PDSA cycles are necessary to determine whether a change practice is resulting in improvement. Each cycle builds on the previous cycle as evidence builds about the implementation and outcomes of the change practices.

Grove Elementary School example case: Part I

The Grove Elementary School example case below will be used throughout the toolkit to illustrate key ideas and processes. In Meeting 1 you will hear from some practitioners in a video about their experience. The example case is based on the work of those practitioners, but some changes have been made to the story to illustrate key ideas presented throughout the toolkit. Consider the following questions as you read this case: What is the problem that Grove Elementary School faces? How do members of the school community know this is a problem? What could they do to address the problem?

Grove Elementary School is in the second year of implementing a new curriculum and instructional strategies that are aligned with the Common Core Standards for Mathematical Practice, which define a range of skills that math educators should seek to develop in their students. The school recently received its state assessment data, and administrators noticed that math scores were lower than in prior years, particularly among low-income students. The principal has also observed that some teachers lack sufficient content or pedagogical knowledge to provide students with instruction that matches the Common Core Standards; she has observed this specifically in engaging students in math discourse.

The principal met with a group of teachers to discuss the lower math scores and the challenges associated with implementing the new curriculum and standards. The group discussed the standards for math practice and things that were and were not working in the classroom. The teachers agreed that what was working well is that students were displaying quantitative reasoning and could use a variety of materials to practice their skills. However, teachers were concerned that many of their students could neither construct viable arguments nor analyze situations and communicate them to others. To better understand teachers' concerns, the principal decided to observe some teachers during math lessons.

The principal selected teachers at different grade levels to observe and used a simple protocol to track teacher questions and student responses. She noted that some students seemed to be less engaged during the lessons. The principal met again with the teachers and shared the results of the initial observations, focusing on what the teachers were doing and on the nature and frequency of student responses. During this meeting, after reviewing the results of the principal's data collection, the Improvement Team more clearly defined the problem and developed a better understanding of what factors might be contributing to the problem. The team agreed that student discourse in math lessons was an area in which students lacked skills and noted that some students were much less able to engage in student discourse than others. They agreed that this was a problem they could address that might lead to improvement in overall student engagement and achievement in math.

Meeting 1

Goals

- Introduce Improvement Team members to continuous improvement as a set of processes that are relevant to school- and district-based teams.
- Discuss and clarify the focus for shared work.
- Discuss next steps in implementing the continuous improvement effort and an overall plan for the year.

Agenda (90 minutes)

Topic	Materials	Time
Welcome, review of agenda and goals, introductions, and discussion of pre-meeting reading	Toolkit, including a customized agenda; pre-meeting reading (p. II-3)	15 minutes
Watch and discuss Video 1	Video 1 (https://youtu.be/wr-7S8KRKGE)	15 minutes
Activity: Read continuous improvement scenarios and discuss guiding questions	<i>Handout 7—Continuous improvement scenarios and guiding questions</i> (p. II-9)	20 minutes
Activity: Discuss the overall focus	Toolkit, <i>Handout 2—Preliminary data inventory worksheet</i> (p. I-8)	25 minutes
Improvement Team member roles and responsibilities and calendar	<i>Handout 4—Improvement Team member roles and responsibilities</i> (p. I-13), <i>Handout 5—Continuous improvement calendar</i> (p. I-16 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf)	10 minutes
Wrap up and next steps	Toolkit	5 minutes

Welcome, review of agenda and goals, introductions, and discussion of pre-meeting reading (15 minutes)

Begin the meeting with a welcome, a review of the agenda and goals, introductions, and a short discussion of the pre-meeting reading. Improvement Team members should:

- Introduce themselves.
- Describe one thing they would like to improve outside of work. Examples: drink more water, spend more time reading for pleasure, get out of the house in the morning in less of a rush.
- Present one question they have about continuous improvement, including PDSA cycles, based on the pre-meeting reading.

The meeting facilitator or the recorder should take notes on the questions the team members raise.

Watch and discuss Video 1 (15 minutes)

Video 1 (available at <https://youtu.be/wr-7S8KRKGE>) tells the story of a group of teachers and their principal at Grove Elementary School who used continuous improvement to address a problem that they saw with their students' math learning. The video provides a general overview of their work and their reflections on the process.

After watching the video, discuss how the teachers and principals described the continuous improvement effort, what challenges they faced, and what they believe they achieved.

Activity: Read continuous improvement scenarios and discuss guiding questions (20 minutes)

Note to meeting facilitator

Depending on the number of Improvement Team members, assign pairs or triads to review one scenario each and provide an overview of that scenario for the larger group. The guiding questions at the end of each scenario may be useful in prompting discussion.

Read *Handout 7—Continuous improvement scenarios and guiding questions* (see next page) and discuss the scenarios and guiding questions. The scenarios are meant to illustrate the different types of issues or problems that are appropriate to address through continuous improvement. Review the cases to understand the range of problems for which continuous improvement can be a useful approach, paying particular attention to the problems embedded in the scenarios and how the educators might go about clarifying the problem, engaging key stakeholders, and examining relevant data.

Handout 7. Continuous improvement scenarios and guiding questions

Scenario 1: Darlene and Response to Intervention progress monitoring

Darlene is the digital learning coordinator in her school, where she has worked for several years. One of her responsibilities is overseeing the use of the school's Response to Intervention (RTI) online progress monitoring reading assessment. The teachers administer the assessment according to the school's 30-day instructional cycle schedule. The assessment was in use at the school before Darlene arrived, and all the teachers have successfully administered and used it. Teachers make time in their schedules to administer the assessment and are good at following up with students who were absent to ensure that they take the assessment as soon as possible. And the teachers talk about the assessment results in their grade team meetings when Darlene drops in.

Given the success of the reading assessment for progress monitoring, this year the principal decided, with faculty support, to start using the same company's math assessment for a similar 30-day RTI progress monitoring for math.

Darlene could not have been more surprised by the rollout of the math assessment: teachers weren't administering it reliably or reviewing the data reports from it. And when Darlene observed classrooms, it seemed that students were not very engaged with the assessment and were just rushing through it, which did not seem to be the case with the reading assessment. The company designed the reading and math assessments to be similar: the administration time was the same, the data reports were the same, and the look and feel to the students was the same.

So why was the reading assessment such a success while the math assessment was not? Darlene talked to a few teachers in one-on-one settings about this, and she was surprised to learn that teachers did not understand the math-related data reports as well as Darlene had thought they did. Some teachers did not even know that many of these data reports existed. Because the teachers did not use the data reports, they did not see the value of the math assessment. Darlene guessed that students picked up on this perception and that it contributed to what she observed—that students were not taking the math assessment seriously.

To address this issue, Darlene asked the principal for her support in starting an Improvement Team with the grade-level leaders in her school. Darlene wants to use the continuous improvement process to improve the faculty's assessment literacy and understanding of how the reading and math assessment data reports can help teachers create instructional groupings of students who need intervention and corrective instruction. Darlene believes that if teachers could see their struggling students accelerate their learning and move toward grade-level achievement using the data reports, the teachers would see the value of administering both assessments as intended.

Guiding questions

- What is the overall issue that Darlene wants to address?
- Who should be part of her Improvement Team?
- How should she present the issue to the Improvement Team?
- What questions might she ask them in seeking further input on the issue or problem?
- What data might she collect to help the Improvement Team understand the issue?

Scenario 2: Richard and instructional practices

Richard recently became the principal of Super Star High School. When he arrived, the school was struggling in several areas, and teacher morale was low, according to numerous school and district staff members. In addition, through classroom walkthroughs he observed that many teachers were not using effective classroom management strategies, which he concluded could be contributing to low teacher morale and to high rates of student discipline problems. He was also concerned that valuable instructional minutes were being lost.

At the middle school where he had been an assistant principal, Richard and a team of instructional coaches had successfully employed frequent classroom observation to support the implementation of several evidence-based instructional practices. The practices included a bell-to-bell instructional framework to maximize instructional minutes, improved classroom management to reduce disruptions, and more efficient lesson planning to reduce transition time between activities. Instruction was improved, school climate improved, and students received more instruction per day and throughout the year. Given his past success with leading an instructional coaching team to change instructional practices in these areas, Richard set out to re-create his past success at Super Star High School.

Unfortunately, Richard's attempts to implement frequent and targeted observations and feedback to support evidence-based practices at Super Star High School were met with resistance from several teachers. The teachers at Super Star High School were not used to having instructional coaches and administrators in their classrooms on a regular basis. Most teachers were observed and provided with feedback for their formal evaluations only as part of a required but far from meaningful activity. Only the least successful teachers received additional ongoing attention throughout the year, which resulted in many teachers reacting to the increased engagement from instructional coaches as a signal that they were now among the lowest performing teachers in the school.

Richard could tell he had his work cut out for him. It wasn't going to be easy to change the professional culture and the instructional practices of Super Star High School teachers. He wanted to find a way to effectively build collaborative and supportive working relationships while simultaneously creating a sense of urgency for improving classroom management, use of instructional minutes, and school discipline.

Guiding questions

- What is the overall issue that Richard wants to address?
- Who should be part of his Improvement Team?
- How should he present the issue to the Improvement Team?
- What questions might he ask them in seeking further input on the issue or problem?
- What data might he collect to help the Improvement Team understand the issue?

Scenario 3: Cyndi and Next Generation Science Standards implementation

Cyndi’s elementary school has adopted a new science curriculum for upper elementary grades that is aligned with the Next Generation Science Standards (NGSS). As the grade 4 teacher leader, Cyndi is excited about this opportunity to use a new science curriculum with her students. NGSS is focused on student sense-making using direct experience of science concepts, and Cyndi loves that the new curriculum comes with a variety of investigations, material kits, experiments, and simulations for students to work on in groups to get hands-on experience with science. She also appreciates that the curriculum is aligned with Common Core English Language Arts Standards and comes with recommendations and strategies for making reading and writing about science accessible for students. The curriculum includes a system for organizing students’ science notebooks with printouts and pre-created tables, which Cyndi thinks will reduce the amount of time teachers spend helping students organize their science work and enable teachers to focus more time on science learning, science writing, and science discussions.

However, with all the opportunities for new teaching methods and new activities comes a lot of teacher anxiety. Cyndi is concerned that some of the grade 4 teachers will be anxious about implementing the new curriculum. The curriculum requires teachers to shift from teacher-led activities to more student-led activities, and many teachers are concerned about classroom management and off-task behavior. The curriculum also includes a strand of earth science content that some teachers have never had to teach before. The last major concern is the amount of science writing that students are expected to do. Although the grade 4 teaching team unanimously agrees that writing in all subjects is important for developing students’ literacy and critical thinking skills, quite a few teachers feel intimidated by the volume of writing that students are expected to put in their science notebooks and that teachers will be expected to review to support their students’ growth.

As is usual for Cyndi, she has a hundred ideas about things she can do to support her teachers in implementing this curriculum. But she is not sure which ideas are going to resonate with her teachers, nor is she sure what support teachers feel they most need.

Guiding questions

- What is the overall issue that Cyndi wants to address?
- Who should be part of her Improvement Team?
- How should she present the issue to the Improvement Team?
- What questions might she ask them in seeking further input on the issue or problem?
- What data might she collect to help the Improvement Team to understand the issue?

Activity: Discuss the overall focus (25 minutes)

Note to meeting facilitator

It is valuable to frame the discussion of the overall focus with some general guidance about what the Improvement Team should achieve during this initial meeting:

- One of the primary objectives of this first formal meeting of the Improvement Team is to build a shared understanding of the overall focus that the Improvement Team gathered to address.
- Continuous improvement is an inherently collaborative process in which a team works together to build a shared understanding, set a shared direction, and build a shared action plan with shared responsibilities.
- In setting the stage for the Improvement Team's work together, it is important to recognize that members may have different experiences and perspectives related to the identified focus. This may lead to different ideas about what the problem is and how it should be solved. This is in fact a strength of the continuous improvement approach, because these multiple perspectives contribute to a rich and varied set of possible approaches that can be used to solve the common problem of practice.

Discuss and further clarify the overall focus for the continuous improvement effort using the four steps below. At this point the team needs to agree only on the overall focus of its work and not on the specific problem and change practices to implement. That will come in a future meeting. The objectives of this discussion are to:

- Share multiple perspectives and draw people's attention to the overall focus.
- Identify additional questions that Improvement Team members have about the overall focus.
- Determine whether and what data or information collection related to the overall focus will occur before the next meeting.

Step 1. Have the CI leader or meeting facilitator present a brief statement about the overall focus that the team will address through the continuous improvement effort. For the Grove Elementary School example case the statement is:

Student achievement in elementary math is an area of concern, based on recent state achievement results.

Step 2. Discuss the overall focus, answering the following questions:

- What issues or challenges do we face in our own context as a classroom teacher, coach, curriculum coordinator, and so forth that are related to this focus? *(For the Grove Elementary School example case, teachers would describe their difficulty getting students to engage in class or to do more complex multistep problems.)*
- What successes have we had related to this focus? What has gone well and why? *(For the Grove Elementary School example case, teachers would describe their success using small groups or having students complete "do now's" of short review problems before they complete a math lesson.)*

Step 3. Brainstorm questions about the overall focus and what data related to the issue would be valuable to collect or review:

- What questions do we have about why we are facing these challenges and why we are experiencing these successes? *(For the Grove Elementary School example case, teachers would want to know more about which students are engaged in math class and which are not and whether there are certain types of "do now" review problems that students have difficulty completing.)*

- What data might help us answer these questions? (*For the Grove Elementary School example case, teachers would consider tallying which students appeared engaged in math class or collecting and reviewing the “do now” review questions to determine which types of problems were more difficult for students.*)

Step 4. Have the CI leader share *Handout 2—Preliminary data inventory worksheet* (p. I-8) that he or she completed to help inform which data should be collected. For data related to the questions that arose in the discussion, determine what needs to be collected and who will collect it before Meeting 2.

The meeting facilitator or designated recorder should take notes on this discussion.

Improvement Team member roles and responsibilities and calendar (10 minutes)

To conclude the meeting, review *Handout 4—Improvement Team member roles and responsibilities* (p. I-13) and determine who will take on what responsibilities (if this has already been accomplished, have the CI leader present these roles), and review *Handout 5—Continuous improvement calendar* (p. I-16 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout5_CI-calendar.pdf) and discuss the dates and times for upcoming meetings, as well as the overall timeline for the work.

Wrap up and next steps (5 minutes)

CI leader

- Send the notes from the Meeting 1 to Improvement Team members and ask them to review the notes before Meeting 2. (If a recorder has been selected, he or she can do this task.)
- Ask Improvement Team members to complete the pre-meeting reading for Meeting 2.
- Collect any data or information related to the overall focus discussed in the meeting and prepare to share it in Meeting 2. This may include working with the data manager or other Improvement Team members.
- Prepare flip chart paper or a shared screen that can be used to record ideas generated in Meeting 2.
- Assign a team member to facilitate Meeting 2, as needed.

Improvement Team members

- Read the notes from Meeting 1 and complete the pre-meeting reading for Meeting 2 on defining the problem and developing a fishbone diagram.
- Collect any data or information related to the overall focus discussed in the meeting and prepare to share it in Meeting 2.

Data manager

- Work with the CI leader and other Improvement Team members to collect any data or information related to the overall focus discussed in the meeting and prepare to share it in Meeting 2.

Recorder

- Send the notes from Meeting 1 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for Meeting 2.

Meeting 2. Defining the problem and determining root causes using a fishbone diagram

In Meeting 1 the Improvement Team discussed and reached some consensus about the overarching issue that the team will address. In this meeting the team will learn about the “fishbone” or “cause and effect” diagram, which is a tool to support a team in clearly defining a problem of practice and what might be contributing to the problem. The team will then develop a fishbone diagram related to the defined problem of practice. This will set the team up to develop an aim statement and identify change practices in Meeting 3.

Preparations

CI leader

- Ask Improvement Team members to review the notes from Meeting 1.
- Ask Improvement Team members to complete the pre-meeting reading (see next page) on defining the problem and developing a fishbone diagram and to review *Handout 8—Fishbone diagram for the Grove Elementary School example case* (p. II-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout8_Fishbone-example.pdf).
- If any data or information was collected related to the overall focus discussed in Meeting 1, prepare to share it in the meeting.
- Prepare flip chart paper or a shared screen that can be used to record ideas generated during the defining the problem activity.
- Assign a team member to facilitate the meeting, as needed.

Improvement Team members

- Read the notes from Meeting 1, complete the pre-meeting reading (see next page) on defining the problem and developing a fishbone diagram, and review *Handout 8—Fishbone diagram for the Grove Elementary School example case* (p. II-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout8_Fishbone-example.pdf).
- Bring any data or information that was collected related to the overall focus discussed in Meeting 1, and prepare to share it in the meeting.
- Come prepared to define the problem of practice.

Data manager

- Work with the CI leader and other Improvement Team members to prepare any data or information that was collected related to the overall focus discussed in Meeting 1.

Recorder

- Send the notes from Meeting 1 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for the meeting.

Materials needed

- Pre-meeting reading: Defining the problem and developing a fishbone diagram* (p. II-15)
- Handout 8—Fishbone diagram for the Grove Elementary School example case* (p. II-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout8_Fishbone-example.pdf)
- Handout 9—Template for a fishbone diagram* (p. II-22 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout9_Fishbone-template.pdf)
- Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23)

Pre-meeting reading: Defining the problem and developing a fishbone diagram

Grove Elementary School example case: Part II

In Meeting 1 you were introduced to the Grove Elementary School example case and heard from some practitioners in Video 1. Meeting 2 begins with an activity related to this example case. Below, the example case is provided again but with some additional information about defining the problem and developing a fishbone diagram. As you read, consider the following questions: What was the problem that the team identified? What practices did the team consider to address the problem it had identified? What resources or supports might be needed to implement the selected change practice?

Grove Elementary School is in the second year of implementing a new curriculum and instructional strategies that are aligned with the Common Core Standards for Mathematical Practice, which define a range of skills that math educators should seek to develop in their students. The school recently received its state assessment data, and administrators noticed that math scores were lower than in prior years, particularly among low-income students. The principal has also observed that some teachers lack sufficient content or pedagogical knowledge to provide students with instruction that matches the Common Core Standards; she has observed this specifically in engaging students in math discourse.

The principal met with a group of teachers to discuss the lower math scores and the challenges associated with implementing the new curriculum and standards. The group discussed the standards for math practice and things that were and were not working in the classroom. The teachers agreed that what was working well is that students were displaying quantitative reasoning and could use a variety of materials to practice their skills. However, teachers were concerned that many of their students could neither construct viable arguments nor analyze situations and communicate them to others. To better understand teachers' concerns, the principal decided to observe some teachers during math lessons.

The principal selected teachers at different grade levels to observe and used a simple protocol to track teacher questions and student responses. She noted that some students seemed to be less engaged during the lessons. The principal met again with the teachers and shared the results of the initial observations, focusing on what the teachers were doing and on the nature and frequency of student responses. During this meeting, after reviewing the results of the principal's data collection, the Improvement Team more clearly defined the problem and developed a better understanding of what factors might be contributing to the problem through a fishbone diagram. The team agreed that student discourse in math lessons was an area in which students lacked skills and noted that some students were much less able to engage in discourse than others. They agreed that this was a problem they could address that might lead to improvement in overall student engagement and achievement in math.

After developing the fishbone diagram in Meeting 2 (see below), the Improvement Team turned from the problem to potential solutions through a driver diagram in Meeting 3. Since the team agreed that increasing student engagement by promoting higher level thinking and math discourse was a problem it could address, it concluded that it was necessary to build teachers' capacity to promote the math discourse of all learners. The teachers considered various practices to test—including implementing small group activities, employing team teaching, and conducting mini-lessons—and ultimately decided on a set of “sentence starters and frames” to promote high-level math discourse in their classrooms. These sentence starters and frames are simple phrases that students can use to explain and justify their techniques for solving math problems. The sentence starters also support conceptual understanding as the teacher facilitates discussions and invites students to ask open-ended questions

that encourage critical thinking. The teachers selected this change practice over the others because they believed it represented a concrete change from their current practice, because it was something they could all implement fairly similarly, and because they could collect some basic data during their instructional time that would allow them to measure an increase in student math discourse.

Developing a fishbone diagram

Before testing any change practices, the Improvement Team needs to define the problem to be solved and identify potential strategies or changes that might be expected to achieve the aim of the project. A fishbone diagram is a graphic representation of everything that might contribute to a problem. Building a fishbone diagram supports the team in drawing on their diverse perspectives to develop a clearer picture of the problem and potential ways to address it. Generating all the factors that might contribute to the problem before homing in on a proposed solution also ensures that participants consider all aspects of the issue before they define the practice or process to be tested. A fishbone diagram contains three main parts:

- *Problem statement.* A brief statement of the specific and measurable problem that the Improvement Team will address.
- *Factors.* Ideas regarding the issues that contribute to the problem. In the example, one factor is that students are not engaged in their learning, which the Improvement Team believes has led to the problem that students are below proficient in math.
- *Causes.* All the possible reasons related to each of the factors. In the example, it would not be sufficient to just state that students are not engaged. The team must dig deeper to try to uncover what is contributing to, or causing, the lack of engagement. For example, the team posits that one of several causes of students' limited engagement is that they lack language and listening skills.

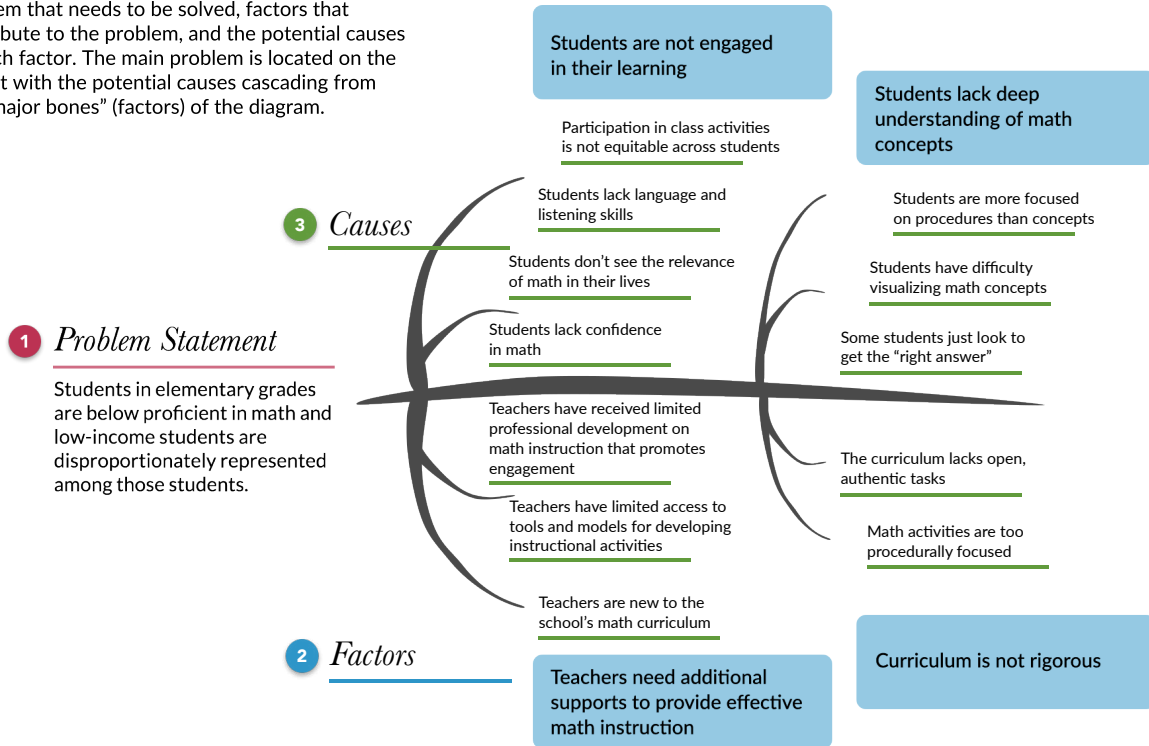
Handout 8. Fishbone diagram for the Grove Elementary School example case



Fishbone diagram



This completed fishbone diagram shows the problem that needs to be solved, factors that contribute to the problem, and the potential causes of each factor. The main problem is located on the far left with the potential causes cascading from the "major bones" (factors) of the diagram.



Meeting 2

Goal

- Collaboratively define the problem of practice by developing a fishbone diagram for the focus identified in Meeting 1.

Agenda (90 minutes)

Topic	Materials	Time
Welcome and review of agenda and goals	Meeting 1 notes, agenda	10 minutes
Introduce the pre-meeting reading and activity	Pre-meeting reading (p. II-15), Model for Improvement chart (p. II-19)	15 minutes
Watch Video 2 and discuss <i>Handout 8—Fishbone diagram for the Grove Elementary School example case</i>	Video 2 (https://youtu.be/IfVEJVWR3aI), <i>Handout 8—Fishbone diagram for the Grove Elementary School example case</i> (p. II-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout8_Fishbone-example.pdf)	15 minutes
Activity: Develop a fishbone diagram	<i>Handout 9—Template for a fishbone diagram</i> (p. II-22 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout9_Fishbone-template.pdf), flip chart, sticky notes, notes from Meeting 1, any data or information collected, <i>Handout 10—Guiding questions for developing a fishbone diagram</i> (p. II-23)	40 minutes
Wrap up and next steps		10 minutes

Welcome and review of agenda and goals (10 minutes)

Begin the meeting with a welcome and a review of the agenda and goals. The meeting will center on developing a fishbone diagram related to the overall focus discussed in Meeting 1.

Take a few minutes to have Improvement Team members:

- Ask any questions about the last meeting.
- Indicate whether they have data or information related to the overall focus to share at this meeting. This will be useful as part of the discussion of the fishbone diagram.

Introduce the pre-meeting reading and activity (15 minutes)

Note to meeting facilitator

The Improvement Team members should have read the Grove Elementary School example case, provided in the pre-meeting reading, before the meeting. If they haven't, first have them read the case. The activity that follows is designed to help them think about how to define a specific problem.

Using the pre-meeting reading on the Grove Elementary School example case, discuss and answer the questions below in the Model for Improvement chart. Record notes for each question in the appropriate column.

What is the specific problem that the teachers at Grove Elementary are trying to solve?	What changes do the teachers choose to introduce to address the problem?	How will the teachers at Grove Elementary know that their change is an actual improvement?

Additional questions to discuss:

- What do you notice about the size or scope (the “grain size”) of the problem that the principal and teachers are trying to solve?
- What do you notice about the proposed change practice? Is it likely to achieve the goals they want to achieve? Is it specific? Is it actionable?

Watch Video 2 and discuss Handout 8—Fishbone diagram for the Grove Elementary School example case (15 minutes)

Video 2 (available at <https://youtu.be/IfVEJVWR3al>) explains what a fishbone diagram is and uses the Grove Elementary School example case to illustrate how to build one.

After watching the video, review Handout 8—Fishbone diagram for the Grove Elementary School example case (p. II-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout8_Fishbone-example.pdf) and discuss the following three questions:

- What is the relationship between the factors and the problem identified in the Grove Elementary School example case?
- Are all the factors, and related causes, within the control or purview of the teachers and principal to address?
- Does the fishbone diagram make sense in light of what you know about the case?

Note to meeting facilitator

Using a flip chart and sticky notes, Improvement Team members could brainstorm factors and causes of those factors and write each idea on a separate sticky note and then post these notes to a blank fishbone diagram. This will allow the team to move the ideas around in real time and to discuss what causes are related to which factors.

Now it is the Improvement Team's turn to develop a fishbone diagram for the focus generated in Meeting 1. Follow the five steps below to develop a fishbone diagram using a flip chart and sticky notes or *Handout 9—Template for a fishbone diagram* (p. II-22 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout9_Fishbone-template.pdf). Refer to *Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23) while developing the diagram. Though 40 minutes is the suggested timeframe, the team may need more time for this activity.

Step 1. Review the notes from Meeting 1 about issues and problems the Improvement Team faces related to the overall focus and promising practices or approaches that have been witnessed or tried. The team should agree generally on the overall focus but does not need to totally agree on why they are seeing the issue or issues they have identified. Remember that the purpose of the fishbone diagram is to determine why a specific problem occurs and factors that may contribute to it. There may be, and probably are, multiple contributing factors.

Step 2. As a result of the discussion at the last meeting, some Improvement Team members may have collected data or information to support the defining the problem activity. Review these data and discuss what they might contribute to the understanding of the problem. See the *Preliminary data review* sidebar for a brief description of how to review and discuss these data.

Step 3. Based on the initial discussion and any data review, develop a draft statement of the problem. This one-sentence summation of the problem of practice is placed on the left side of the fishbone diagram. In the Grove Elementary School example case, one of the main problems that the teachers and principal identified was that students, especially low-income students, were below proficient in math. That is the problem that the Improvement Team at Grove Elementary School chose to focus on.

Preliminary data review

Identifying and collecting preliminary data prior to the first Plan-Do-Study-Act (PDSA) cycle may help the Improvement Team better understand and define the problem. During Meeting 1 the team may have identified some preliminary data related to the overall issue. These data should be included in the discussion when developing the fishbone diagram. Here are some general principles for examining these data:

- Describe the data before interpreting or making conclusions based on the data: What are the data?
 - Observe any patterns or trends: What do you notice about the data overall?
 - Note how the data relate to the problem: Do the data reinforce or contradict what you see as the issue or problem you would like to address?
 - Determine how the data will inform your problem definition: How will the data help further specify the problem you will address?
-

Step 4. Generate the “major bones” in the diagram. Each major bone represents a main factor that may be related to the problem. For example, a lack of student engagement is one major factor the Improvement Team at Grove Elementary School identified.

Step 5. Within each major bone, brainstorm more specific causes related to each key factor. A fishbone diagram will typically include four to six major bones (main factors), with a few causes cascading from each factor.

Brainstorming and organizing factors that contribute to the problem enable the Improvement Team to focus on why the problem occurs, not just on symptoms of the problem. The main idea behind a fishbone diagram is to brainstorm all possible factors and then drill down to identify what might be causing the problem. Data play a critical role in defining the problem and developing the fishbone diagram, but the team members should not limit causes to those that are directly related to data they collect or to which they have access. The value of the team’s multiple perspectives is the rich discussion about the issues faced. Once team members exhaust their ideas about why the problem might exist, they can begin to plan ways to address the problem.

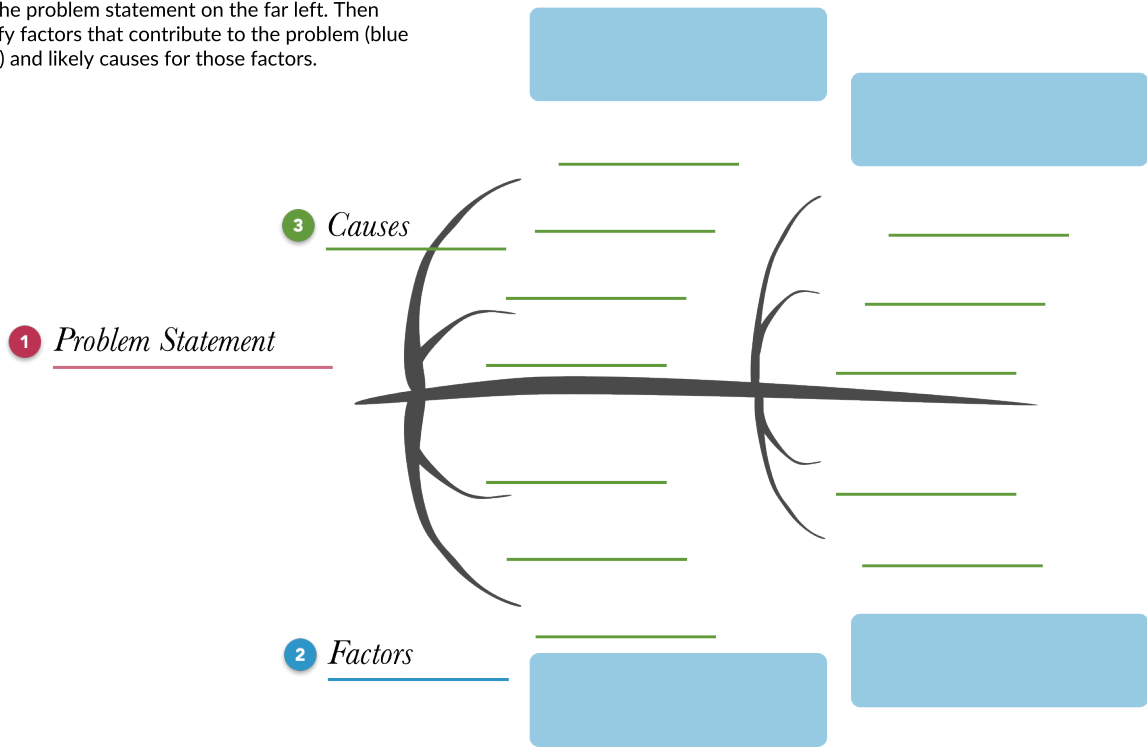
Handout 9. Template for a fishbone diagram



Fishbone diagram



To complete your own fishbone diagram, begin with the problem statement on the far left. Then identify factors that contribute to the problem (blue boxes) and likely causes for those factors.



This document is a part of the Continuous Improvement in Education Toolkit, produced by the Regional Educational Laboratory Northeast & Islands.

Handout 10. Guiding questions for developing a fishbone diagram

Consider the guiding questions below while developing and reviewing the fishbone diagram. Remember that the fishbone diagram helps in determining and clarifying the problem. The questions below are designed to prompt the team to consider the problem from many angles. It is from this examination of the many factors, and causes of those factors embedded within the problem, that some of the best ideas about how to address the problem will emerge.

Problem statement

- What problem are you trying to address?
- Is the problem clear, specific, and measurable?
- Is the problem clearly articulated?
- Does the problem seem too big for the Improvement Team to address? Is the problem too general? Is it unrealistic to think the team could make any changes related to the problem? If the answer is yes to any of these questions, revisit the problem and try to focus or narrow it.

Factors

- Are the factors contributing to the problem? Are they directly related to the problem?
- Are the factors just symptoms of the problem? In other words, are they evidence of the problem rather than actual conditions or circumstances that contribute to the problem? If the answer is yes to any of these questions, continue to brainstorm factors that are causing the problem.
- Do the factors represent the multiple perspectives of the Improvement Team?
- Is any critical perspective missing?

Causes

- Are the potential causes directly related to the factors?
- Are the potential causes clearly stated?
- Are the causes at a more specific grain size than the factors? In other words, do they go further than the factors in terms of specifying the problem?

Wrap up and next steps (10 minutes)

Based on the conclusion of the fishbone diagram activity, the final step of the meeting will be to confirm that the work generated will be compiled and that a draft fishbone diagram will be developed and shared with the Improvement Team before the next meeting. Determine how this will be completed and who will do it.

CI leader

- Complete a draft fishbone diagram based on the work generated during the meeting, using *Handout 9—Template for a fishbone diagram* (p. II-22 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout9_Fishbone-template.pdf) and share it with team members before Meeting 3. Include *Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23) so team members can reflect on and review the fishbone diagram at the start of Meeting 3. (The CI leader can designate another team member to complete this task.)
- Ask Improvement Team members to complete the pre-meeting reading for Meeting 3, which describes a driver diagram, and to review *Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf).

Improvement Team members

- Review the draft fishbone diagram and come to Meeting 3 with any questions or suggestions for changes.
- Complete the pre-meeting reading for Meeting 3, which describes a driver diagram and review *Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf).

Data manager

- None.

Recorder

- Send the notes from Meeting 2 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for Meeting 3.

Meeting 3. Establishing an aim and developing a driver diagram

The purpose of this meeting is to arrive at an aim for the continuous improvement effort and to develop a driver diagram. As a reminder, the aim is the specific goal, developed in response to the problem statement, that guides the improvement effort. It should describe what the Improvement Team wants to achieve and should be specific and measurable. A driver diagram is essential because the specific change practices that the Improvement Team will implement are derived from it. A driver diagram also serves as the basis for Improvement Team members' determination of the appropriate data to collect in efforts to understand how the change practices are working and whether they are leading to improvement.

Preparations

CI leader

- Complete a draft fishbone diagram based on the work generated during Meeting 2, using *Handout 9—Template for a fishbone diagram* (p. II-22 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout9_Fishbone-template.pdf), share it with the Improvement Team before the meeting, and be prepared to discuss it with team members using *Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23) for guidance.
- Ask Improvement Team members to complete the pre-meeting reading (see next page), which describes a driver diagram, and to review *Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf).

Improvement Team members

- Review the draft fishbone diagram developed in Meeting 2 and come prepared to discuss and make any needed changes using *Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23) for guidance.
- Complete the pre-meeting reading (see next page), which describes a driver diagram, and review *Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf).

Data manager

- None.

Recorder

- Send the notes from Meeting 2 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for the meeting.

Materials needed

- Draft fishbone diagram developed in Meeting 2*
- Pre-meeting reading: Description of a driver diagram* (p. II-26)
- Handout 8—Fishbone diagram for the Grove Elementary School example case* (p. II-17 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout8_Fishbone-example.pdf)
- Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23)
- Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf)
- Handout 12—Template for a driver diagram* (p. II-32 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout12_Driver-diagram-template.pdf)
- Handout 13—Guiding questions for developing a driver diagram* (p. II-33)

Pre-meeting reading: Description of a driver diagram

A driver diagram is a tool that helps translate the work from the fishbone diagram—which defined the problem, main factors, and related causes—into a clearly articulated improvement goal, or aim. The driver diagram identifies a logical set of smaller, tangible goals and supports the selection of specific actions, or change practices, to be tested as part of the continuous improvement process. The driver diagram provides a graphic representation of the various actions and change practices the Improvement Team could test through the continuous improvement effort. It has up to four elements: an aim statement, primary drivers, secondary drivers, and change practices.

Aim statement. The aim statement is the specific goal, developed in response to the problem statement, that guides the improvement effort. It should describe what the Improvement Team wants to achieve, by how much the team wants to increase or decrease something, and, if possible or appropriate, by when. Ideally, an aim statement should target a specific population, be time specific, and be measurable. The aim statement generally restates the problem from the fishbone diagram in the affirmative. In the Grove Elementary School example case the problem is that students, especially low-income students, are below proficient in math. The aim statement restates this problem by affirming what the positive corollary to that problem might be and states it in specific and measurable terms. The aim statement in the driver diagram for the example case is that the percentage of students performing at proficient or above will increase by 10 percent, and the gap between low-income students and their peers will decrease.

Primary drivers. Primary drivers focus on the conditions that are essential for making the improvement described in the aim statement. An aim generally has three to five primary drivers that act independently or together. These drivers are derived from the factors identified in the fishbone diagram. Taken together, the primary drivers represent how the aim might be achieved. In the Grove Elementary School example case the principal and the teachers observed that students were not engaged in math class, which is identified as a factor in the driver diagram. They believe this lack of engagement might be contributing to lower performance. So, one of the primary drivers they identified is to increase student engagement in class. However, the primary drivers may be too general, as with this example, to direct specific actions, in which case, secondary drivers are necessary.

Secondary drivers. Secondary drivers, derived from the primary drivers, are specific leverage points that are expected to have a direct impact on the primary drivers and, in turn, on the aim. They more clearly direct the types of change practices that participants can implement. In the Grove Elementary School example case a primary driver, related to one of the factors in the fishbone diagram, is to increase student engagement. So, a secondary driver that directly relates to student engagement is to increase students' math discourse. This secondary driver is derived from one of the causes the team identifies: a lack of language and listening skills. While this focus on student discourse is somewhat more specific, and is expected to have an impact on the primary driver, it still does not provide a specific action in the form of a change practice. Depending on the scope of the aim and the specificity of the primary drivers, secondary drivers may not be necessary.

Change practices. Change practices are the interventions or specific work practices that are predicted to affect the secondary and, in turn, the primary drivers. Derived from the secondary drivers, or in some cases from the primary drivers, change practices should be specific, actionable, and measurable. In the Grove Elementary School example case a change practice directly related to the secondary driver of increasing math discourse among students is to have teachers introduce and use sentence starters to prompt math discourse in the classroom. This change practice is specific and measurable and is hypothesized to positively influence math discourse and, in turn, student engagement.

As the Improvement Team translates the primary drivers into secondary drivers and then into change practices, the specific tools, processes, and strategies to be used should become clear. Through this process the team can clarify all the possible options and then select the best, most manageable approach. *Handout 11—Driver diagram for the Grove Elementary School example case* (see next page) shows that the Grove Elementary School Improvement Team identified several potential change practices, but they settled on sentence starters as the change practice to implement because it:

- Represented a concrete change from their current practice.
- Was something that could be implemented fairly similarly across all classrooms.
- Was a practice about which all teachers could collect some basic data during their instructional time that would allow them to measure an increase in student math discourse.

Driver diagrams should be living documents that change over time as Improvement Team members see changes in their setting. The diagrams represent the team's theory of change—or idea about what strategies are most likely to achieve the goal outlined in the aim statement—but they are always provisional and, through the continuous improvement effort, are tested and revised. Since the driver diagram is designed to be an improvement tool, the team should select drivers that are realistic and most likely to affect the aim and should remove drivers that are likely to have little to no impact or that have no chance of being influenced. In the Grove Elementary School example case the primary and secondary drivers are meant to affect the aim and be realistic, specific, and achievable.

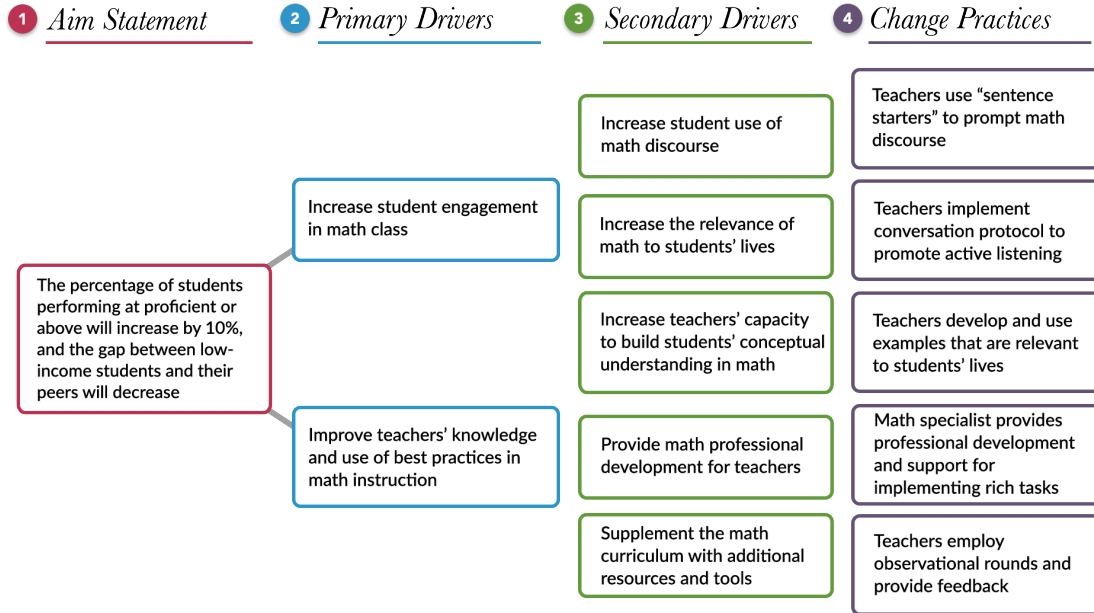
Handout 11. Driver diagram for the Grove Elementary School example case



Driver diagram



This completed driver diagram shows how the change practices (the interventions or specific work practices) are predicted to affect the secondary, and in turn, the primary driver.



This document is a part of the Continuous Improvement in Education Toolkit, produced by the Regional Educational Laboratory Northeast & Islands.

Meeting 3

Goals

- Review the draft fishbone diagram developed in Meeting 2, make any needed changes, and confirm consensus on the specific problem of practice and key factors.
- Establish the aim for the project and draft a driver diagram.

Agenda (120 minutes)

Topic	Materials	Time
Welcome and review of agenda and goals		5 minutes
Review and revise the draft fishbone diagram developed in Meeting 2	Draft fishbone diagram developed in Meeting 2	35 minutes
Watch Video 3 and discuss <i>Handout 11—Driver diagram for the Grove Elementary School example case</i>	Video 3 (available at https://youtu.be/NqaVgGHrcqU), <i>Handout 11—Driver diagram for the Grove Elementary School example case</i> (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf)	15 minutes
Activity: Develop a driver diagram	<i>Handout 12—Template for a driver diagram</i> (p. II-32 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout12_Driver-diagram-template.pdf), flip chart, sticky notes	60 minutes
Wrap up and next steps		5 minutes

Welcome and review of agenda and goals (5 minutes)

Begin the meeting with a welcome and a review of the agenda and goals. The meeting will center on confirming the fishbone diagram and developing a driver diagram.

Review and revise the fishbone diagram from Meeting 2 (35 minutes)

Review the draft fishbone diagram developed in Meeting 2 and address any changes that should be made using *Handout 10—Guiding questions for developing a fishbone diagram* (p. II-23) to support the discussion and the following questions:

- Should the problem statement be changed? Is it too general or too specific? Is it important and timely for us to address?
- Do the “major bones” or key factors directly relate to the problem? Are they contributing to the problem? Have we left out any key factors?
- Are the causes connecting to each factor the right causes? Is anything missing?

Watch Video 3 and discuss *Handout 11—Driver diagram for the Grove Elementary School example case* (15 minutes)

Video 3 (available at <https://youtu.be/NqaVgGHrcqU>) explains what a driver diagram is and uses the Grove Elementary School example case to illustrate how to develop one.

After watching the video, review *Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf) and discuss. If read from right to left, are the relationships between the change practices, the drivers, and the aim clear and logical?

Activity: Develop a driver diagram (60 minutes)

Note to meeting facilitator

As with the development of the fishbone diagram, use a flip chart and sticky notes so Improvement Team members can brainstorm drivers and change practices. They can write each idea on a separate sticky note and post them to a blank driver diagram. This will enable team members to move the ideas around in real time and to discuss what drivers are related to one another and what change practices might influence specific drivers.

Follow the four steps below to develop a driver diagram using the Improvement Team’s fishbone diagram as a reference and a flip chart and sticky notes or *Handout 12—Template for a driver diagram* (p. II-32 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout12_Driver-diagram-template.pdf) to brainstorm drivers and change practices. Refer to the pre-meeting reading for a description of the aim, primary and secondary drivers, and change practices, and to *Handout 11—Driver diagram for the Grove Elementary School example case* (p. II-28 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout11_Driver-diagram-example.pdf) for examples. Also refer to *Handout 13—Guiding questions for developing a driver diagram* (p. II-33) while developing the diagram.

Step 1. Develop the aim statement. Starting with the Improvement Team’s fishbone diagram, develop an aim statement based on the problem statement that the team generated for the fishbone diagram. Remember that the aim is the specific and measurable goal, developed in response to the problem statement, that guides the improvement effort. It should describe what the team wants to achieve, by how much the team wants to increase or decrease something, and, if possible and appropriate, by when. In the Grove Elementary School example case the problem statement is that students in elementary grades, especially low-income students, are below proficient in math. The aim statement in the driver diagram example case reflects this. The aim is: “The percentage of students performing at proficient or above will increase by 10 percent, and the gap between low-income students and their peers will decrease.” Similarly, consider how to turn your problem statement into a specific and measurable aim for the continuous improvement effort.

Step 2. Develop the primary drivers. The primary drivers directly affect the aim and should focus on changes that are essential to making the improvement described in the aim statement. A driver diagram generally has three to five primary drivers.

Step 3. Develop the secondary drivers. The secondary drivers should derive from the primary drivers and should be specific leverage points that are expected to have a direct impact on the primary drivers.

Step 4. Develop change practices. The change practices should derive from the drivers and should be specific, actionable, and measurable. In general, seek change practices that have evidence in support of their use. Some resources for identifying evidence-based practices can be found on the next page in *Resources for identifying evidence-based change practices*.

Once the Improvement Team has developed a driver diagram, it is ready to embark on preparations for the first Plan-Do-Study-Act (PDSA) cycle, which will be the focus of Meeting 4.

Resources for identifying evidence-based change practices

The following resources will be useful in learning more about evidence-based practices and how to identify them. This is not an exhaustive list, but it may be useful, depending on the type of drivers identified. Review these resources before Meeting 4 and come prepared to share any ideas about any change practices that may be appropriate to implement and test.

- *Identifying and implementing educational practices supported by rigorous evidence* (<https://www2.ed.gov/rschstat/research/pubs/rigorousvid/rigorousvid.pdf>). This guide by the U.S. Department of Education provides user-friendly tools to distinguish practices supported by rigorous evidence and provides a list of additional websites that can help identify evidence-based practices.
 - *Guidelines for identifying evidence-based interventions for school improvement* (<http://www.fcrr.org/essa/>). These self-study guides help schools systematically consider the evidence base and appropriateness of school improvement interventions for use in schools. They may also help in implementing a continuous improvement effort.
 - *Non-regulatory guidance: Using evidence to strengthen educational investments*. (<https://www2.ed.gov/policy/elsec/leg/essa/guidanceuseinvestment.pdf>). This resource provides state education agencies, local education agencies, schools, educators, and partner organizations with information to assist in selecting and using evidence-based activities, strategies, and interventions.
 - What Works Clearinghouse (WWC) (<https://whatworks.ed.gov/>). The WWC reviews existing research on different programs, products, practices, and policies in education and provides information so that practitioners can make evidence-based decisions.
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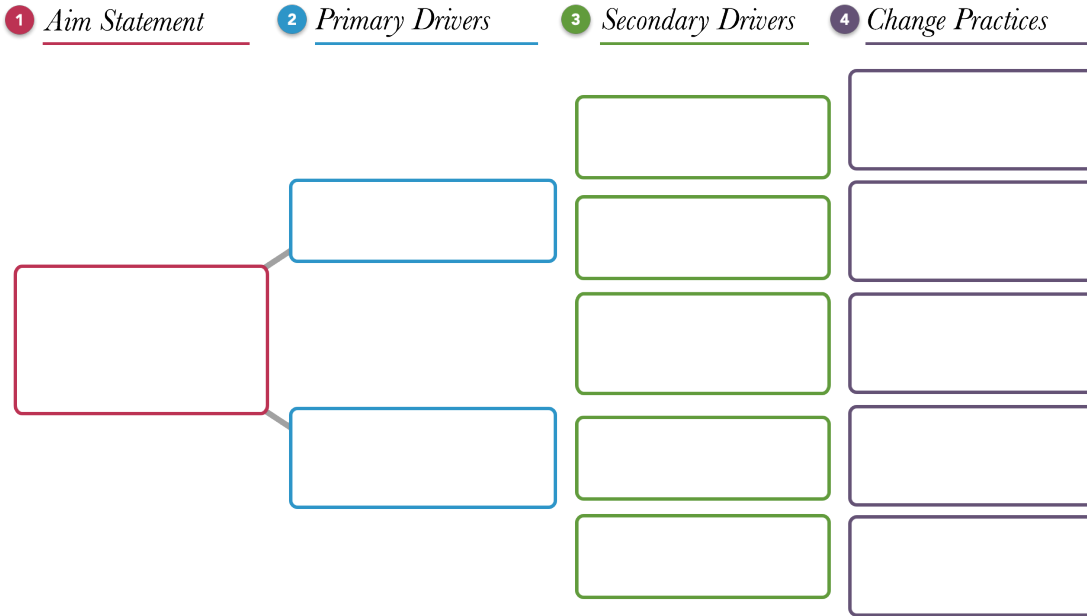
Handout 12. Template for a driver diagram



Template for a driver diagram



Complete your own driver diagram beginning with the aim statement and working through primary and secondary drivers and change practices. Add connecting lines as appropriate. Then, check your logic from right to left: "If [change practice], then [secondary -> primary -> aim]."



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Handout 13. Guiding questions for developing a driver diagram

Along with your fishbone diagram, and the description of the different elements of the driver diagram, also consider the guiding questions below while developing and reviewing your driver diagram. Remember that the driver diagram helps in understanding where you're going with your work; identifies a logical set of smaller, more tangible goals; and supports the selection of specific actions or changes.

Aim statement

- What is your goal?
- What are you trying to accomplish?
- Does the aim statement describe what you want to achieve and by when?
- Is the aim attainable and realistic?
- Is the aim specific and measurable?
- Is the aim statement clearly articulated?

Primary drivers

- Are the primary drivers directly related to the aim?
- How do the primary drivers achieve the aim? Do they achieve the aim independently or together?
- Do the primary drivers identify the conditions that are necessary and sufficient to achieve the aim?

Secondary drivers

- Are the secondary drivers expected to have an impact on the primary drivers? Which ones?
- Are the secondary drivers defining specific leverage points that are expected to influence the primary drivers?

Change practices

- Are the change practices directly related to the secondary drivers (or to the primary drivers if there are no secondary drivers)?
- Are the change practices specific and measurable actions?
- Are the change practices realistic and achievable?
- Can the change practices be implemented frequently over a short period?

Wrap up and next steps (5 minutes)

It is unlikely that the Improvement Team will reach consensus on the driver diagram in a single meeting. So, it may be necessary to schedule an additional meeting to complete the activity. But regardless of where the team arrives by the end of the meeting, the final step of the meeting will be to confirm that the work generated during this meeting will be compiled, and a draft driver diagram will be developed and shared before moving to the next stage in the process. Determine how this will be completed and who will do it.

CI leader

- If an additional meeting is needed to complete the driver diagram, schedule this meeting to occur before Meeting 4.
- Send the completed draft driver diagram to the full team for review. (The CI leader can designate another team member to complete this task.) Remind team members to use *Handout 13—Guiding questions for developing a driver diagram* (p. II-33) when reviewing it.
- Ask Improvement Team members to review *Resources for identifying evidence-based change practices* (p. II-31) and identify any change practices that may be relevant to the continuous improvement effort and to come to Meeting 4 prepared to discuss potential change practices for the first PDSA cycle. Potential change practices may be based on evidence-based practices, Improvement Team members' own ideas, or other resources.
- Ask Improvement Team members to complete the pre-meeting reading for Meeting 4 on measurement for improvement and come prepared to discuss potential measures for the first PDSA cycle.
- Decide how the Improvement Team will complete *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf) during Meeting 4 (on paper or projected on a screen for the group to view together).

Improvement Team members

- Review the draft driver diagram and *Handout 13—Guiding questions for developing a driver diagram* (p. II-33) and come to Meeting 4 prepared to make any changes and move forward with planning for the first "Do" cycle, in which a specific change practice will be tested.
- Review *Resources for identifying evidence-based change practices* (p. II-31) and come to Meeting 4 with any change practices that may be relevant to the continuous improvement effort. Potential change practices may be based on evidence-based practices, Improvement Team members' own ideas, or other resources.
- Complete the pre-meeting reading for Meeting 4 on measurement for improvement and come prepared to discuss potential measures for the first PDSA cycle.
- Meet to finish drafting the driver diagram, if necessary.

Data manager

- None.

Recorder

- Send the notes from Meeting 3 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for Meeting 4.

Meeting 4. Preparing for Plan-Do-Study-Act cycles

The purpose of this meeting is to select the driver and related change practice that will be the focus of the initial Plan-Do-Study-Act (PDSA) cycle and to prepare to launch the cycle. After several PDSA cycles, the Improvement Team may decide to select a new driver or change practice and launch a new series of PDSA cycles, in which case the team would return to this meeting, Meeting 4, to prepare for a new PDSA cycle.

Preparations

CI leader

- Ask Improvement Team members to review the draft driver diagram developed in Meeting 3 and *Handout 13—Guiding questions for developing a driver diagram* (p. II-33) and come prepared to discuss any changes.
- Ask Improvement Team members to review *Resources for identifying evidence-based change practices* (p. II-31) and identify any change practices that may be relevant to the continuous improvement effort and to come prepared to discuss potential change practices for the first PDSA cycle. Potential change practices may be based on evidence-based practices, Improvement Team members' own ideas, or other resources.
- Ask Improvement Team members to complete the pre-meeting reading (see next page) on measurement for improvement and come prepared to discuss potential measures for the first PDSA cycle.
- Decide how the Improvement Team will complete *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf) during the meeting (on paper or projected on a screen for the group to view together).

Improvement Team members

- Review the draft driver diagram developed in Meeting 3 and *Handout 13—Guiding questions for developing a driver diagram* (p. II-33) before the meeting and come prepared to make any changes and move forward with planning for the first “Do” cycle, in which a specific change practice will be tested.
- Review *Resources for identifying evidence-based change practices* (p. II-31) and come with any change practices that may be relevant to the continuous improvement effort. Potential change practices may be based on evidence-based practices, Improvement Team members' own ideas, or other resources.
- Complete the pre-meeting reading (see next page) on measurement for improvement and come prepared to discuss potential measures for the first PDSA cycle.

Materials needed

- Draft driver diagram developed in Meeting 3.
- Pre-meeting reading: Understanding measurement for improvement* (p. II-37)
- Handout 13—Guiding questions for developing a driver diagram* (p. II-33)
- Handout 14—Plan-Do-Study-Act planning tool for the Grove Elementary School example case* (p. II-43 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout14_PDSA-example.pdf)
- Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf)
- Handout 16—Discussion guide for data collection planning* (p. II-47)
- Handout 17—Run chart templates and examples* (p. II-51 and https://ies.ed.gov/ncee/edlabs/regions/northeast/xls/handout17_Run-chart.xlsx)
- Handout 18—Protocol for data dialogue* (p. II-65)

Data manager

- None.

Recorder

- Send the notes from Meeting 3 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for the meeting, including a record of decisions on *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf).

Pre-meeting reading: Understanding measurement for improvement

Measurement for improvement is different from measurement for accountability, which may be more familiar to school-based practitioners (Bryk et al., 2015). Measurement for accountability generally:

- Focuses on outcomes or results.
- Is used to make high-stakes decisions.
- Does not provide information about how outcomes were achieved.

In contrast, measurement for improvement, while also focused on outcomes, investigates a small set of change practices that may be implemented, studied, and refined to test a working theory of change in a particular context.

Measures for improvement should be practical—that is, they should be:

- Embedded in practitioners’ regular work in the process of teaching and learning. Ideally, those doing the “improving” are involved in selecting the measures.
- Administered frequently to identify opportunities for change and to assess whether the measure is yielding the targeted outcomes.
- Made accessible, in language, tone, and content, to those using the measures as well as to those making decisions based on the results.

Types of measures

Central to continuous improvement is practical measurement that is tied directly to the working theory of change. There are several types of measures. The first is the measurement of the aim, which is the ultimate targeted outcome of the continuous improvement effort. In the Grove Elementary School example case the aim is increased math achievement for all students. The aim is typically a long-term outcome. It is also important to develop measures related to the primary and secondary drivers that serve as intermediate outcomes and are aligned tightly with the tools, processes, or strategies enacted during the “Do” part of the Plan-Do-Study-Act (PDSA) cycle.

There are three types of data to collect in a PDSA cycle (Bryk et al., 2015; Langley et al., 2009):

- *Outcome measures.* Outcome measures are data on the intermediate outcomes related to the primary and secondary drivers and change practices. These measures are collected to track improvement that has resulted from implementation of the change practices from the baseline. A baseline is a measurement of relevant outcomes before the change practice is implemented. In the Grove Elementary School example case an outcome measure, tied to a driver, is improvement in students’ participation in class discussion. Improvement in this outcome is determined based on observing an increase in student participation compared with the baseline measure of student participation taken before the change practice was implemented. Effective outcome measures provide information quickly enough to allow teams to make appropriate adjustments if progress is not

observed. In the Grove Elementary School example, students' grades at the end of the term might be aligned to the larger problem teachers are trying to address, but they are too far removed from the specific change being implemented. The percentage of students each day who use sentence starters that their teachers have modeled would be a better outcome measure. It is both timely and aligned to the change practice.

- *Process measures.* Process measures are data on whether the steps associated with implementing the change practice took place as intended. For example, did teachers implement the sentence starter change practice as intended? If not, why not? In the Grove Elementary School example case a process measure could be the number of times teachers used sentence starters in their lessons each day, as measured by the teachers keeping classroom logs of their use of the sentence starters.
- *Balance measures.* Balance measures are data on the unintended consequences and the costs of the change practice. This information is collected to ensure that improvement in one practice does not have a negative impact on other practices or outcomes and to determine whether the costs are in proportion to, or “in balance” with, the benefits of the change practice. In the Grove Elementary School example case a balance measure could be the records of how much time teachers devoted to introducing the sentence starters to students during math instruction time.

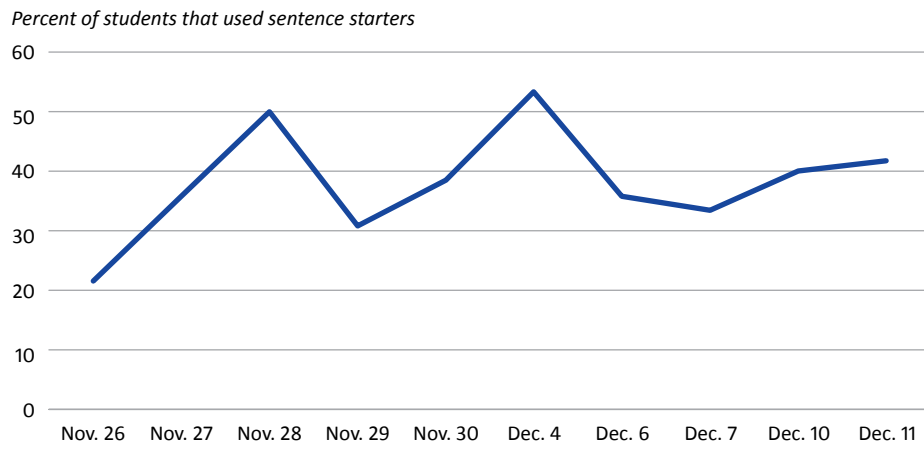
Measures are deemed practical when practitioners can collect, analyze, and use them in their daily work. The focus is on collecting just enough of the right data that will inform practitioners whether an improvement has occurred without overburdening them in the collection process. Determining how to collect data that are both useful and reasonable for practitioners to collect in the classroom can require several cycles to iron out. In the Grove Elementary School example case the teachers had to modify their data collection strategies after the initial cycle to make it feasible for them to collect the necessary data. While they initially thought each teacher could collect his or her own data on student participation, it proved difficult to do so while teaching. Instead, the teachers involved others to observe and collect the data. The kindergarten teachers combined classrooms a few times so they could observe one another and collect data, and the math coach served as an additional data collector, observing several classes. It is okay if it takes a few tries to arrive at a good approach to practical data collection; that is part of the process and one of the reasons that multiple cycles are implemented.

Run charts

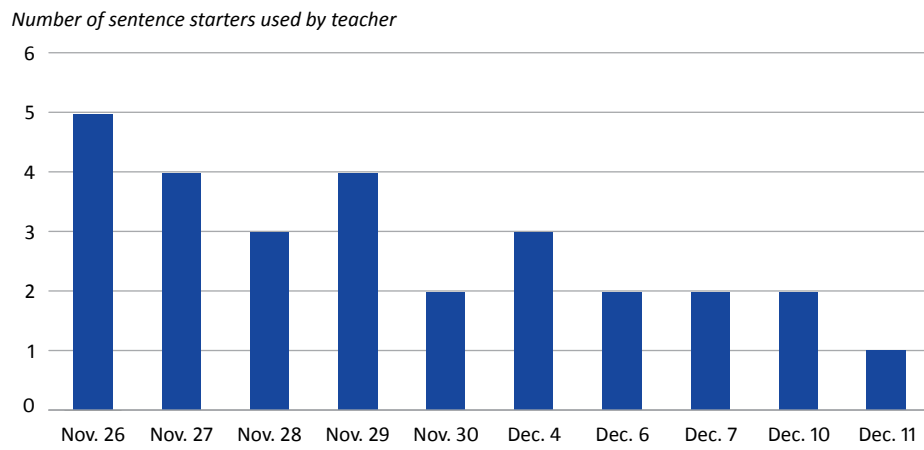
Run charts are a tool often used to chart data over time. They can be used to examine trends and patterns in both outcome and process data. In a typical continuous improvement run chart the horizontal axis represents time and the vertical axis represents the measure of interest, such as the percentage of students who used sentence starters. Enough time points, perhaps 8–10, are needed to allow for normal variation. With simple run charts, the implementers of change practices can record data in real time, simplifying data entry and reporting.

The two run chart examples on the next page display outcome and process data from the Grove Elementary School example case. *Handout 17—Run chart templates and examples* (p. II-51 and https://ies.ed.gov/ncee/edlabs/regions/northeast/xls/handout17_Run-chart.xlsx) includes several Excel templates for creating run charts, with instructions on how to use them. Use these templates or create your own run charts to track the Improvement Team's data over time.

Run chart example 1: Outcome measure for teachers' use of sentence starters



Run chart example 2: Process measure of implementation of change practice



Meeting 4

Goals

- Select a driver and a change practice for the first PDSA cycle.
- Select measures for the first PDSA cycle and create a data collection plan.
- Discuss next steps in launching the first PDSA cycle.

Agenda (120 minutes)

Topic	Materials	Time
Welcome, review of agenda and goals, and discussion of driver diagram and pre-meeting reading	Draft driver diagram, <i>Handout 13—Guiding questions for developing a driver diagram</i> (p. II-33)	10 minutes
Activity: Select a driver and change practice for the first Plan-Do-Study-Act cycle	Draft driver diagram developed in Meeting 3	35 minutes
Introduction to the Plan-Do-Study-Act planning tool and data discussion	Toolkit, <i>Handout 15—Template for the Plan-Do-Study-Act planning tool</i> (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf), <i>Handout 18—Protocol for data dialogue</i> (p. II-65)	15 minutes
Watch and discuss Video 4	Video 4 (https://youtu.be/KN37O2rzuMc)	10 minutes
Activity: Select measures and develop a data collection plan for the first Plan-Do-Study-Act cycle	Toolkit, <i>Handout 15—Template for the Plan-Do-Study-Act planning tool</i> (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf)	40 minutes
Wrap up and next steps		10 minutes

Welcome, review of agenda and goals, and discussion of driver diagram and pre-meeting reading (10 minutes)

Begin the meeting with a welcome and a review of the agenda and goals. Have a brief discussion to:

- Address any changes to the draft driver diagram.
- Review the pre-meeting reading on measurement for improvement.

For the driver diagram review, use *Handout 13—Guiding questions for a driver diagram* (p. II-33) to confirm the driver diagram addresses all the ideas. Also try following the logic of the driver diagram from right to left: “If we do x change practice, we will achieve y driver; and if we achieve y and z drivers, we will reach our aim.” Look for the logic within the driver diagram: Do the change practices and drivers “add up” to the aim?

For the review of the pre-meeting reading, focus the discussion on:

- The features of measurement for improvement and how they differ from those of measurement for other purposes, such as accountability.
- The three types of measures for PDSA cycles: outcome, process, and balance.
- The characteristics of good measures for improvement.

Activity: Select a driver and change practice for the first Plan-Do-Study-Act cycle (35 minutes)

Use the Improvement Team’s completed driver diagram to prioritize which driver will be the focus of the first PDSA cycle and what change practice the team will test first. Over time the team will probably test several change practices across multiple drivers; for the first cycle select a single driver and change practice. The driver should be one that is both high leverage and accessible. That is, implementing the change practice must have the potential for advancing progress toward the aim, and the driver must be within the purview of the team members who will implement the change practice.

In the Grove Elementary School example case the teachers identified the primary driver “increase student engagement” and the related secondary driver “increase student use of math discourse.” They focused on these related drivers because addressing these drivers was something they felt had the potential to yield positive results for students—that is, it is high leverage—and because making changes to classroom practice was something they could do—that is, it is accessible. The specific change practice, related to the secondary driver, was to implement the use of sentence starters in math class; this was a narrow change practice that could be implemented quickly and without substantial resources.

In selecting a driver and a change practice, the Improvement Team should discuss the following questions and be able to answer them affirmatively:

- Is the driver likely to be high leverage, in that achieving the driver might yield positive results related to the overall aim? Is the driver something accessible, in that it is within the control of the Improvement Team members?
- What is the specific change practice? How and how often will it be implemented?
- Is the “grain size” of the related change practice appropriate? Is it narrow enough to allow for immediate implementation?
- Is implementing the change practice feasible? Are there enough resources, and do Improvement Team members have the knowledge and skills to support implementation?
- If the Improvement Team members who will be implementing the change practice do not have all the knowledge and skills to implement it right now, can they acquire the knowledge and skills quickly with training and resources? Are these training and resources available?
- Are there enough people available to implement the change practice? There is no set number of people that must implement the change; in some cases 3–4 teachers would be appropriate, whereas in others 10–15 would be. It is more important to have a few people who are truly ready and willing to implement the practice and collect the data than it is to have a large group of people engaged in implementing the change practice, especially if they are not ready or willing to do so.
- Is data collection associated with the change practice feasible? Can you quickly and easily collect outcome and process measure data?
- Do you have appropriate tools or protocols to support data collection, such as simple observation instruments, quick surveys, or other tools that support teachers or others to easily collect the relevant data?
- Is the change practice aligned with the aim the Improvement Team identified?

After discussing these questions and identifying the driver and change practice, have the recorder or meeting facilitator record the decision on *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf), which is introduced next.

Introduction to the Plan-Do-Study-Act planning tool and data discussion (15 minutes)

Take a few minutes to review *Handout 14—Plan-Do-Study-Act planning tool for the Grove Elementary School example case* (p. II-43 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout14_PDSA-example.pdf) and *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf). The tool will help the Improvement Team document the change practices and the data collection activities for the “Study” part of the PDSA cycle.

To complete the template (see example on the next page):

- Record the “Plan” title—a succinct name for the first PDSA cycle—related to the driver and the change practice selected.
- Determine the cycle timeframe and record it in the appropriate fields on the template.
- Record the selected driver and change practice, including who will implement, in what contexts, and when.

Note the key decision points in the template. After deciding on the relevant driver and related change practice and the start and end date of the cycle, determine who will implement the change practice. Then determine the appropriate data to collect to understand whether the change practice is being implemented as planned and is an improvement related to the driver and aim.

Handout 14. Plan-Do-Study-Act planning tool for the Grove Elementary School example case



PDSA planning tool for the example case



Plan Title: Teachers engage students in mathematical discourse		Cycle 1 start date: 11/26/19	Cycle end date: 12/21/19
Relevant Driver: Increase student engagement in mathematics/increase student use of mathematical discourse			
Overall Aim: Improve mathematics achievement for all students and reduce gap between low-income and non low-income students			
Change Practice Teachers implement the use of sentence starters at least two times a week in math class.	Who implements Selected teachers	Implementing in what context 4th and 5th grade mathematics instruction	When implementing November-December

Question	Instrument(s)/Measures(s) <i>What data will be collected?</i>	Data Collector(s) <i>Who will collect data?</i>	Sample <i>From whom will data be collected?</i>	Timing <i>When will data be collected?</i>	Data Entry/Reporting <i>How will data get compiled?</i>	Predictions <i>What do we think will happen (what will the data tell us)?</i>	Results <i>(Completed after data collection)</i>
Process <i>How well was the change practice implemented?</i>	Teacher log to record the use of sentence starters (date of instruction, minutes spent planning and implementing) and reflections on how it went (barriers encountered, adaptations to planned implementation)	Participating teachers (7)	All participating teachers (7)	Log completed on each day of sentence starter use	Entry into Excel spreadsheet, by teacher by the end of day	At least 6 (of 7) teachers will use sentence starters at least twice a week across the 4-week cycle.	
	Observation protocol to assess how well teachers implemented sentence starters (instructional minutes spent on discussion using sentence starters, explicit instructions on using sentence starters, checklist of types of starters used)	Jen Nguyen (CI team member) will observe each participating teacher once	One math lesson of each participating teacher	Week 2 or 3 of cycle	Real time entry into Excel spreadsheet by observer	At least 6 (of 7) teachers will provide explicit instruction on at least 3 types of sentence starters for a class discussion lasting at least 10 minutes	

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PDSA planning tool for the example case



Question	Instrument(s)/Measures(s) <i>What data will be collected?</i>	Data Collector(s) <i>Who will collect data?</i>	Sample <i>From whom will data be collected?</i>	Timing <i>When will data be collected?</i>	Data Entry/Reporting <i>How will data get compiled?</i>	Predictions <i>What do we think will happen (what will the data tell us)?</i>	Results <i>(Completed after data collection)</i>
Outcome (Driver) <i>Did the change practice result in an improvement related to the associated driver?</i>	Student participation log (to track which students used sentence starters and how often)	Participating teachers (7)	All students in participating teachers' classes	Baseline measure collected before the use of sentence starters to track which students participate in math discussion and how often. Subsequent measures at the time of instruction using sentence starters.	Log completed on hard copy or Excel sheet. Summary entered by the end of day in Excel: date, list of present students, and notation of who used a sentence starters and how many times	The number of students participating in math discussions will increase from baseline to the end of the cycle.	
Balance <i>Were there any unintended negative consequences that resulted from implementing the change practice? What are the costs associated with this change practice?</i>	Teacher logs including date of instruction, minutes spent planning and implementing, and reflections on how it went (e.g., barriers encountered, adaptations to planned implementation), and if they had to sacrifice other activities for the sake of implementing the change practice. Same log as above.	Participating teachers (7)	All participating teachers (7)	Log completed on each day of sentence starter use	Entry into Excel spreadsheet, by teacher by the end of day	On average, teachers will spend less than 10 minutes planning for instruction for the use of sentence starters and at least 10 minutes doing the activity in class.	

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Handout 15. Template for the Plan-Do-Study-Act planning tool

A fillable PDF of the template is available at https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf.



Plan Title: _____ Cycle 1 start date: _____ Cycle end date: _____

Relevant Driver:

Overall Aim:

Change Practice	Who implements	Implementing in what context	When implementing
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Question	Instrument(s)/Measures(s) <i>What data will be collected?</i>	Data Collector(s) <i>Who will collect data?</i>	Sample <i>From whom will data be collected?</i>	Timing <i>When will data be collected?</i>	Data Entry/ Reporting <i>How will data get compiled?</i>	Predictions <i>What do we think will happen (what will the data tell us)?</i>	Results <i>(Completed after data collection)</i>
Process <i>How well was the change practice implemented?</i>							

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Question	Instrument(s)/Measures(s) <i>What data will be collected?</i>	Data Collector(s) <i>Who will collect data?</i>	Sample <i>From whom will data be collected?</i>	Timing <i>When will data be collected?</i>	Data Entry/ Reporting <i>How will data get compiled?</i>	Predictions <i>What do we think will happen (what will the data tell us)?</i>	Results <i>(Completed after data collection)</i>
Outcome (Driver) <i>Did the change practice result in an improvement related to the associated driver?</i>							
Balance <i>Were there any unintended negative consequences that resulted from implementing the change practice? What are the costs associated with this change practice?</i>							

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Watch and discuss Video 4 (10 minutes)

Video 4 (available at <https://youtu.be/KN37O2rzuMc>) illustrates how to use a driver diagram to generate appropriate data for continuous improvement, using the Grove Elementary School example case. After viewing the video, discuss how outcome, process, and balance measures differ from one another.

Activity: Select measures and develop a data collection plan for the first Plan-Do-Study-Act cycle (40 minutes)

Take a moment to review the three types of measures (outcome, process, and balance) in *Handout 14—Plan-Do-Study-Act planning tool for the Grove Elementary School example case* (p. II-43 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout14_PDSA-example.pdf). Consider how the examples relate to your own driver diagram and note the following about data collection:

- The data collected for the PDSA cycle in the Grove Elementary School example case include a participation log and observation data. Collecting these more specific and frequent data can help the Improvement Team understand whether the change is being implemented as intended (process measures), whether it is yielding the immediate results defined in the related driver (outcome measures), and whether there are other, unexpected outcomes associated with implementation (balance measures). This information will inform decisions about the next test of the change practice. For example, if the student participation log shows that when teachers use sentence starters, math discourse improves for only some students and not for students about whom the teachers were most concerned, the team might consider changing the implementation of sentence starters or implementing a different change practice to improve the math discourse of low-income students in particular.
- The data collected for the PDSA cycle in the Grove Elementary School example case do not include data related to the overall aim, which is annual math achievement. This is because standardized math achievement results are collected too infrequently to inform a PDSA cycle. In fact, the Improvement Team may hypothesize that improving math discourse in the classroom will improve student achievement; however, the team will not know this after a single or even several cycles. What it will know after several cycles is whether implementing the change practice improves student discourse, which is an intermediate outcome related to the driver. The team, as graphically represented in the driver diagram, hypothesizes that increased student discourse improves student achievement. This relationship may be grounded in empirical evidence conducted in another setting or based on practitioner experience or supposition. When the next annual student math achievement data are available, there may be an improvement in student achievement. This improvement in the overall aim may thus increase confidence among team members and other educators that the increase in student discourse is related to positive achievement outcomes.
- Outcome data are needed that relate more directly to the driver, such as a measure of student use of sentence starters, and that are collected more frequently—in this case, daily or weekly. The Improvement Team may hypothesize that improving math discourse in the classroom will improve student achievement; however, the team will not know this after a single or even several cycles. What it will know after several cycles is whether implementing the change practice improves student discourse, which is an intermediate outcome related to the driver. The team, as graphically represented in the driver diagram, hypothesizes that increased student discourse improves student achievement. This relationship may be grounded in empirical evidence conducted in another setting or based on practitioner experience or supposition. When the next annual student math achievement data are available, there may be an improvement in student achievement. This improvement in the overall aim may thus increase confidence among team members and other educators that the increase in student discourse is related to positive achievement outcomes.

- The use of predictions in the PDSA planning tool are important because the Improvement Team lists what it anticipates the outcomes will be for each cycle of implementation as a way to chart the expected versus actual improvement (if any) that is witnessed. As described above, realizing the predicted outcome builds confidence in the change practice and suggests directions for future implementation. Similarly, not realizing a predicted outcome might warrant the team reconsidering whether the change practice is likely to achieve the targeted outcomes.

Directions for completing the template for the Plan-Do-Study-Act planning tool

Step 1. Discuss data collection for outcome, process, and balance measures. Use *Handout 16—Discussion guide for data collection planning* (p. II-47) to discuss the relevant data sources for the outcomes related to the driver and the change practice, as well as the processes and activities required to collect high-quality data. It includes example data sources to generate ideas. Here are some recommendations regarding the selection of measures and data collection strategies:

- Ensure that the measures address the specific change practice that will be introduced and tested in this first PDSA cycle. Planning the measurement strategies at the same time that the Improvement Team selects the change practice will allow the team to confirm that the change practice is readily measurable.
- Plan data collection to align with the daily activities of practitioners. If teachers are expected to collect data, consider the burden placed on them and ensure that the data collection strategies are manageable and realistic. Practical measurement should be as fast and simple as possible, ideally without requiring practitioners to greatly change their normal routines.
- Collect data that are relevant and useful to the practitioners. The people collecting and analyzing the data should clearly understand why the data are being collected and how the data will inform practice.
- Leverage relevant data already being collected in classrooms, meetings, or schoolwide, and consider whether any of them could be meaningful measures for this PDSA cycle.

Step 2. Record the measures selected. After discussing the data collection, complete the section of *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf) that outlines the outcome, process, and balance measures with the decisions the Improvement Team made. Detail the data collection plan, including who will collect the data, how often, and using what format. A clear, detailed plan will promote consistency in how data are collected.

Step 3. Make predictions. Record both predictions and the results of the data collection in *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf). Making predictions is an essential component of testing a change practice. Predictions are tied to the working theory of change. If the results do not confirm predictions, the Improvement Team will need to determine whether the theory of change is incorrect, the change practice was not well implemented, or the measure did not capture a true improvement. The team’s assessment of the reasons the predictions were not accurate may determine whether the change practice is adapted or discarded. See *Handout 14—Plan-Do-Study-Act planning tool for the Grove Elementary School example case* (p. II-43 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout14_PDSA-example.pdf) for reference.

Handout 16. Discussion guide for data collection planning

Use these questions to discuss options for data collection, and record decisions on *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf).

- What types of data are needed for outcome, process, and balance measures (see *Examples for data collection planning* below for ideas)?
- What tools, protocols, or instruments are most relevant and practical for collecting the data needed? Examples include assessments, surveys, checklists, observation forms, logs or journals, interviews, and attendance sheets.
- What existing data sources or instruments should be considered for measurement in this cycle? Examples include lesson plans, walkthrough protocols, and formative assessments.
- What new data sources or instruments should be considered? Examples include “do now’s” or student exit tickets and interview or survey questions.
- When and how frequently will data need to be collected?
- Who will be responsible for collecting the data? A teacher, principal, district staff member, or student? What training and instructions related to data collection will be needed?
- How will data be compiled and prepared for the data team to review? Will hard-copy data need to be entered electronically? If so, how will this happen? What software or templates will be used? Who is responsible for ensuring that everyone’s data are submitted and prepared for presentation to the Improvement Team?

Examples for data collection planning

Type of measure	Example data sources and methods
Outcome (related to the aim, drivers, or change practice)	<ul style="list-style-type: none">• Progress monitoring assessments• Unit or chapter tests• Standardized achievement tests (most appropriate related to the aim rather than the drivers)• Counts to record such information as how many and which students participated in discussion• Ratings to measure the quality or frequency of phenomena such as student reports of confidence in participating in class discussions• “Do now’s” or entry or exit tickets to gather responses to a small number of questions• Surveys of teachers, administrators, students, or family members• Interviews or focus groups of family members, students, teachers, or administrators• Attendance or discipline records• Behavioral checklists completed by teacher, parent, or student to document instances of appropriate or inappropriate behaviors• Nonacademic assessments to assess areas such as social-emotional skills• Student work samples• Observations conducted by peer teachers, administrators, or others to assess such areas as student engagement, social interactions, and time on task• Written logs or gradebooks to record instances of behaviors such as whether students turned in homework

Type of measure	Example data sources and methods
Process (to determine whether change practice was implemented with fidelity and to understand context of implementation)	<ul style="list-style-type: none"> • Lesson plan surveys to assess instructional activities such as the frequency of practice implementation • Journals, such as for self-reflection on what worked or what did not work • Classroom observations • Administrator walkthroughs • Checklist of actions completed • Interviews or focus groups to collect detailed information on how implementation went • Logs to record instances of a change practice implemented • Administrative records such as class lists to determine characteristics of students who received the change practice
Balance (to identify costs and unintended consequences of the change practice)	<ul style="list-style-type: none"> • Logs or journals for implementers to record time spent, challenges, and unexpected results • Interviews or focus groups of administrators, teachers, or others involved in the change practice • Surveys to collect specific information on costs, challenges, and fiscal data

Wrap up and next steps (10 minutes)

Conclude the meeting with a review of what is going to occur during the first PDSA cycle:

- Review the change practice and what high-quality implementation of the change practice entails to ensure a common understanding.
- Record who is going to be testing the change practice and how often the change practice is going to be tested. For example, all math teachers will test the math discourse strategy at least twice per week.
- Review the data collection plan and assign responsibility for creating any of the measurement tools. For example, the math instructional coach is going to create the discourse participation log by the end of this week for teachers to use starting next week.
- Set the next PDSA meeting date and time to correspond with the end of the cycle.

CI leader

- Follow up with the Improvement Team members responsible for implementing the change practice and collecting data.
- Disseminate the materials needed to implement the change practice.
- Communicate with implementers about the timing of change practice implementation and data collection. Check in regularly with implementers and data collectors to ensure that the change practice and data collection are occurring as planned and to determine whether additional resources and supports are needed.
- Work with the data manager to develop a plan for monitoring data quality and ensure that all data are collected, summarized, and presented in an accessible way for discussion.
- Decide and confirm who will facilitate the data discussion in Meeting 5.
- Ask Improvement Team members to complete the pre-meeting reading for Meeting 5 on examining data and making decisions based on results.

Improvement Team members

- Implement the change practice.
- Communicate with the meeting facilitator and data manager about progress, challenges, and support needs.
- Collect and submit data.
- Complete the pre-meeting reading for Meeting 5 on examining data and making decisions based on results.

Data manager

- Develop or identify tools for compiling data.

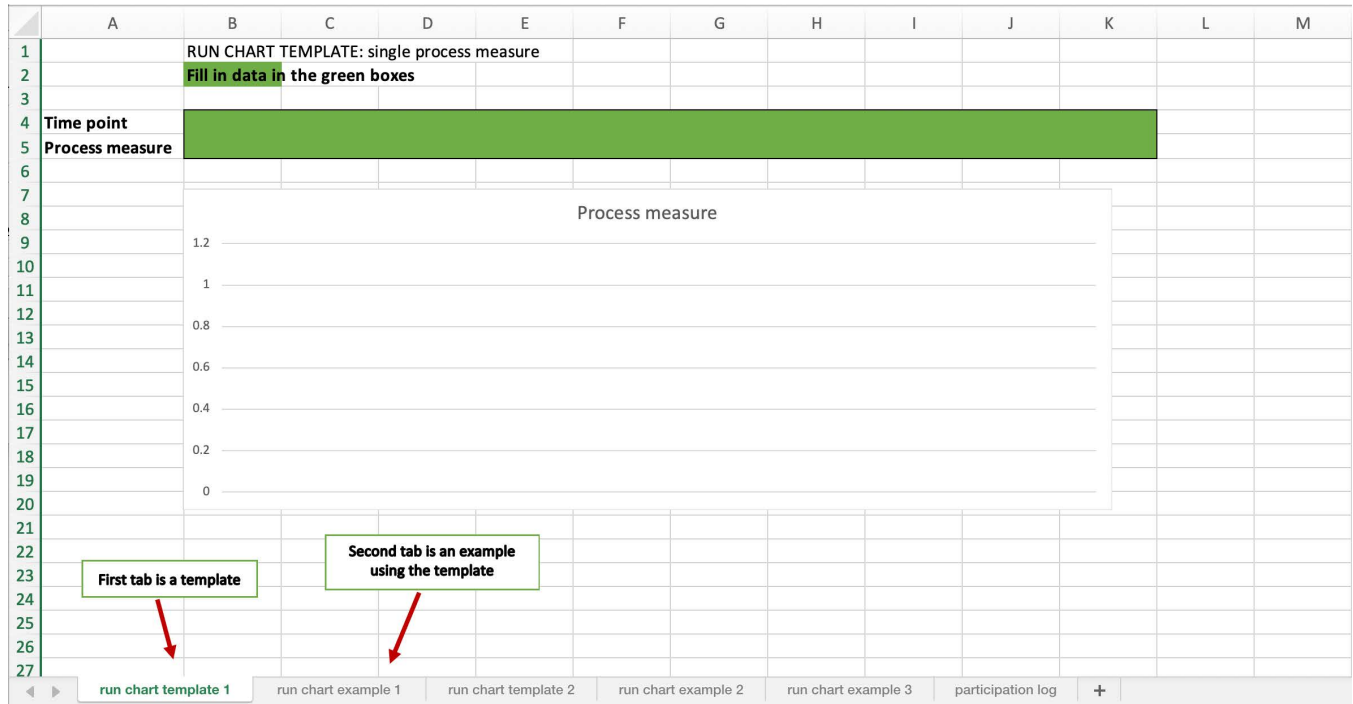
- Consider using the run chart instructions and templates provided with this toolkit (*Handout 17—Run chart templates and examples*; see next page).
- Develop instructions and procedures for compiling data. This could be a spreadsheet or shared form for data collectors to enter data and the procedures and timeline for document data submission.
- Develop a process for managing data, such as a checklist of data expectations or procedures for merging data submitted by individuals.
- Ensure that all data are collected, summarized, and presented in an accessible way for discussion during Meeting 5.

Recorder

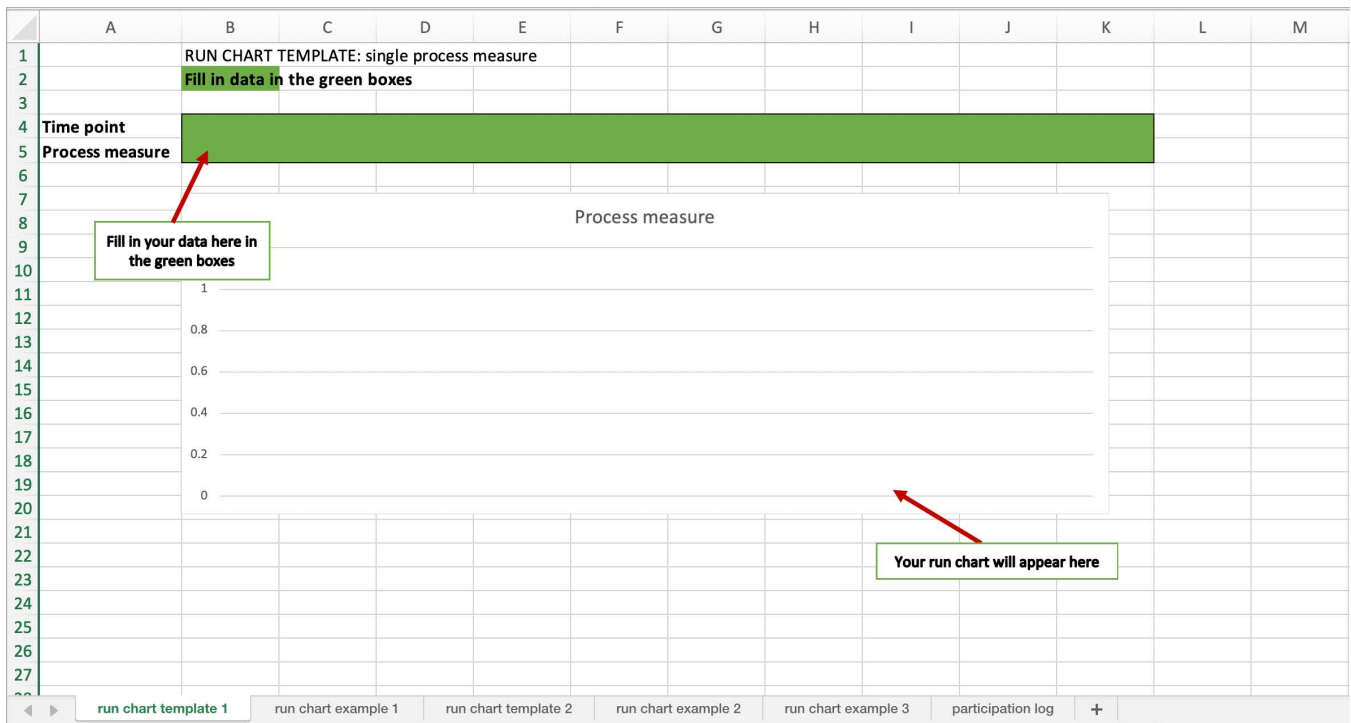
- Send the notes from Meeting 4 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for Meeting 5.

Handout 17. Run chart templates and examples

The Excel workbook associated with this toolkit (available at https://ies.ed.gov/ncee/edlabs/regions/northeast/xls/handout17_Run-chart.xlsx) contains six worksheets that offer a series of templates and examples for different run charts. Each worksheet is in its own tab, shown at the bottom of the screen. The screenshot below points out the first two tabs: *run chart template 1*, which is the first template for a single process measure, and *run chart example 1*, which is the corresponding example.



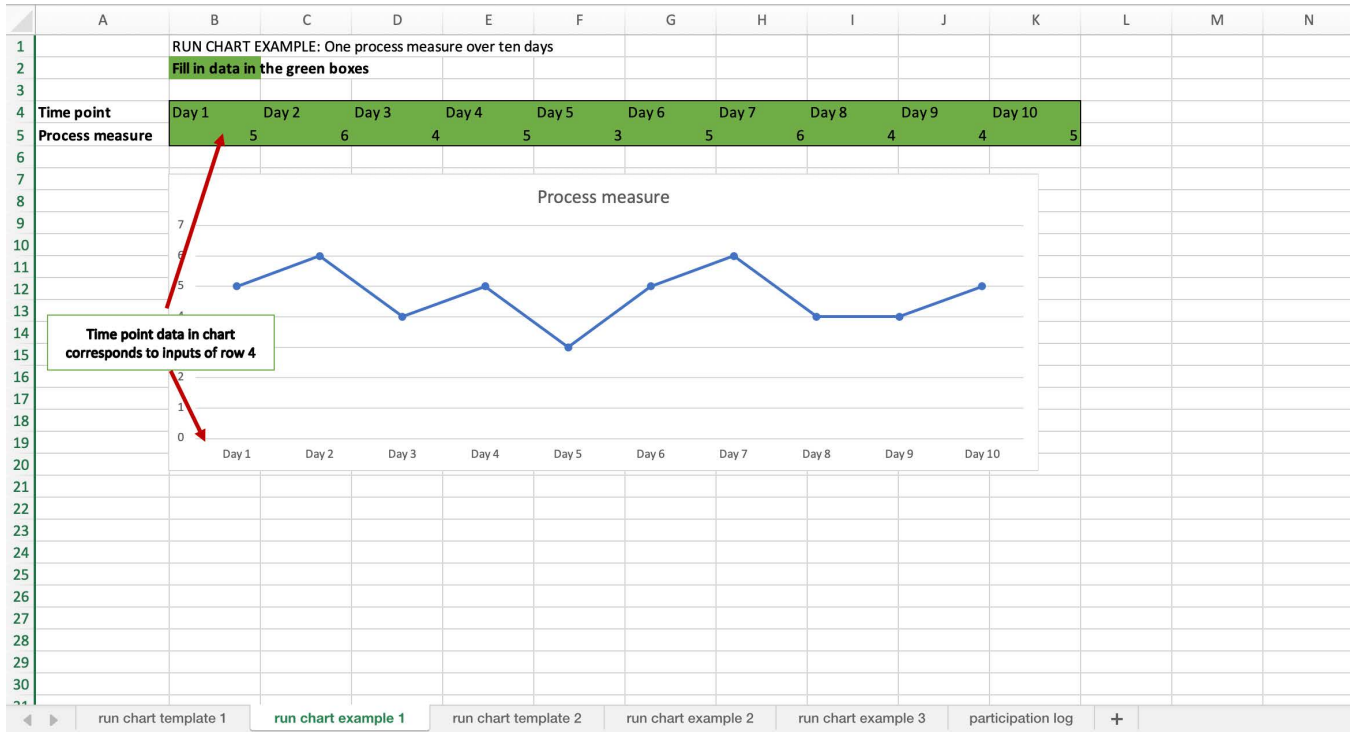
All the templates in the workbook have some cells shaded in green. Input your data in the green cells. Row 4 (“Time point”) is where you document the date of the observations. Row 5 (“Process measure”) is where you input the data collected as your process measure.



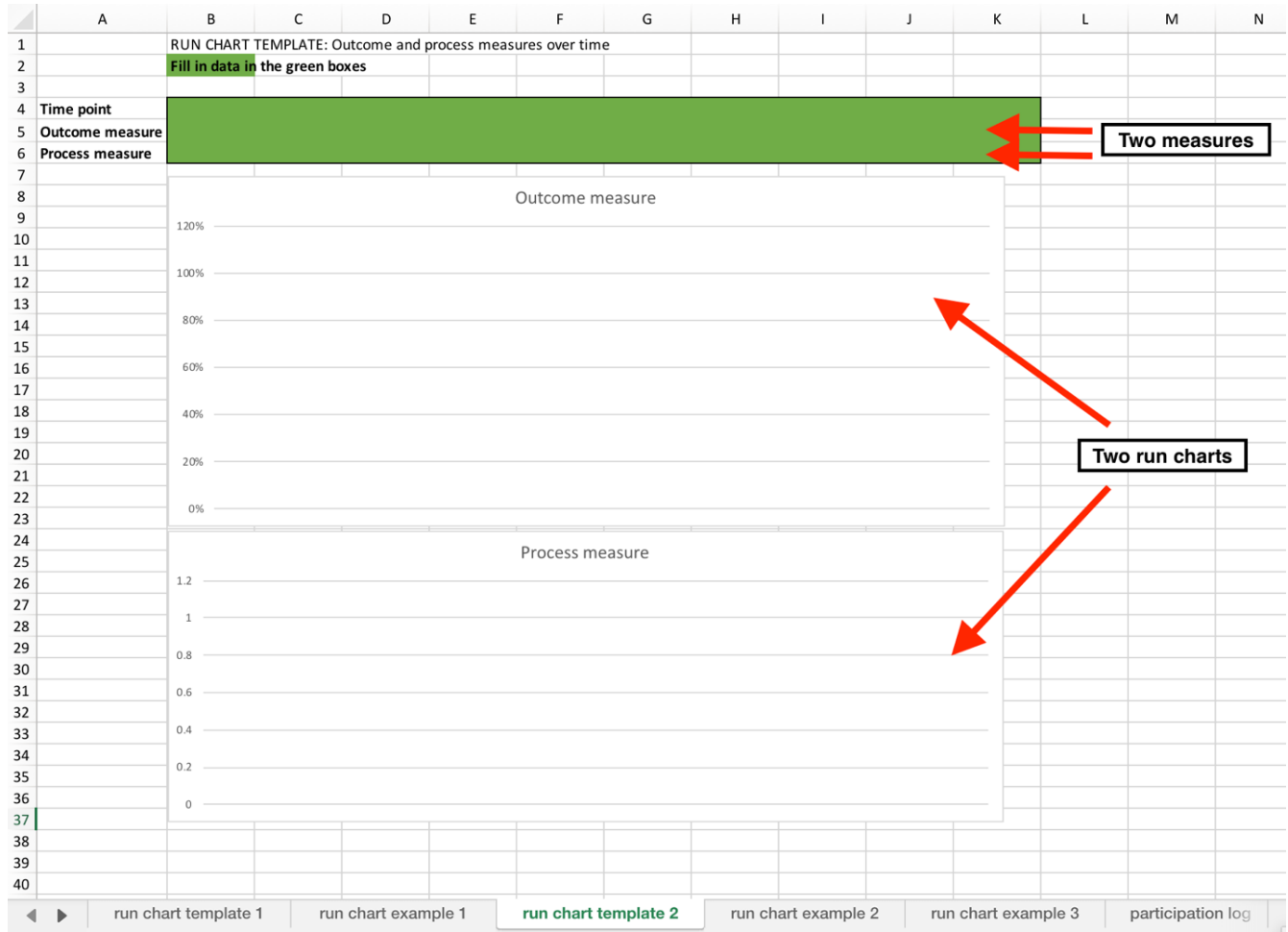
When you type your data into the green boxes, a run chart reflecting the data you entered will appear in the blank graph area. You can look at the second tab, *run chart example 1*, to see what this will look like with some sample data.

The templates currently contain enough room for 10 time points. There is no rule for how many data points should be included in the run chart, but 10 data points is generally a good aim, depending on the data being collected and the length of the cycle. If you have more data than that, the run chart will not automatically update with the additional data points. You can edit the chart and select a larger data range if that is needed for your data set. (If you are unsure about how to do this in your version of Excel, type “select data” in the Excel help box.)

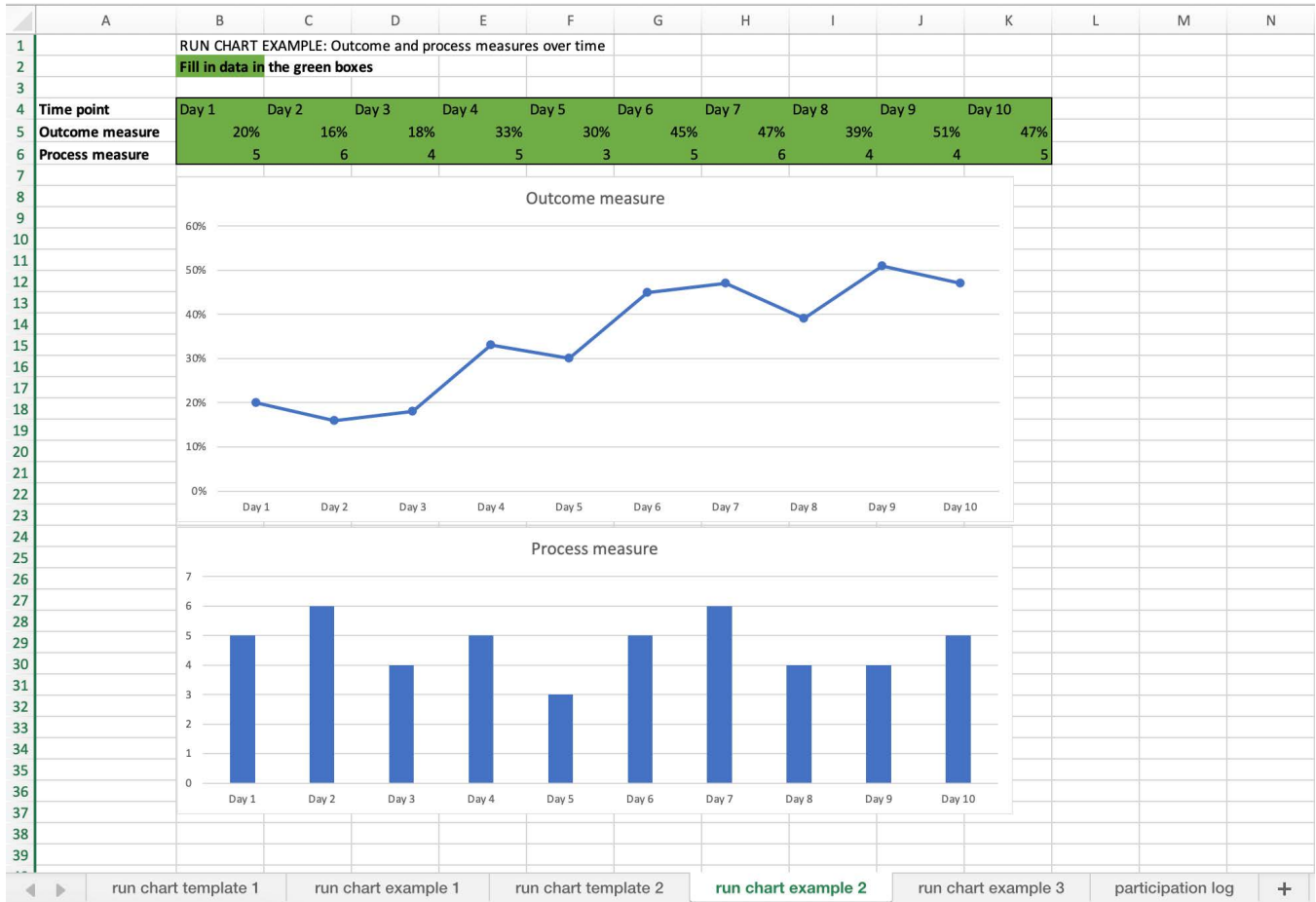
As you can see in the example below, whatever you type in for the time point data will show up in the run chart. The time points can be descriptive as in this example (“Day 1,” “Day 2”) or they can be actual dates or times.



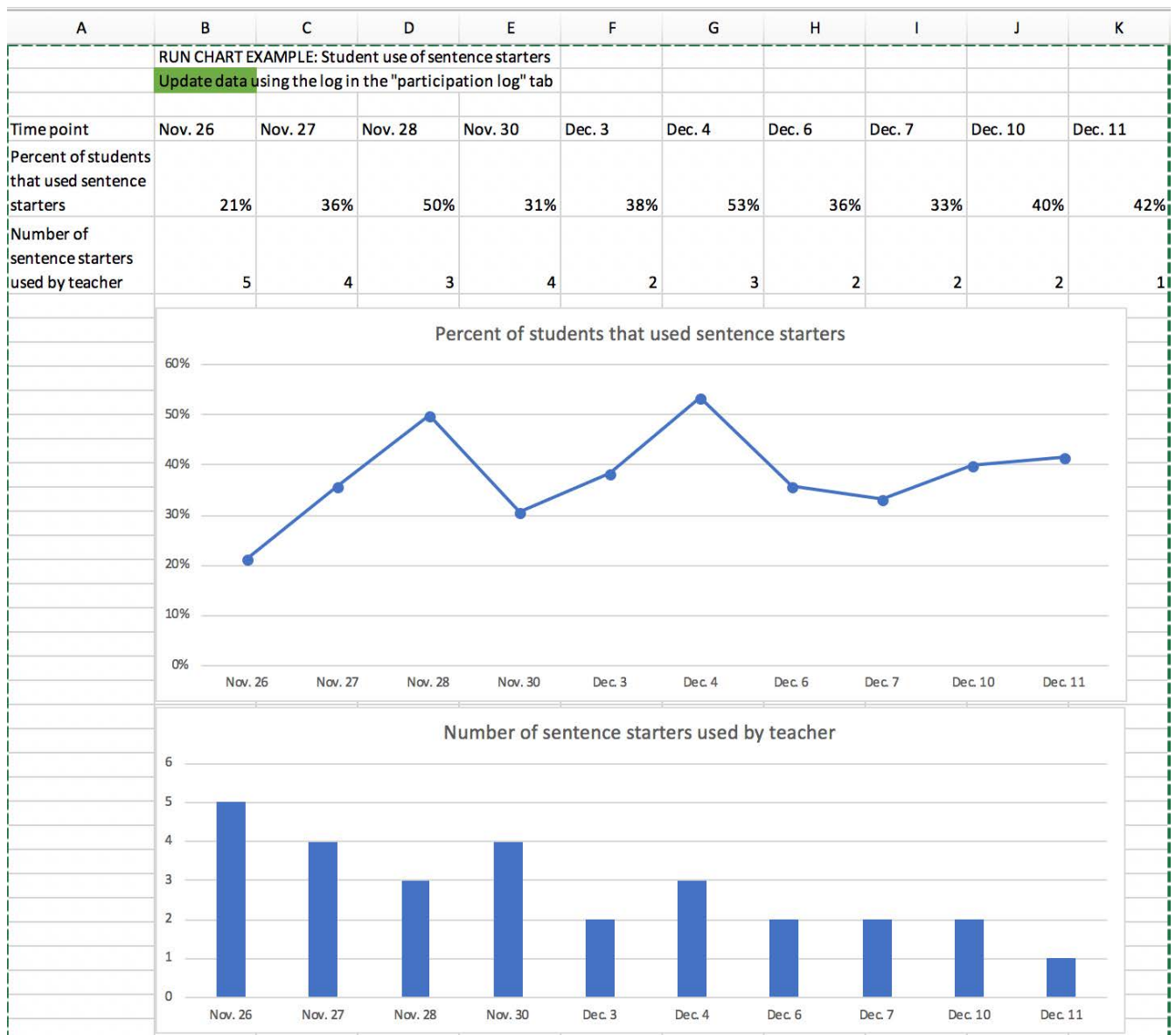
The worksheets *run chart template 2* and *run chart example 2* have charts for both an outcome and a process measure over time. There are two charts and an additional row of data, as you can see in the screenshot below.



The worksheet *run chart example 2* includes an outcome measure that is a percentage and a process measure that is a whole number, as shown below. *Run chart template 2* also has these defaults for the type of data expected (for example, a percentage or a whole number), but you can change it if that is not appropriate for your specific data. (Highlight the cells of data that are the wrong format and go to Format → Cells in the Excel menu.) The charts are lined up one on top of the other to help you visually identify any relationships or associations between the outcome and the process measures over time.



The worksheet *run chart example 3* also has both an outcome measure (percent of students that used sentence starters) and a process measure (number of sentence starters used by teacher). In this example the names of these measures are shown in the run charts. You can also see that the time points are actual dates.



Meetings 5–8. Examining results and related data

This is the first meeting where Improvement Team members examine data together. The structure and content of this meeting will be used for each “Study” phase of the Plan-Do-Study-Act (PDSA) cycle. This meeting is titled “Meetings 5–8” because it is assumed that the Improvement Team will engage in three to four PDSA cycles; however, this meeting should be repeated for as many PDSA cycles as the Improvement Team launches, before moving to Meeting 9. In each of these data discussion meetings, team members will review data and determine whether to adopt, adapt, or abandon the change practice as well as decide on data collection strategies for the next PDSA cycle.

Preparations

CI leader

- Reach out to Improvement Team members partway through the “Do” phase to check in about data challenges and strategies, using the questions in *Handout 20—Discussion protocol for data collection challenges and strategies* (p. II-71).
- Work with the data manager to ensure that PDSA cycle data are collected, summarized, and presented in an accessible way for discussion. This includes any use of graphs or charts.
- Decide and confirm who will facilitate the data discussion. Will this be the same person in every data-related meeting? Will facilitation rotate among members?
- Decide how data will be presented. Will data be presented on paper copies or projected on a screen for Improvement Team members to view. Will data be distributed in advance?
- Ask Improvement Team members to complete the pre-meeting reading for Meeting 5 (see next page) on examining data and making decisions based on results.

Improvement Team members

- Implement change practice and collect data as assigned.
- Follow prescribed procedures for submitting data.
- Complete the pre-meeting reading (see next page) on examining data and making decisions based on results.

Data manager

- Collaborate with the CI leader to reach out to Improvement Team members partway through the “Do” phase to check in about data challenges and strategies, using the questions in *Handout 20—Discussion protocol for data collection challenges and strategies* (p. II-71).

Materials needed

- Completed run charts and other summarized data from between meeting activity
- Plan-Do-Study-Act (PDSA) planning tool for this PDSA cycle (completed during Meeting 4 or revised at the end of a previous PDSA cycle)
- Pre-meeting reading: Data discussions and decisions* (p. II-60)
- Handout 18—Protocol for data dialogue* (p. II-65)
- Handout 19—Adopt, adapt, or abandon flow chart* (p. II-69 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout19_Adopt-adapt-abandon.pdf)
- Handout 20—Discussion protocol for data collection challenges and strategies* (p. II-71)
- Data from previous PDSA cycles, if this is not the first PDSA cycle for this change practice

- Ensure that all data are collected, summarized, and presented in an accessible way for discussion (refer to *Handout 17—Run chart templates and examples* on p. II-51 and https://ies.ed.gov/ncee/edlabs/regions/northeast/xls/handout17_Run-chart.xlsx).

Recorder

- Send the notes from Meeting 4 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for the meeting.

Pre-meeting reading: Data discussions and decisions

This pre-meeting reading will help Improvement Team members orient themselves to the processes, tools, and resources that will be used to support data discussion, analysis, and decisions in Meeting 5 and subsequent data dialogue meetings.

Data discussions

Handout 18—Protocol for data dialogue (p. II-65) guides the Improvement Team through the process of observing and analyzing the data. The protocol outlines five steps for holding a team data dialogue:

Step 1. Review the purpose of the data discussion to create a shared understanding of the goals and norms for the discussion and identify any significant data limitations. It is not necessary to uncover every limitation; however, if serious concerns arise about the utility of the data for assessing the change practice, the Improvement Team could consider postponing the data discussion until additional data are collected.

Step 2. Observe the data. Begin by describing the data with simple factual statements. Start with the simplest descriptions, attempting to avoid any inferences. Statements such as “10 students used sentence starters on Day 1, and 11 students used sentence starters on Day 2” are appropriate. Often, these simple statements are necessary to ensure that Improvement Team members are reading the data accurately.

Step 3. Make inferences based on the data. Inferences go beyond simple description to observations of the trends, patterns, outliers, and differences across subgroups revealed in the data. They might include statements such as “The number of students who used sentence starters increased from the first day to the second day” or “Students used two of the sentence starters much more than the others.”

Step 4. Interpret the data. Use the data to better understand the change practice. What evidence do the data provide related to the change practice? Determine what can realistically be learned about the change practice from the data and what cannot be learned. In other words what do the data not tell you? Statements at this step may include, “Students seem more comfortable using the ‘I notice’ sentence starter than the ‘I agree/disagree with...’ sentence starter. This may be because their listening skills are still limited and that sentence starter requires them to listen to their peers in class.”

Step 5. Conduct a pulse check on the data conversation. Conclude the data discussion with group reflection to “take the pulse of the group” related to the data discussion to identify what could be improved for future data discussions.

Common challenges with data discussions

The Improvement Team needs to be mindful of the challenges it may face during the discussion of the data and the many hazards that can derail the important process of interpreting and making sense of the data. These challenges include:

- *Moving too quickly to interpretation before fully examining the data.* In data dialogues people often move too quickly and draw conclusions based on experience and gut instincts without objectively considering the data at hand. By following the practice of describing the data before drawing conclusions, participants can put preconceived notions about what should or would happen to the side. A focus on data helps keep biases in check.

- *Being overwhelmed by data.* Excessive amounts of data can hinder progress, creating confusion and fatigue. An important role of the data manager is to prioritize and summarize data based on the Improvement Team’s focus for a given Plan-Do-Study-Act (PDSA) cycle, as described in the PDSA tool (completed during Meeting 4). Capturing the data that relate to the specific drivers and change practices will ensure that the most important data are presented in ways that support the development of decisions and action. The team can also consider eliminating data collection activities that are not yielding useful and actionable information. If in doubt, the data manager should consult with the CI leader or other team members for input and guidance.
- *Interpreting variation in data.* Whatever the change practice is, data are collected by different individuals operating in different contexts. For example, did classrooms have different populations, such as one classroom with a higher percentage of English learner students than the others? Were some implementers of the change practice administrators while others were teachers? Did the change practice take place in classrooms or after school programs, or both? Collecting data on where and how the change practice was implemented will help the Improvement Team better understand why discrepancies exist and where or how the change practice might be more successful.

Making decisions based on the data

After each change practice is tested, the Improvement Team reviews the data collected and determines whether to adopt, adapt, or abandon the change practice. During this step the team makes decisions about modifying or fine-tuning the tested change. This is also when the team decides whether and how to scale up the change practice or try it in different contexts.

Use the predictions made on the PDSA planning tool for this cycle (completed during Meeting 4) to guide decisions. Results that are consistent with predictions may indicate that the change practice is having the intended outcome and represents an improvement toward the aim, and the Improvement Team may want to continue testing to confirm the results or eventually implement the change practice on a wider scale. Results that are not consistent with predictions can be the result of implementation issues, if the change practice was not implemented as intended; the quality or sensitivity of the measures, if the measure is not picking up on changes that members of the Improvement Team believe is occurring; or a change practice that will not yield improvements related to the aim. Further testing may be necessary.

Handout 19—Adopt, adapt, or abandon flow chart (p. II-69 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout19_Adopt-adapt-abandon.pdf) will guide the Improvement Team at this stage. The flow chart will help the team reflect on how well it is implementing the change practice (through process measures), discern whether the change practice is resulting in improvement (through outcome measures), and assess whether the costs of the change practice are balanced against the benefits (through balancing measures).

The Improvement Team will usually determine that it should move forward by adapting the change practice or how it is implemented or measured. It is recommended that the team refrain from adopting or abandoning a change practice until after multiple PDSA cycles. This is because the team will usually need multiple attempts to determine that the change practice has been consistently implemented with high fidelity, to consistently see good results, and to consistently assess that the costs are reasonable. The team will also need multiple cycles to assess whether the change practice is achieving the desired results and to determine whether a larger change is needed.

Critical questions before moving forward include:

- *Adopt: Should the change practice be tested on a larger scale?* If the Improvement Team saw actual improvement and positive movement toward the outcome, it may be time to implement the change practice on a larger scale, in more classrooms or schools. Several PDSA cycles are recommended before this option is selected.
- *Adapt: Does the change practice need to be adjusted?* If adjustments are needed to the change practice, to a process related to implementing the change practice, or to data collection, the Improvement Team will make the changes and go through another PDSA cycle. This is the most common scenario. Repeating the cycle without making any changes to collect more data is also an option.
- *Abandon: Should the change practice be abandoned?* If the Improvement Team concludes that the change practice that was tested was implemented well but did not achieve the desired outcomes or that process or balance measures indicate that the approach is not likely to achieve the desired outcomes, it may be appropriate to abandon a change practice. In that case, return to the driver diagram and consider whether a new change practice should be introduced and tested.

Meetings 5–8

Goals

- Review tools and processes for examining data (Meeting 5 only).
- Examine data (“Study”) collected during the “Do” phase of the PDSA cycle.
- Decide how to proceed in light of the data (“Act”).
- Determine steps for the next PDSA cycle, if applicable (“Plan”).

Agenda (90 minutes)

Topic	Materials	Time
Welcome, review of agenda and goals, and discussion of pre-meeting reading	Toolkit, including a customized agenda; pre-meeting reading	15 minutes
Watch and discuss Video 5 on data in continuous improvement (Meeting 5 only)	Video 5 (https://youtu.be/jb7PkjMsxdw)	10 minutes
Activity: Data dialogue	Toolkit, <i>Handout 18—Protocol for data dialogue</i> (p. II-65)	30 minutes
Activity: Discuss the adopt, adapt, or abandon flow chart	Toolkit, <i>Handout 19—Adopt, adapt, or abandon flow chart</i> (p. II-69 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout19_Adopt-adapt-abandon.pdf)	15 minutes
Activity: Discussion of data collection challenges and strategies	<i>Handout 20—Discussion protocol for data collection challenges and strategies</i> (p. II-71)	10 minutes
Wrap up and next steps	Toolkit, PDSA planning tool for this PDSA cycle (completed during Meeting 4 or revised at the end of a previous PDSA cycle)	10 minutes

Welcome, review of agenda and goals, and discussion of pre-meeting reading (15 minutes)

Note to meeting facilitator

Determine in advance who will facilitate the data discussion. This can be the meeting facilitator or someone else from the Improvement Team. The role of the data dialogue facilitator is to use *Handout 18—Protocol for data dialogue* to move the team through the steps of a productive data discussion. Before starting the discussion, the meeting facilitator or data dialogue facilitator should remind the team of the steps of the discussion, emphasizing the importance of observing the data before moving to interpretation and basing interpretations on the data. The data dialogue facilitator should also monitor participation and help engage everyone in the discussion.

Begin the meeting with a welcome, a review of the agenda and goals, and a short discussion of the pre-meeting reading. Review:

- The steps in the data dialogue.
- Common data dialogue challenges.
- Considerations for adopting, adapting, or abandoning a change practice.

Watch and discuss Video 5 on data in continuous improvement (Meeting 5 only) (10 minutes)

Video 5 (available at <https://youtu.be/jb7PkjMsxdw>) shows the teachers and principal from Grove Elementary School reflecting on the data collection and data study aspects of their continuous improvement effort. After viewing the video, discuss:

- What challenges the teachers described in collecting data.
- What benefits the teachers saw in systematically collecting and reviewing data.

Activity: Data dialogue (30 minutes)

Present run charts and other summarized data so that all Improvement Team members can see them. Use the series of steps in *Handout 18—Protocol for data dialogue* (see next page) to examine and discuss the data collected during the PDSA cycle. Summarize findings in the “Results” column of the PDSA planning tool for this PDSA cycle.

Handout 18. Protocol for data dialogue

Step 1. Review the purpose of the discussion. Create a shared understanding of the goals and norms for the discussion and identify any significant data limitations. It is not necessary to uncover every limitation; however, if serious concerns arise about the usefulness of the data for assessing the change practice, consider postponing the data discussion until additional data are collected.

Discussion prompts:

- The purpose of this Plan-Do-Study-Act (PDSA) cycle was to test the following change practice:

- Today we are discussing data from the following sources: _____
- Were there significant problems that may have influenced the results? These may include problems with implementing the change practice or collecting data. Should we proceed with the discussion or postpone until these problems are resolved?

Step 2. Observe the data. Describe the data with simple factual statements. Start with the simplest descriptions, attempting to avoid any inferences.

Discussion prompts:

- Describe the data. For example, “Teachers used sentence starters in 7 class periods during the 4-week cycle” or “Six students used sentence starters the first time we collected data and 14 students used sentence starters the final time we collected data in this cycle.”
- Are you reading the data accurately? Is anything about the data unclear?

Step 3. Make inferences. Observe trends, patterns, outliers, and differences across subgroups revealed in the data.

Discussion prompts:

- What patterns or lack of patterns do you see in the data? For example, “Students increased their use of sentence starters over the course of the cycle” or “Boys used the sentence starters more than girls.”

Step 4. Interpret the data. Discuss how the data help you understand the change practice. What evidence do the data provide related to the change practice? Determine what can realistically be learned about the change practice from the data and what cannot be learned. In other words, what do the data not tell you?

Discussion prompts:

- To what extent do the data provide evidence that the change practice is leading to the targeted outcomes?
- How might variation in contexts explain any variation in results?
- What hypotheses and assumptions do the data confirm or not confirm?

- What conclusions can we make, based on the data?
- What are the limitations of the data and any conclusions we are making? Are there any contextual, implementation, or data quality factors we should consider in making conclusions?
- Do these data provide the evidence we need or do we need to collect additional/different data? What additional data might we need?

At the conclusion of this step, stop and record the results in the PDSA planning tool for this PDSA cycle.

Step 5. Conduct a pulse check on the data conversation. Conclude the discussion with group reflection to “take the pulse of the group” related to the data discussion. This will help identify what could be improved for future data discussions.

Discussion prompts:

- Did the presentation of data make it easy to understand and interpret the data?
- What might be helpful to change for next time, before, during, or after you look at the data, to help you decide to adopt, adapt, or abandon?

Activity: Discuss the adopt, adapt, or abandon flow chart (15 minutes)

Use *Handout 19—Adopt, adapt, or abandon flow chart* (p. II-69 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout19_Adopt-adapt-abandon.pdf) to help decide how to proceed with the change practice. Follow the flow chart to answer questions about fidelity of implementation of the change practice and about evidence that the change practice is an improvement. After a single cycle the most likely decision will be to repeat the change practice, perhaps with adaptations. Employing an adopt, adapt, or abandon framework is a common approach to making decisions about what to do after one or more cycles of testing a change practice (Örtenblad, Löfström, & Sheaff, 2015). The flow chart is a guide to help the Improvement Team make decisions. But the team is not required to follow the direction of the flow chart. There may be circumstances in which a path different from what the flow chart outlines makes sense to pursue.

Consider the following questions in assessing whether to adopt, adapt, or abandon the change practice:

- *Was the change practice implemented with fidelity?* Reflect on whether the change practice was enacted as expected. High fidelity of implementation is required for confidence that any improvement is likely to be the result of the change practice. To assess fidelity of implementation, review the data collected through process measures from the PDSA planning tool for this PDSA cycle. If the process measures do not provide enough evidence to determine how well the change practice has been implemented, the Improvement Team automatically goes into the middle “Somewhat” path of the flow chart.
- *Is there evidence that the change practice is associated with improvement?* If the Improvement Team is moving forward with high fidelity, turn to whether the change practice is resulting in improvement and whether the improvement is balanced against its costs (the green boxes on the left). Assess these questions using the outcome measures and balancing measures from the PDSA planning tool for this PDSA cycle. If the evidence from these measures is positive—meaning the change practice is credibly associated with improvement and the costs are acceptable—and if the evidence is positive across multiple PDSA cycles, the team is ready to adopt this change practice. Move forward to Meeting 9 and decide whether to begin testing a new change practice or to work on scaling the change practice to a larger audience.
- *Is there interest in trying to improve implementation?* If the Improvement Team is implementing the change practice with low fidelity, inconsistent fidelity, or no fidelity, discuss whether the team has the interest and capacity to engage in this change practice. The teams may feel pressured to pick change practices that people in positions of leadership think they “should be doing” or the team may be influenced by the sentiment “everyone is doing this, so we should too.” Selecting change practices without having an earnest desire to test them can result in poor implementation and a lack of progress. If the team is interested in testing the change practice, keep moving forward with it. But if the team is not interested or capable, the best thing to do is to explicitly abandon the idea, regroup, and select a new change practice backed by active interest.

It is likely that after a single or even a few cycles the Improvement Team will follow *Handout 19—Adopt, adapt, or abandon flow chart* (p. II-69 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout19_Adopt-adapt-abandon.pdf) and arrive at the recommendation to adapt the change practice and conduct another PDSA cycle. There are many different ways to adapt a change practice, and it is important to connect the correct type of adaptation to the pathway the team took through the flow chart:

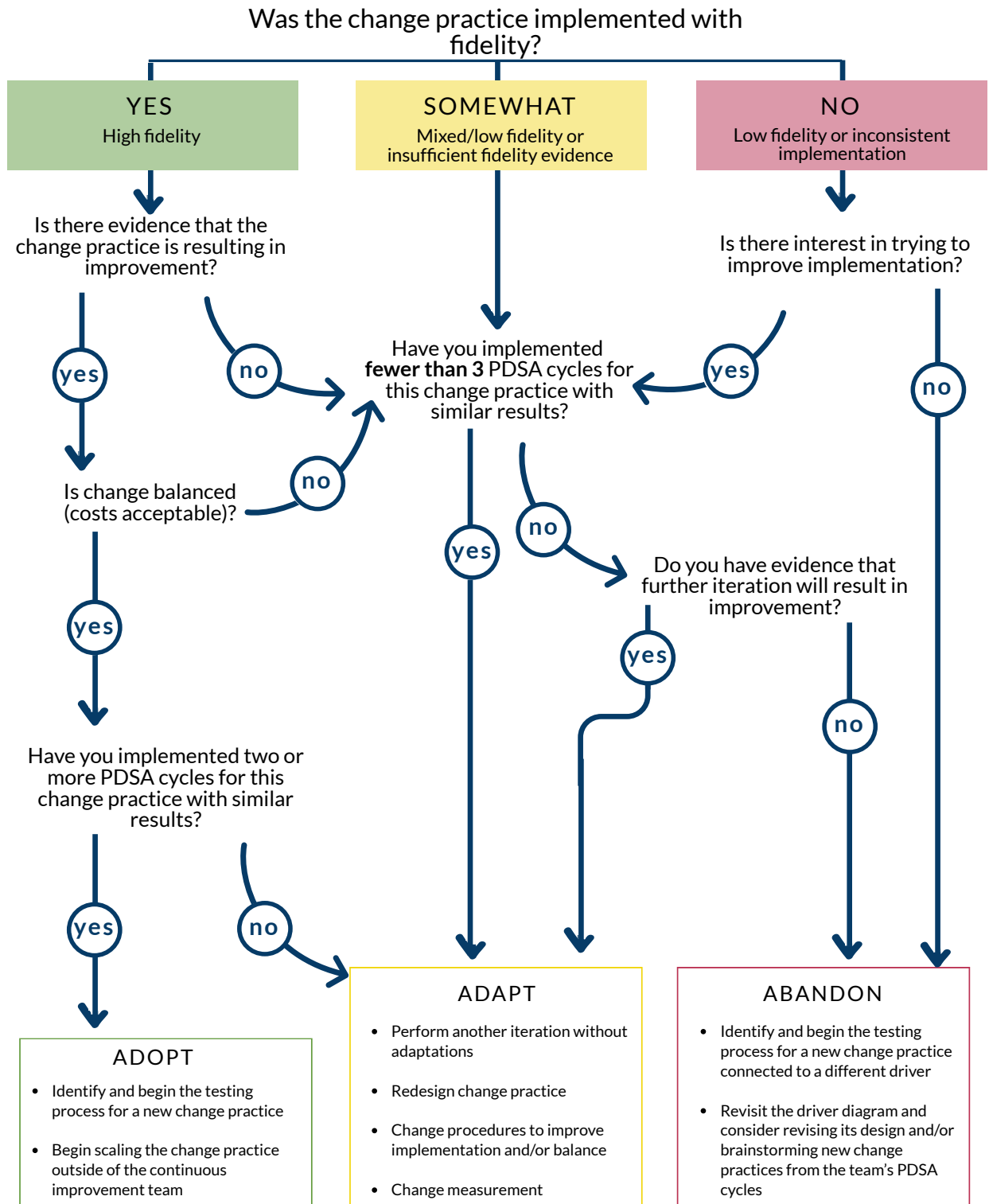
- *Change measurement.* If the Improvement Team reached the adapt recommendation because of any “not sure” pathways, consider adapting the work by changing the process, outcome, or balancing measures, as appropriate. Continuous improvement work is grounded in the collection, analysis, and review of evidence. The team cannot move forward in its work without sufficient evidence.

- *Change procedures to improve implementation.* If the Improvement Team reached the adapt recommendation because the change practice was too costly, consider streamlining it. Reducing the burden of implementation will improve both the fidelity of implementation and the balance of the improvement against the costs.
- *Redesign the change practice.* If the Improvement Team is not seeing improvement from the change practice, but implementation is occurring with fidelity, redesign the change practice. If evidence suggests that the change practice as it is currently designed will not result in the progress needed, make adjustments or modifications to the practice.
- *Perform another iteration without adaptations.* Doing another cycle as-is can be an appropriate adaptation. In fact, often several cycles of testing a change practice prior to adopting the practice is best, to confirm the consistency of positive results. The Improvement Team will not want to tinker with a change practice that is working well. It could also be the case that the team is getting used to the change practice and would like to improve implementation with another PDSA cycle.

Handout 19. Adopt, adapt, or abandon flow chart



Adopt, adapt, abandon flow chart



Activity: Discussion of data collection challenges and strategies (10 minutes)

Handout 20—Discussion protocol for data collection challenges and strategies (see next page) guides discussion of what is working and what is most challenging in collecting data. Asking the questions before embarking on the next PDSA cycle will help the Improvement Team address any problems encountered in collecting and analyzing data in this cycle. It may also be valuable to check in with team members before the end of the cycle, through an email or short meeting, to discuss these questions and surface any issues.

Handout 20. Discussion protocol for data collection challenges and strategies

- What data collection activities worked well in terms of time spent, data quality, and usefulness of results?
- What data collection activities did not work well?
- Do we need to address the feasibility of data collection for the Improvement Team or other practitioners? If so, how can we improve the feasibility of data collection, keeping in mind the goal of practical data collection?
- Do we need to improve data quality? How can we do so?
- What data collection strategies from this cycle should we use again next cycle? What new data collection strategies and activities should we use?

Wrap up and next steps (10 minutes)

Plan for the next PDSA cycle or move to reflecting on multiple PDSA cycles (Meeting 9). To plan for the next PDSA cycle, refer to *Handout 15—Template for the Plan-Do-Study-Act planning tool* (p. II-44 and https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/handout15_PDSA-template.pdf) to:

- Review the change practice, including any adaptations that will be made, and discuss what high-quality implementation of the change practice entails to ensure a common understanding.
- Record who is going to be testing the change practice and how often the change practice is going to be tested.
- Review the data collection plan and assign responsibility for adjusting any of the measurement tools.
- Set the next PDSA meeting date and time.

CI leader

- Follow up with the Improvement Team members responsible for preparing for the next PDSA cycle, if applicable. This includes those who will prepare documentation about any adjustments to the change practice or to data collection tools or templates.
- Disseminate the materials needed to implement the change practice, if applicable.
- Communicate with implementers about the timing of change practice implementation and data collection. Check in regularly with implementers and data collectors to ensure that the change practice and data collection are occurring as planned and to determine whether additional resources and supports are needed.
- Work with the data manager to monitor data quality.
- If the Improvement Team has conducted several PDSA cycles and is moving on to Meeting 9, compile data and documents from this series of PDSA cycles, organized chronologically.

Improvement Team members

- Implement the change practice.
- Communicate with the meeting facilitator or the data manager about progress, challenges, and support needs.
- Collect and submit data.
- If the Improvement Team has conducted several PDSA cycles and is moving on to Meeting 9, review material provided and complete the pre-meeting reading on reflecting on multiple PDSA cycles. Come to the meeting prepared to discuss learning and next steps.

Data manager

- Make any necessary adjustments to tools or processes for collecting, compiling, or managing data.
- Follow any procedures the Improvement Team has identified for monitoring and improving data quality.

- Collect, compile, and prepare data for the next Improvement Team discussion.
- If the Improvement Team has conducted several PDSA cycles and is moving on to Meeting 9, combine data and create run charts spanning all the PDSA cycles. If this is not feasible given changes in the measures, ensure that the individual cycle run charts are available and organized chronologically to allow team members to visualize a flow of time.

Recorder

- Document decisions made during the PDSA cycles and keep track of the completed PDSA planning tools from each cycle.
- Send the notes from Meeting 5 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for Meeting 9.

Meeting 9. Reflecting across multiple Plan-Do-Study-Act cycles

The purpose of this meeting is to reflect across several Plan-Do-Study-Act (PDSA) cycles and synthesize the data that the Improvement Team has collected and the lessons learned across several tests of one or more change practices. The team will also decide how to proceed with the continuous improvement effort. The correct timing for this meeting depends on the team's schedule and progress. For example, at one school the team may run short two-week PDSA cycles. In that case, after three months the team will have conducted six PDSA cycles, probably implementing more than one change practice. Another team may run month-long PDSA cycles and, over the course of three months, have conducted three PDSA cycles, all focused on adaptations of a single change practice. At a minimum the team should conduct at least three PDSA cycles before this meeting since the purpose of this meeting is to reflect on the overall value of the change practice and determine the team's next steps. It is important to have several cycles completed to make any clear observations about the change practice and the status of the team's work.

Materials needed

- Completed Plan-Do-Study-Act (PDSA) planning tools from each PDSA cycle
- Run charts and other data collected during the PDSA cycles
- Documentation of decisions made during PDSA cycles (from adopt, adapt, or abandon flow chart and meeting notes)
- Completed driver diagram (from previous meetings)
- Pre-meeting reading: Reflecting on multiple Plan-Do-Study-Act cycles*
- Handout 21—Discussion questions for reflecting on multiple Plan-Do-Study-Act cycles (p. II-78)*

Preparations

CI leader

- Work with the data manager to compile data and documents from this series of PDSA cycles, organized chronologically. This includes the completed PDSA planning tools for each PDSA cycle, additional meeting notes, and run charts for the cycles.
- Ask Improvement Team members to complete the pre-meeting reading (see next page) on reflecting on multiple PDSA cycles.

Improvement Team members

- Review material provided and complete the pre-meeting reading (see next page) on reflecting on multiple PDSA cycles.
- Come to the meeting prepared to discuss your learning and next steps.

Data manager

- Combine data and create run charts spanning all the PDSA cycles. If this is not feasible given changes in the measures, ensure that the individual cycle run charts are available and organized chronologically to allow Improvement Team members to visualize a flow of time.

Recorder

- Share documentation of decisions made during the PDSA cycles with the meeting facilitator and CI leader.
- Prepare to take notes for the meeting.

Pre-meeting reading: Reflecting on multiple Plan-Do-Study-Act cycles

Review work to date

In preparation for the cross-cycle reflection meeting, review these materials:

- Completed Plan-Do-Study-Act (PDSA) planning tool(s) reflecting the work for each cycle.
- Completed run charts.
- Additional meeting notes or other decision tracking documentation.

Synthesize learning

The goal in reviewing all these materials is to take a broad view of the information contained in the documents and to find connections, comparisons, or contrasts between the PDSA cycles. The Improvement Team will identify the lessons learned that go beyond what any individual cycle would teach on its own. The three guiding questions from the Model for Improvement should guide the reflection and conversation:

- *What problem are we trying to solve?* The Improvement Team developed the driver diagram, with an overarching aim statement, early in the continuous improvement effort. The aim statement focused work and built a shared understanding of the team’s ultimate goal. The aim is purposefully documented at the top of the PDSA planning tool for each cycle to continually orient the team toward this goal. Depending on the nature of the aim statement, the team may or may not have collected data directly related to the aim statement that it can refer to at this point. For example, an aim statement related to increasing classroom participation may have data associated with it and therefore the team can evaluate progress toward the aim during each PDSA cycle, whereas an aim statement related to annual state tests would not have related data collected as part of the PDSA cycles. Rather, the team would focus on outcome data related to the drivers, which the team has hypothesized are related to the overall aim of improving student achievement.
- *What change might we introduce and why?* This is one of the core questions that the Improvement Team explored in initial meetings as it mapped out the fishbone and the driver diagrams. The team selected change practices that members expected would contribute to improvements. Then the team made decisions in each cycle about whether to adopt, adapt, or abandon the change practice.
- *How will we know that a change is an improvement?* This is the core question of Meetings 5–8 and guides the “Study” phase of each PDSA cycle. The Improvement Team’s task with each cycle is to review and reflect on the data collected to evaluate this question for each test of change practice, whether it is a new change practice or an adaptation of a prior change practice. During this reflection meeting the team’s goal is to consider whether the change practice has resulted in improvement toward the aim. To do so, it must consider whether data from several PDSA cycles indicate that improvement is occurring.

Deciding whether to implement a change practice

One goal for this reflection meeting is to decide whether to conduct additional PDSA cycles or to transition efforts toward implementing the tested change practices as usual practice in the school or district. The team should

decide together whether there is enough evidence of improvement to transition from the testing phase to the implementation phase of the continuous improvement work.

There are several considerations to think through in making this decision:

- *Progress toward the aim statement.* Sometimes a single well implemented change practice will result in significant improvement on its own. In that case implementing a single change practice could be a worthwhile endeavor. However, the Improvement Team often determines that a single helpful change practice is insufficient to make the needed progress toward the aim. In that case the team may find it necessary to further develop a “change packet” of multiple change practices before working on transitioning to implementing the change practice.
- *Understanding of the change practice or change packet.* Implementing a change practice or change packet requires the Improvement Team to understand what the change practice or change packet is, when to use it, how to maximize its value, and why it is resulting in improvement. Even with evidence that a change practice or change packet is associated with significant improvement, it is important to assess whether the team is prepared to train and support greater implementation. If not, another cycle focused on developing this level of understanding may be needed before implementing the change practices.
- *Schedule.* How does the work the Improvement Team has done to identify, implement, and study change practices to date fit into the larger context? Most school-based teams align their PDSA cycles with the academic year, academic semester, or some other significant scheduling consideration. Given the current date, assess whether the team has time to conduct additional tests of change practice. If not, it may be best to redirect efforts to documenting the team’s existing knowledge for use in the next semester or next year, even if the team has not yet fully realized the aim statement.

Meeting 9

Goals

- Review the findings from the multiple PDSA cycles.
- Synthesize data and decisions.
- Decide how to proceed with the continuous improvement effort.

Agenda (90 minutes)

Topic	Materials	Time
Welcome and review of agenda and goals		10 minutes
Activity: Review work to date and reflect on multiple PDSA cycles	Completed PDSA tools, run charts, decision documentation, and driver diagram from each PDSA cycle; <i>Handout 21—Discussion questions for reflecting on multiple Plan-Do-Study-Act cycles</i> (p. 11-78)	45 minutes
Activity: Decide whether to implement a change practice		25 minutes
Wrap up and next steps		10 minutes

Welcome and review of agenda and goals (10 minutes)

Begin the meeting with a welcome and a review of the agenda and goals. Ensure that everyone has the appropriate materials for the meeting. Give Improvement Team members a few minutes to review the materials before launching into the first activity.

Activity: Review work to date and reflect on multiple PDSA cycles (45 minutes)

Note to meeting facilitator

Support the Improvement Team in keeping the discussion focused on evidence and the documents compiled for this meeting. If participants are focused on sharing opinions or inferences without explicit connections to the team's work, use some of the following questions to refocus the conversation:

- Where are you seeing that in our data?
- Can you show me what is leading you to that conclusion?
- Are you sure? How could we check that?

In preparation for this meeting, Improvement Team members should have reviewed the following materials:

- Completed PDSA planning tools for each cycle.
- Completed run charts.
- Additional meeting notes or other decision tracking documentation.

Step 1. Spend a few minutes independently reviewing the collected work to date, focusing on what the change practice was, what evidence the Improvement Team collected, and what decisions the team made.

Step 2. As a team, work through *Handout 21—Discussion questions for reflecting on multiple Plan-Do-Study-Act cycles* (see next page).

Handout 21. Discussion questions for reflecting on multiple Plan-Do-Study-Act cycles

Discuss the following questions in whatever order makes the most sense to the Improvement Team. The team may bounce back and forth among several questions. Some of the questions may be more relevant than others, given the results of the Plan-Do-Study-Act (PDSA) cycles.

- *Is the Improvement Team making progress toward its aim statement based on the evidence collected thus far?* Consider whether the outcome measures for each PDSA cycle are providing meaningful evidence that might suggest progress toward the overall aim. For example, if the team is collecting measures of student engagement in math class and sees improvement in student engagement, does the team believe this progress is the result of the change practice?
- *Does the Improvement Team see improvement across cycles that it didn't see when looking at a single cycle?* Consider a team that tested and adapted a change practice across four PDSA cycles. Each individual cycle may not have resulted in much change at all, perhaps improving student participation from 50 percent to 56 percent in the first PDSA cycle, from 56 percent to 62 percent in the second PDSA cycle, and so forth. However, across four cycles the improvement appears to jump from 50 percent to 74 percent. This tells a story about improvement that is very different from that told by any one PDSA cycle on its own.
- *Does the driver diagram contain the best change practices to make improvements toward the aim?* Now that the Improvement Team has been through several PDSA cycles, it may have new ideas about the change practice inspired by what it learned in implementing the change practice thus far. The team may also want to consider conducting additional searches for effective evidence-based practices.
- *Is the Improvement Team working on the right drivers?* If the team is not seeing significant progress toward the aim, it could reflect on which drivers have been the focus of the effort and consider whether another driver might lead to a more effective approach.
- *Does the driver diagram need to be revised?* If the Improvement Team has evidence from the prior cycles suggesting that some of the primary or secondary drivers are being realized but are not creating progress toward the aim, the team may want to revisit and revise the driver diagram to remove some of those drivers and include new drivers that it believes are more directly related to the aim.
- *Based on the evidence, what has the Improvement Team learned that might be relevant to other change practices or adaptations?* What has the team learned through the PDSA cycles that will inform choices about what to test next, how to effectively implement a change practice, or what data are most feasible and relevant to collect?
- *Does the Improvement Team need to change the outcome, process, or balancing measures?* If the team is not seeing meaningful or actionable data or if the team has difficulty synthesizing knowledge across multiple PDSA cycles, changes to the measures may be warranted.

Activity: Decide whether to implement a change practice (25 minutes)

Step 1. As a team, discuss the following questions:

- If other people received similar results to what we are seeing, would we consider that “good enough” progress?
- How much more do we think we can learn with another series of PDSA cycles?
- Do we understand what we’re doing well enough to train other people to do it?
- What external factors, such as scheduling, might influence our ability to continue testing or to implement, or both?

Step 2. As a team, decide whether to conduct another series of PDSA cycles, to revisit the driver diagram to revise drivers or change practices, or to transition to implementing the change practice.

At this point, the Improvement Team will confirm the next step for the improvement effort.

- If the team decides to revisit the driver diagram, go back to Meeting 3 to prepare for revisions or develop a new driver diagram.
- If the team decides to engage in another series of PDSA cycles, go back to Meeting 4 to prepare for the next test of change practice.
- If the team decides to transition to implementing the change practice or a set of change practices, go to Meeting 10.

Regardless of which path the team takes, be sure to celebrate your progress before concluding Meeting 9.

Wrap up and next steps (10 minutes)

Celebrate progress

It is important in this reflective meeting to allocate time for acknowledging and validating the progress that the Improvement Team has made. Even if the team has hit some stumbling blocks, there is always something that can be gleaned from the work.

Give all participants a chance to contribute to the discussion. First allow a few minutes for quiet reflection; then invite Improvement Team members to share their thoughts. Consider using the following sentence starters (or use your own):

- I used to think... and now I think...
- I am most proud of...
- I/We have been challenged by... and are overcoming it by...

Adding “because of...” to any of the above pushes the reflection deeper.

Adding “as evidenced by...” to any of the above connects your larger experience to your improvement work.

Next steps

The next steps will depend on the path the Improvement Team will make. If the team decides to revisit the driver diagram, go back to Meeting 3 for pre-meeting activities and readings. If the team decides to implement another series of PDSA cycles, go back to Meeting 4 to review the pre-meeting activities and reading. If the team decides to transition to implementing the change practice or a set of change practices, the next steps are provided below.

CI leader

- Seek out information and input from the appropriate stakeholders to understand when, by whom, and where the change practice or change packet will be implemented. Consider how much time will be required to document, train, and prepare for the implementation of the change practice.
- Ask Improvement Team members to complete the pre-meeting reading for Meeting 10 on preparing for implementation of a change practice.

Improvement Team members

- Complete the pre-meeting reading for Meeting 10 on implementation of a change practice.
- Reflect on and be prepared to discuss details of the change practice that will need to be communicated to new implementers. Also reflect on the continuous improvement effort more generally and be prepared to discuss what has worked well and what could be improved.

Data manager

- While the data manager will not have any designated tasks before Meeting 10, it is wise to be sure all data are in order and all data collection and storing processes have been documented.

Recorder

- Send the notes from Meeting 9 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for Meeting 10.

Meeting 10. Preparing to implement a change practice more broadly

The purpose of this meeting is to begin planning for implementation of the change practice so that it becomes business as usual in the intended setting.² Although the Improvement Team may not be responsible for supporting full implementation of the change practice, the team does have a responsibility to take what has been learned about the change practice through the Plan-Do-Study-Act (PDSA) cycles and help the school or district prepare for further or full implementation.

Preparations

CI leader

- Bring information collected from stakeholders about when, by whom, and where the change practice will be implemented.
- Ask Improvement Team members to complete the pre-meeting reading (see next page) on preparing for implementation of a change practice.

Improvement Team members

- Complete the pre-meeting reading (see next page) on preparing for implementation of a change practice.
- Reflect on and be prepared to discuss details of the change practice that will need to be communicated to new implementers. Also reflect on the continuous improvement effort more generally and be prepared to discuss what has worked well and what could be improved.

Data manager

- None.

Recorder

- Send the notes from Meeting 9 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.
- Prepare to take notes for the meeting.

Materials needed

- Existing documentation of the change practice, such as description of practices or procedures
- Pre-meeting reading: Planning for scale up* (p. II-82)
- Handout 22—Template for outlining a change practice* (p. II-85)
- Handout 23—Template for communicating about a change practice* (p. II-87)
- Handout 24—Completed template for communicating about a change practice for the Grove Elementary School example case* (p. II-88)
- Handout 25—Template for implementation planning* (p. II-91)
- Handout 26—Protocol for reflecting on the continuous improvement effort* (p. II-92)

2. The documentation for this meeting refers to a single change practice, but it applies equally to a series of change practices (a “change packet”).

Pre-meeting reading: Planning for scale up

The purpose of the Plan-Do-Study-Act (PDSA) cycles (Meetings 4–8) is to test change practices and determine whether they are resulting in improvement. Once the Improvement Team concludes that a change practice³ is an improvement toward the overall aim and has decided to implement it as usual practice (Meeting 9), the focus shifts to planning for implementation. Successful implementation requires the team to formalize and document the change practice and develop or identify the supports and resources needed for initiating and sustaining implementation.

Formalizing the change practice

As Improvement Team members think about involving additional individuals and sites in implementing a change practice, they should use what they have learned from the PDSA cycles in answering:

- *What are the individual steps that make up the change practice, and how do they work?* Practitioners will not be successful in implementing the change practice without a clear explanation of what the specific steps are. Written descriptions should include the essential components of the change practice with operational definitions (including acceptable and unacceptable variations of the practice), steps, and procedures.
- *Who will be involved in implementing the change practice?* The Improvement Team should be specific about which people are taking which actions. This may be a simple question for the team if, for example, all math teachers are enacting the change practice in the same way. In other cases different groups of actors may need to take different actions, and the team should make this clear.
- *In what contexts and for what populations is the change practice intended?* Users of the practice will need information about the contexts in which the practice should be implemented and the intended population. For example, it may be implemented during math instruction for all grade 5 students or for students who are not reaching specified benchmarks.

The amount and type of documentation needed will depend on the complexity and nature of the change practice.

Preparing for successful implementation of a change practice

Changing adult behaviors in complex organizations such as schools and districts is not easy. Any change practice proposed by the Improvement Team, simple or complex, will require changes in the behaviors of individuals and possibly in how the school or district operates. The team can play a critical role in preparing for successful implementation. The following strategies can help build a strong foundation for implementing the change:

- *Gaining leadership support.* Gain leadership support and commitment in order to achieve successful implementation.
- *Communicating about the change practice.* Effectively communicate about the change practice to those who will be involved or affected. This is important for building buy-in.
- *Building capacity through training and materials.* Plan for the types of training and materials that will support implementation. Even simple changes will require new knowledge and capacities.

3. This discussion refers to a single change practice, but it applies equally to a series of change practices (a “change packet”).

- *Identifying resources and infrastructure supports.* Consider the materials and resources that new implementers will need, along with any implications for staffing, scheduling, and communication.
- *Monitoring progress to identify and address challenges.* Set up a process to monitor implementation. This is essential if the goal is to achieve high-quality and sustained implementation. Implementation drift and abandonment are normal occurrences in environments where many demands compete for staff attention.

Reflecting on the continuous improvement effort

Working together as an Improvement Team has almost certainly been a new experience for everyone. Continuous improvement is an approach to enacting change that is very different from the traditional ways in which schools operate. The team has probably encountered successes and challenges in working together that may inform future continuous improvement work.

Each member of the Improvement Team should set aside time before Meeting 10 to reflect on the experience throughout the continuous improvement effort and identify what has worked well and what could be improved.

Meeting 10

Goals

- Formalize change ideas.
- Begin planning for implementing the change.
- Reflect on continuous improvement process.

Agenda (90 minutes)

Topic	Materials	Time
Welcome, review of agenda and goals, and discussion of pre-meeting reading		15 minutes
Activity: Formalizing the change practice	<i>Handout 22—Template for outlining a change practice</i> (p. II-85)	30 minutes
Activity: Planning for implementation	<i>Handout 23—Template for communicating about a change practice</i> (p. II-87), <i>Handout 24—Completed template for communicating about a change practice for the Grove Elementary School example case</i> (p. II-88), <i>Handout 25—Template for implementation planning</i> (p. II-91)	30 minutes
Wrap up and next steps	<i>Handout 26—Protocol for reflecting on the continuous improvement effort</i> (p. II-92)	15 minutes

Welcome, review of agenda and goals, and discussion of pre-meeting reading (15 minutes)

Begin the meeting with a welcome and a review the meeting goals and agenda. Then, briefly discuss:

- Questions that need to be addressed to formalize the change practice.
- Preparation needed to support the change practice.

Activity: Formalizing the change practice (30 minutes)

The Improvement Team’s first action in this final meeting is to begin formalizing the change practice. The goal is to be as detailed as possible, enabling people who have never seen the change practice before to understand what it is, why they should implement it, and what successful implementation of the change practice looks like.

Use *Handout 22—Template for outlining a change practice* (see next page) to begin documenting the steps and practices for the change practice. If a series of change practices is being implemented, repeat the process for each change practice. The documentation is intended to provide all the information that practitioners need to implement the change practice and for the school or district to be able to support implementation through training and supervision. The documentation may include information about what the change practice is, how and in what contexts it should be implemented, and what resources and supports will be needed. Use information collected during the PDSA cycles to provide guidance on what works well and what to avoid in implementing the change practice.

Review *Handout 23—Template for communicating about a change practice* (p. II-87). If a series of change practices is being implemented, complete a template for each change practice. The template can be used to introduce potential implementers and other stakeholders to the practice. See *Handout 24—Completed template for communicating about a change practice for the Grove Elementary School example case* (p. II-88) for guidance.

The Improvement Team is unlikely to complete *Handout 22—Template for outlining a change practice* (p. II-85) or *Handout 23—Template for communicating about a change practice* (p. II-87) during Meeting 10. Rather, the team will likely need to identify next steps for their completion after the meeting.

Handout 22. Template for outlining a change practice

Use the following outline to formalize the tested change practices.

- Name of the change practice: _____
- Purpose of the change practice:
 - a. The Improvement Team was created to _____ [overall focus].
 - b. Specifically, the goal was to improve _____ [aim/outcome].
 - c. From testing, we know that [change practice] will improve _____ [outcome] by _____ [primary or secondary driver].
- Description of the change practice
 - a. The major parts of the change practice are: [list the major components]
 - _____
 - _____
 - _____
 - b. The list of people who will be enacting the change practice are:
 - _____ [person or group] will do _____ [component]
 - _____ [person or group] will do _____ [component]
 - _____ [person or group] will do _____ [component]
- Step-by-step details of the change practice
 - a. First step of the change practice
 - The first specific step is: _____ [small task].
 - This looks like: _____ [example].
 - This could look like: _____ [acceptable adaptation].
 - This should not look like: _____ [adaptation that failed in testing].
 - b. [Repeat for all steps of the change practice]

- Tips for implementing the change practice

- a. List of tests with positive results

- When doing _____ [step #] you SHOULD _____ [positive recommendation]

- [Repeat for more recommendations]

- b. List of tests with negative results

- When doing _____ [step #] you should NOT _____ [negative recommendation]

- [Repeat for more recommendations]

- Potential challenges and how to address them

- a. You might notice _____ [challenge]. If so, you should try _____ [solution].

- b. [Repeat for more challenges]

- Assessing implementation

- a. First measurement

- When you start to implement _____ [change practice], you should measure _____ [measurement]

- _____ [measurement] is important to measure because _____ [rationale connected to effectiveness]

- You ideally want to see _____ [measurement result] because _____ [rationale connected to target outcome]

- b. [Repeat for more measurements]

Handout 23. Template for communicating about a change practice

WHAT is the change practice? Briefly describe the practice being implemented.

WHO will be using the change practice and WHEN will they start? WHO is going to support these people in using the change practice and HOW will they get support?

WHY are we doing this?

EXPLAIN the change practice. Provide examples.

DO these things when implementing the change practice.

AVOID these things when implementing the change practice.

Handout 24. Completed template for communicating about a change practice for the Grove Elementary School example case

WHAT is the change practice? Briefly describe the practice being implemented.

Teachers will use sentence starters at least twice a week in their math lessons to support more students talking and writing about math in the classroom.

Teachers will use sentence starters to help students both talk and write about math.

WHO will be using the change practice and WHEN will they start? WHO is going to support these people in using the change practice and HOW will they get support?

The Grove Elementary School grade 4 and 5 teaching teams are going to start using the sentence starters in math lessons in the beginning of the coming school year. Once math sentence starters are being used routinely and effectively at these two grade levels, we will start using them in lower grade levels. The goal is for all teachers in Grove Elementary School to be using math sentence starters by the end of the first semester.

The local experts on math sentence starters are Joanie Rivera (grade 4), Rosanna Barron (grade 5), and Toni Rhodes (math coach). Joanie and Rosanna are going to lead the grade-level Professional Learning Community meetings, along with Toni, to train teachers on how to create and use sentence starters in math lessons. They will provide some examples they have used themselves and will conduct a model lesson activity to demonstrate what has worked well for them in their classrooms. Toni will visit each teacher's classroom at least once in September to observe and coach teachers on the use of sentence starters.

WHY are we doing this?

Our students at Grove Elementary School struggled with the new Common Core math curriculum that we adopted last year, and this was reflected in many students, particularly our low-income students, performing below proficient on the state assessment. As we discussed at our whole-school teacher meeting at the beginning of this school year, our students are doing well at quantitative reasoning, but they have been struggling with talking and writing about their thinking.

Over the last year a small team of teachers and staff worked together to address this problem: Trent Masters (grade 3), Joanie Rivera (grade 4), Rosanna Barron (grade 5), Toni Rhodes (math coach), and Rebecca Armstrong (literacy coach). They started testing out different math sentence starters in November to see what would work best for our students. After spending the school year trying different approaches to math sentence starters, the Improvement Team feels ready to train others on best practices for how to incorporate these into math lessons on a regular basis.

EXPLAIN the change practice. Provide examples.

Consider these questions about students' skills:

- Are students unpacking their own thinking?
- Are students checking for understanding of what other students said?
- Are students actively comparing and contrasting their work with that of other students?
- Are students selecting appropriate math vocabulary?

Notice that the four sentence starters below encompass a broad spectrum of student skills. Using different sentence starters will keep students more engaged than they might be if they always use the same one.

- Focused on strategy (Strategy)

"The strategy I used was _____; my strategy is like or different from _____ because _____."

- Focused on listening to others and repeating or restating (Repeat/Restate)

"You're saying that _____ [repeat what _____ said]; would someone like to add on?"

- Individual/initial thinking (Initial thinking)

"I think _____ because _____; I believe this is true because _____. I solved the problem by _____."

- Student prompted to repeat prior student's thinking and then provide individual thinking (Prompts/Vocab)

"The correct math vocabulary word is _____ because it means _____."

DO these things when implementing the change practice.

- Introduce students to sentence starters in math orally at first. Students took a few days to warm up to talking about math and were not successful writing about their math thinking in the first few days after the sentence starters were introduced.
- Use sentence starters with partner activities to further support greater math discourse in your classroom. Partner activities force more students to spend more time talking.
- Circulate with purpose during partner activities. It is better to observe a few pairs of students than try to get to all pairs. In particular, check in on your English learner students to see whether they need additional support or encouragement.
- Write sentence starters on the white board with large spaces where students are supposed to insert their own words or numbers. During whole-class discussion, write down what different students are saying using the sentence starters so that students can both see and hear others' thinking.

AVOID these things when implementing the change practice.

- Rushing. Don't rush! You'll be tempted to get students to use all the sentence starters right away, but students will take longer to get used to them than you do. Give yourself twice as much time as you think it will take at first until you get a better sense of how quickly your students are adapting to the sentence starters.
- Calling only on students whose hands are up. The goal of this practice is to support more students in talking more often. You can print out a copy of your class roster and track how many times students have talked to help you better distribute whom you call on. Teachers who used participation sticks or other cold-calling techniques found that those techniques worked very well with math sentence starters.

Activity: Planning for implementation (30 minutes)

It is now time for the team to take what it has learned and begin planning for implementation. Implementation at this stage could be onboarding more teachers in a school to incorporate a new teaching practice or set of teaching practices, onboarding more schools in the district, or something else.

Implementing the change practice is going to be a lengthy process that spans beyond the scope of this toolkit. The purpose of Meeting 10 is to begin planning the implementation process and transition the work to those responsible for full implementation, which may or may not involve the Improvement Team.

To begin this transition, consider the following questions:

- Who else needs to be included in the implementation planning process? If the work will branch out to other grade levels, departments, or schools, include teacher leaders or school leaders as appropriate for their buy-in and input.
- When are suitable times to begin implementing a schoolwide or districtwide change practice or set of practices? Small teams of motivated people can often begin changes rather flexibly, whereas larger groups of people often require more structured, formal timing to begin something new.
- What are the dependencies in the implementation planning? Map out which activities need to happen first, which activities need to happen second, and so forth.
- Are there any anticipated barriers or resistance to implementation, and if so, what are they? The Improvement Team reflected on barriers to change they expected to encounter in beginning the continuous improvement work. As the team prepares for the communication and implementation phase of the work, it is important to work through this process again.

Use *Handout 25—Template for implementation planning* (p. II-91) to begin identifying the major activities that will need to be conducted to support further implementation. As with the other activities in this meeting, it is unlikely that the template will be completed in Meeting 10. Use this time to begin planning and identify next steps for the implementation process.

Wrap up and next steps (15 minutes)

Reflecting on the continuous improvement effort

Use *Handout 26—Protocol for reflecting on the continuous improvement effort* (p. II-92) to reflect on the continuous improvement effort and identify improvements for future work.

Handout 25. Template for implementation planning

Use the following planning tool to identify the supports and activities that will be needed to implement and sustain the change practice.

Implementation activity	Specific tasks and timeline	Who is responsible?
Document (formalize) the practice. Include essential components, operational definitions, steps and procedures, and contexts in which the practice should be implemented.		
Leadership support. Work with administrators and other key leaders to ensure that they understand and are committed to the change.		
Communication. Develop a plan to communicate to practitioners, support staff, and other stakeholders (such as families or students) the purpose of the innovation, how it works, and where to obtain further information and support.		
Training. Develop a plan for materials (for example, presentation slides, handouts, or agenda), staffing (in house or external), timing, and how training will be sustained as staff turnover.		
Resources. Identify what will be needed for implementation, such as copies of written materials, instructional supplies or equipment, and release time for training attendance.		
Support. Indicate who will serve as the experts to be a resource to implementers. Develop a plan for how these individuals will communicate with and check in with implementers, especially at the beginning of implementation, to ensure that implementation is going smoothly.		
Monitoring. Develop a plan to determine whether the innovation is being implemented as intended and whether additional support is needed for successful implementation.		
Other supports. Determine whether anything further is needed to facilitate successful implementation.		

Handout 26. Protocol for reflecting on the continuous improvement effort

Reflect on the following elements of the continuous improvement work.

	What worked well?	What could be improved?
Tools and resources (Fishbone diagram, Driver diagram, Plan-Do-Study-Act (PDSA) planning tool, Protocol for data dialogue, others)		
Meetings (frequency, duration, structure)		
Identifying and implementing change ideas		
Collecting and analyzing data		
Data dialogue and making decisions based on data		
Other aspects of the continuous improvement effort		

- Overall, what have been the primary benefits of the continuous improvement effort to your school or district?
- Overall, what have been the primary costs or negative aspects of the continuous improvement effort for your school or district?
- What changes should be made to improve continuous improvement efforts at your school or district in the future?

Next steps

Once the Improvement Team has decided to implement a change practice (Meeting 9) and begun preparing for implementation (Meeting 10), it is time to transition the work to those who will be responsible for full implementation. Complete the steps below to conclude the Improvement Team's work.

CI leader

- Assemble the work conducted during the meeting on the change practice outline, the change practice communication guide, and the implementation planning and identify next steps for their completion.
- Contact the individual or individuals responsible for leading full implementation and share documents, such as those described above, that are needed for implementation.
- Ensure that documentation from the Improvement Team's work is in order and available for future continuous improvement work.

Improvement Team members

- Assist the CI leader as necessary in identifying next steps and sharing information with those who will be responsible for full implementation of the change practice.
- Be available to provide additional information and support those responsible for implementing the change.

Data manager

- Ensure that all data are in order and that data collection and storing processes have been documented.

Recorder

- Send the notes from Meeting 10 in a timely manner to all Improvement Team members and save the notes in a shared location that is accessible to all team members.

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Recommended resources

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