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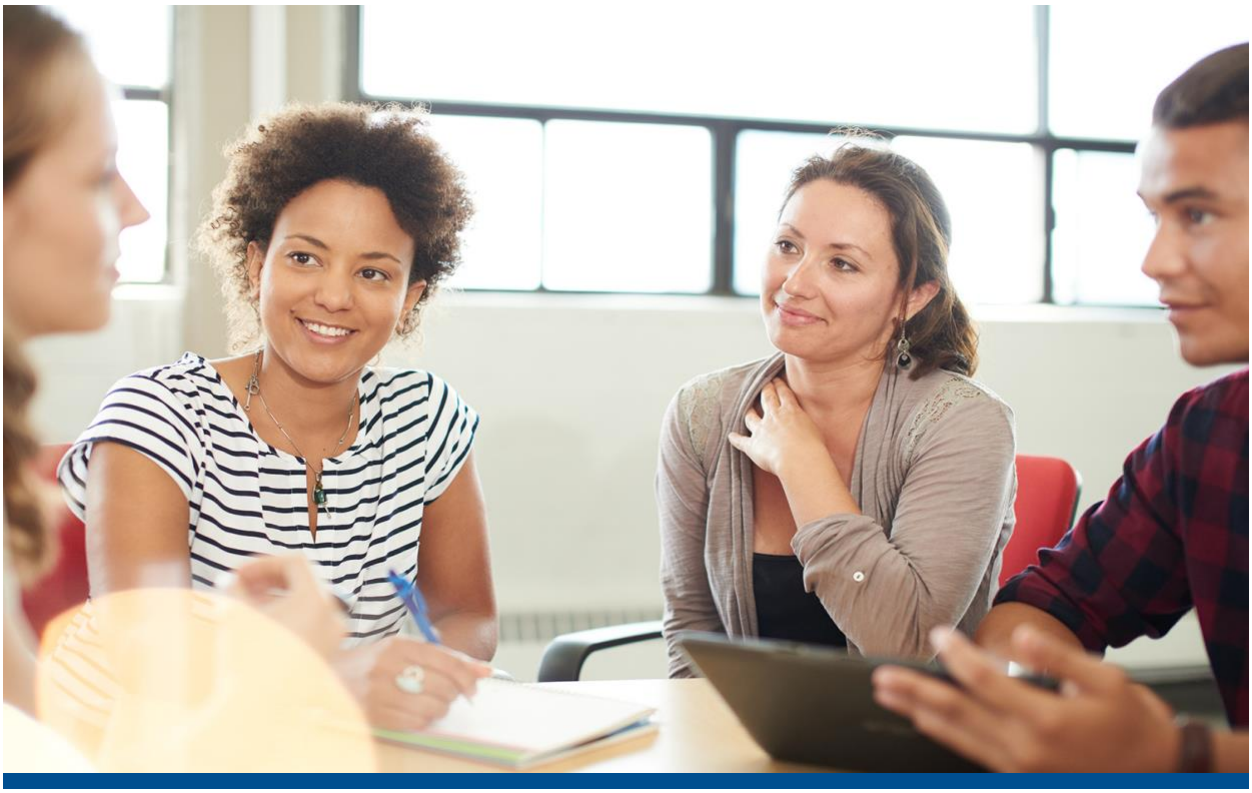

Continuous Improvement Coaching

Facilitators' Workbook

Regional Educational Laboratory Appalachia at SRI International

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https://ies.ed.gov/ncee/edlabs/regions/appalachia/resources/pdfs/continuous-improvement-coaching_facilitator-workbook_Acc.pdf

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Contents

Introduction

In this *Facilitators' Workbook for Continuous Improvement Coaching*, the Regional Educational Laboratory (REL) Appalachia team has compiled resources and strategies to support schools and districts as they strengthen implementation of evidence-based practices to improve student outcomes. Education leaders and stakeholders can use this workbook and the accompanying slide deck to facilitate continuous improvement teams in their efforts to identify evidence-based practices, implement the evidence-based practices with a data-driven approach, and use the process to improve student outcomes.

REL Appalachia developed the process described in this workbook and the accompanying slides during a set of coaching activities with educators in Kentucky who are members of the Improving Postsecondary Transitions partnership. Through ongoing meetings, the REL Appalachia staff coached and collaborated with education leaders who led continuous improvement initiatives in four rural Kentucky school districts and one regional cooperative.

This workbook and the accompanying slides are designed to support school leaders in eastern Kentucky, or other school-improvement facilitators in the region, who are engaged in improvement efforts such as launching a new school/district program, refining an existing program or practice, or studying their contexts to help identify next steps. For the purpose of these materials, we define a facilitator as an educator who guides an improvement team through the continuous improvement process, supports data collection and analysis, and facilitates team meetings. A facilitator can be an instructional coach or school improvement specialist at a district, a district administrator, school principal, or lead teacher. These materials offer recommendations, tips, examples, and resources to help facilitators support their improvement team.

Defining continuous improvement

A continuous improvement process seeks to increase the effectiveness or efficiency of a system by making small-scale changes that are repeatedly evaluated by a series of tests.[1,2,3] This process often incorporates Plan-Do-Study-Act (PDSA) cycles, which offer a systematic way to collect and analyze data to determine whether a small change led to actual improvement.[4] In education, the continuous improvement process is generally used as a part of an effort to improve student outcomes. This disciplined approach to improvement helps educators select an evidence-based practice to address the school's problem; plan, enact, and monitor action steps; and then determine next steps based on data.[5] The process increases the likelihood that the selected evidence-based practice will lead to the intended outcomes.

Why is continuous improvement important?

Teachers and school leaders in every classroom, school, and district aim to support student learning. To do so, many implement evidence-based practices (e.g., policies, programs, curricula) designed to increase positive outcomes for students. However, educators often realize little improvement in student outcomes.[6,7] The new practice may not work in their particular circumstances, or educators may not have fully implemented the new practice as intended. Carefully monitoring action steps and outcomes throughout implementation gives educators information to understand how implementation is going and may lead to adjustments in implementation to tailor for local circumstances that, ultimately, yield the intended results. workbook and the accompanying slides will support your school or district's improvement process and implementation of an evidence-based practice to improve outcomes for students and teachers.[8]

> Note: These materials are focused on strengthening implementation. This process can help improve, but does not guarantee, outcomes. Rather, once you are implementing a new program as intended, it is important to evaluate whether the program is leading to the intended outcomes and, at that point, determine whether to continue it or try something different.

How to use this workbook

This Facilitators' Workbook outlines the five phases of the continuous improvement process and can be used along with the accompanying slides to lead a team through the key steps of that process. This workbook is adaptable to your local context and needs and can be used by schools or districts to guide improvement in any practice. Each phase represents an important component of the overall process and should be fully implemented to maximize outcomes. The process begins with Phase 1, setting the foundation, and continues through each part of a PDSA cycle:

- **Phase 1: Set the foundation**
- **Phase 2: Plan**
- **Phase 3: Do**
- **Phase 4: Study**
- **Phase 5: Act**

These five phases represent one full cycle of the continuous improvement process; completing the first cycle usually requires between six weeks to a whole school semester, depending on the complexity of the evidence-based practice being implemented. Once a full cycle has been completed, the team should adjust the action steps in response to the feedback data and then initiate a second PDSA cycle. Typically, the team would not return to Phase 1: Set the Foundation during the second PDSA cycle, unless the team decides to choose a different evidence-based practice. Expect to complete at least two cycles within one school year to maintain momentum for improvement.

This workbook presents each phase in a separate section, providing facilitators with the guidance, tips, examples, and resources necessary for executing a continuous improvement cycle. Each section includes the following details:

- **What to do in this phase**
  - Presents a general overview of what to do in this phase and introduces templates to use with the improvement team.
- **Facilitator tips**
  - Provides tips from the field.
- **Additional resources**
  - Offers additional resources for in-depth information on each step, supports in the accompanying facilitator slides, and additional templates that can be used in each step.

As you work through each phase, you will guide your team through discussions and action steps. The success of your continuous improvement process relies on the input and support of a team and should not be enacted alone or through a siloed approach. To support your leadership of the team, we provide information and tips on how to form a continuous improvement team (appendix A) and how to facilitate meetings (appendix B), as well as a set of customizable templates and tools (appendix C). Appendix D is a case scenario about fictional, rural Deer View High School, which offers concrete examples of how to implement each phase of one full cycle of the continuous improvement process.

Phase 1: Set the Foundation

Setting a strong foundation is essential to continuous improvement work. Consider drawing an analogy between the construction industry and education: both fields require methodical procedures that build upon one another, and a weak foundation leads to failure of one or more critical components. This section discusses three steps to help build a strong foundation:

- **Define the problem.**
- **Create your theory of action.**
- **Select an evidence-based practice.**

What to do in this phase

In setting the foundation for the continuous improvement process, you will work with your improvement team[1] to gather multiple data sources to define a problem of practice, create a theory of action, and select an evidence-based practice to implement. Expect to schedule between two and five meetings to complete the steps in this phase. A fictional scenario of how one school set its foundation is provided in appendix D.

Step 1: Define the problem

The facilitator should help the improvement team analyze multiple data points to identify a problem area and uncover its root cause. This step is typically conducted during the team's initial meeting, either virtually or face to face. The goal is for the team to clearly articulate the issues so that specific action steps through a continuous improvement cycle can be formulated, enacted, and monitored. To facilitate this analysis process:

- **Compile data for the team to analyze**. Identify and compile information that illustrates a problem or challenge from multiple sources. Organize it for easy access and make it available to your team members before meeting with them. Relying solely on student achievement scores or accountability data may limit your view of the problem and its

[1] The members of your improvement team may vary depending on the focus of your project. See appendix A for a description of team roles.

context, so when possible, include information from students, teachers, and/or families to capture the learning environment of the school. Data sources might include:

- Attendance, absenteeism, dropout rates
- State assessments and proficiency scores
- School grades and courses
- Student social-emotional learning or school climate surveys.

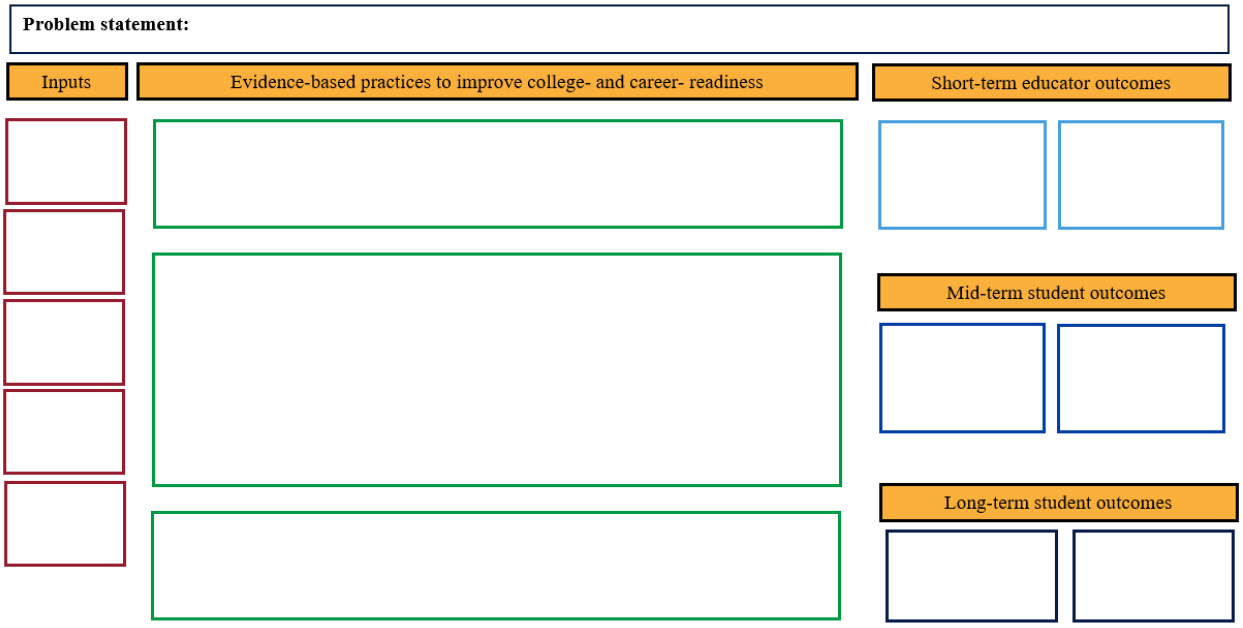
- **Review the data with your team.** When first looking at the data with your team, ask team members to simply describe what they see. Descriptions might include learning or attendance gaps between students of different backgrounds or other patterns such as inequitable student enrollment in advanced courses or low participation rates by certain student groups in available postsecondary planning activities. Make a list of observations for all to reference. Prompt team members to pose questions that come to mind as they review the data. Keep the initial focus of the discussion on the data, not solutions.
- **Engage the team in root-cause analysis.** After the team describes the data, help them identify additional patterns in the data and guide them in uncovering the reason(s) these patterns occur. The *Five Whys* process helps improvement teams dig into these patterns and consider why the current system incurs patterns (see appendix C for the *Five Whys* template and directions). For example, the data might reveal gaps in proficiency between students from economically disadvantaged backgrounds and non-economically disadvantaged backgrounds, leading the improvement team to reflect on possible differences in their learning environments. Help team members focus on reasons within a school's control (e.g., school policies, procedures, instructional practices, etc.) rather than reasons beyond the school's purview (e.g., student characteristics, family background, etc.). The *Five Whys* template helps the improvement team think about why some students may experience the learning environment differently, which may lead to insights about which school or district practices to modify.
- **Develop the problem statement.** Use the results of the root-cause analysis to develop a specific problem statement, one that articulates the challenge a school or district is facing in student outcomes as well as its root cause. Your problem statement should be specific so that clear action steps can be developed to reach desired outcomes (see page 11 or

appendix D for an example problem statement from the fictional Deer View High School).

Step 2: Create your theory of action

Once you have a problem statement, the next step is to develop a theory of action, which is a graphical representation of your improvement initiative; this will help your team specify how school resources and actions will lead to desired outcomes.[9] A theory of action includes the problem statement, the inputs, the evidence-based practice to be implemented, and the desired short-, mid-, and long-term outcomes. Figure 1 and appendix C provide a sample theory-of-action template you can use as-is or modify to better meet the needs of your context.

Figure 1: "Set the foundation" phase — theory of action template



Template adapted from Shakman, K., & Rodriguez, S. M. (2015). *Logic models for program design, implementation, and evaluation: Workshop toolkit* (REL 2015–057). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands. https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015057.pdf

To initiate the theory of action, write your problem statement from step 1 at the top of the page. This serves as a reminder that all efforts in your theory of action are to address this problem.

Once the problem statement is recorded, begin the process of identifying your long-, mid-, and short-term outcomes. The facilitator should organize outcome development using a backward-design process, by starting with the long-term outcomes and working backwards to identify the intermediate outcomes you expect will precede them. Using a backward-design process can help you identify relevant short- and mid-term outcomes that can increase the likelihood that you will be able to monitor progress towards and ultimately achieve your desired long-term outcomes.

- **Define long-term outcomes**. Begin by articulating the desired long-term outcomes of your improvement initiative. Focus on student learning and performance outcomes you can quantify.
- **Identify the mid-term outcomes.** Mid-term outcomes are typically the desired actions that lead to long-term goals. For these, focus on student cognitive, academic, and social and emotional behaviors that lead to student learning and performance.
- **Identify the short-term outcomes.** Adult behaviors and actions prompt changes in student outcomes, so short-term outcomes typically focus on teacher or school leader behaviors and instructional outcomes.[10,11] To formulate the short-term outcomes, the improvement team should first determine who within the school (e.g., administrator, teacher, counselor, etc.) has the greatest opportunity to influence the desired student outcomes. These individuals are recognized as change agents who will enact the selected evidence-based practice. Short-term outcomes are affiliated with each change agent.
- **Identify inputs.** Inputs typically include the individuals, material resources, external supports, and the time required to execute your improvement initiative.

The theory of action is now anchored by inputs and outcomes. The next step will identify activities to place in the center of the theory of action: the key components of the evidence-based practice.

Step 3: Select an evidence-based practice

At this point, you have a problem statement, a list of inputs, and a list of outcomes. Step 3 fills in the "black box" of the teaching and learning process—the evidence-based practice(s) that

will contribute to your desired outcomes. For this, select practice(s) that meet one of the four tiers of evidence in the Every Student Succeeds Act (ESSA). ESSA evidence tiers include:

- **Tier 1 – Strong Evidence**: supported by one or more well-designed and well-implemented randomized controlled experimental studies.
- **Tier 2 – Moderate Evidence**: supported by one or more well-designed and well-implemented quasi-experimental studies.
- **Tier 3 – Promising Evidence**: supported by one or more well-designed and well-implemented correlational studies (with statistical controls for selection bias).
- **Tier 4 – Demonstrates a Rationale**: practices that have a well-defined logic model or theory of action, are supported by research, and have some effort under way by a state education agency, local education agency, or outside research organization to determine their effectiveness.

The facilitator's role during this step is to help the improvement team identify the best-aligned evidence-based practice for the school's problem statement, local context, and resources. It helps to propose practices with strong evidence of improving outcomes for students like yours, that are affordable, and that have been tested in communities like yours. When an evidence based-based practice cannot be identified, the facilitator should help the team choose a practice or strategy that is best aligned with the problem statement. A useful approach to selecting an evidence-based practice includes:

- **Compile evidence-based practices for the team's consideration.** This step will likely require research, so allot sufficient time between team meetings. Depending on the scope of the topic, research may take a few hours or may occur across a few days. Encourage team members to take part in compiling a list of potential evidence-based practices and supporting documentation describing their usability, effectiveness, and suitability for your context. Reach out to trusted sources for help, such as the Regional Educational Laboratories, the What Works Clearinghouse website (which provides practice guides, intervention reports, and other resources for educators), and other organizations listed at the end of this section, on page 14.

- **Discuss and assess options and alternatives.** Convene the improvement team to review each evidence-based practice. Each member should show supporting evidence for each potential practice, such as studies finding a positive impact on similar students. Evaluating practices by reviewing studies may be time-consuming and difficult. However, trusted sources such as the Regional Educational Laboratories and the What Works Clearinghouse websites may be of assistance. The goal is to reduce selections to three or fewer viable options.

  Consider using the *Hexagon* exploration tool from the National Implementation Research Network (appendix C) to evaluate practices, which provides a systematic approach to examining and selecting an evidence-based practice.[12] This tool uses three indicators to assess the efficacy of the program or practice (evidence, usability, and supports) and three indicators to assess site fit (capacity to implement, fit with current initiatives, and need).

- **Select the evidence-based practice for implementation.** Based on the team's assessment of viable alternatives, reach consensus on which evidence-based practice to implement for your improvement initiative. Reaching consensus is critical, as successful execution relies on support from all team members. Continue your discussion and vetting process until all members agree to support the selected practice.

Once the evidence-based practice(s) are selected, update your theory of action to include the key components of the evidence-based practice.

Phase 1 at Deer View High School (DVHS)

The DVHS principal was concerned that 82.5 percent of seniors graduated last year, but among students who qualify for free or reduced-price meals, only 70 percent graduated. The principal created an improvement team that included the department chairs in math and English, the director of counseling, the assistant principal, and a district school improvement specialist to identify the school's problem of practice and set the foundation for improvement.

Step 1: Define the problem

Problem statement: Students are not prepared for postsecondary transition due to inadequate development of academic and nonacademic competencies.

Step 2: Create your theory of action

Long-term student outcome: By 2025, all students at DVHS demonstrate preparedness for the rigors of postsecondary education by earning a college preparatory diploma.

Mid-term student outcome: Students increase attendance in school and academic engagement in classrooms.

Short-term teacher outcome: Teachers improve student academic engagement and attendance by linking clearly stated learning objectives to career options, which helps students understand the relevance of learning.

Inputs: Common vision of improvement, school leadership, improvement teams, time invested in teacher professional learning, improvement specialist

Step 3: Select an evidence-based practice

The improvement team identified three evidence-based practices to vet: multi-tiered system of support, formative assessment, and social-emotional student learning blocks.

The team selected to implement formative assessment practices.

Facilitator tips

Think about the timing of steps. When scheduling meetings for data analysis and decisionmaking, steps one and two may be combined (define the problem and create a theory of action) into a single meeting of two hours. Schedule enough time between steps two and three (create a theory of action and select an evidence-based strategy) for team members to research improvement options.

Remember: Use multiple data sources

Facilitators should ensure that multiple kinds of data are available to the team for analysis and decisionmaking. While student achievement data are useful, they represent achievement at a single point in time and may be insufficient to identify an effective improvement strategy. Augmenting achievement data with information such as attendance rates, dropout rates, key course performance, and data reflecting student and teachers' perception of the learning environment, school climate, and culture will help teams make more informed decisions about the strategies needed to achieve goals.

Show transparency of process. For team members to fully support an initiative, the facilitator must ensure an objective, transparent facilitation process. Use discussion protocols to engage all members and ensure all voices are heard. Allow time for sufficient discussion to reach team consensus rather than relying on a majority vote on major decision points. Conversation increases buy-in throughout the process.

Create a graphical representation of the theory of action. A picture is worth a thousand words. Rather than a table with rows and columns, create a graphical representation of your theory of action. This kind of visual helps to show connections, as well as gaps, in the theory. A sample theory of action is included with the scenario in appendix D.

Additional resources

For more information on the setting the foundation, see the following resources.

- The accompanying Continuous Improvement Coaching presentation slides: Slides 8–20.
- Appendix C for tools and templates that include an editable document for the *Five Whys* process and the theory of action.
- Continuous Improvement Through Networked Improvement Communities: Root Cause Analysis and Theory of Action Facilitator's Guide. This REL Midwest facilitator's guide supports users engaged in the early steps of a continuous improvement process. Section 4 demonstrates how to guide a discussion on creating a theory of action.
- Elevating Evidence: Frequently Asked Questions. This Kentucky Department of Education Frequently Asked Questions (FAQs) memo gives an overview of ESSA evidence levels, why they matter, and how to identify evidence-based practices that fit into school improvement plans.
- Using What Works Clearinghouse to Find Evidence-Based Interventions. This Kentucky Department of Education Office of Continuous Improvement and Support user manual provides a step-by-step process for navigating the What Works Clearinghouse website to identify evidence-based interventions.
- Elevating Evidence: Clearinghouses and Databases. This Kentucky Department of Education document lists recommended clearinghouses and databases that can be consulted to locate evidence-based interventions.
- Applicability of Evidence-Based Interventions. This infographic from REL West highlights seven contextual factors with related questions school leaders can consider when assessing whether an evidence-based practice will be a good fit for their local context.
- Core Principles of Improvement Science. The Carnegie Foundation has a number of resources on improvement science, including the six core principles underlying improvement.

Phase 2: Plan

As with any construction project, you need a blueprint for what you plan to build. In our PDSA cycle, the *Plan* phase represents the blueprint.

The PDSA cycle begins once the foundation has been laid in Phase 1. The *Plan* phase outlines the process of hypothesizing what will happen in the context of your school or district community, collecting data, testing your hypotheses, and studying the results to build your evidence base. The heart of the PDSA cycle—repeatedly learning what worked, what did not work, and responding to feedback—can support positively changing student outcomes. This section describes three steps:

- **List the action steps.**
- **Identify data to monitor.**
- **Make predictions.**

What to do in this phase

By systematically planning for implementation of the evidence-based practice, you are developing evidence for whether this practice should be continued, modified, or abandoned. This phase will require between two and three meetings to draft and finalize the plan in preparation for implementation.

Step 1: List the action steps

The *Plan* phase of a PDSA cycle results in an action plan for implementing your evidence-based practice and measuring progress toward desired outcomes. Your action plan is like a classroom lesson plan and includes the goal or objective of the plan, the steps and activities of the plan, the timeline for each step, and how to monitor implementation and outcomes. Consider the following key questions when constructing your action plan:

- What are you trying to accomplish or improve?
- What change (e.g., modification to an instructional practice, new program) might you make and why?

- How will you know that a change is an improvement?

You can use the action plan template in figure 2 and appendix C to help your team create a plan to implement and test your evidence-based practice. The template includes sections in which to describe the *who*, *what*, *where*, and *when* of each activity so that all team members know their roles and responsibilities.

- **Specify who will implement each planned activity.** Identifying a specific person for each action step helps distribute responsibility among team members and encourages each member to take ownership for a component of the plan.
- **Identify each action step to implement the evidence-based practice.** Describe the specific steps, both small and large, that will be required for successful implementation.
- **Specify where and when each action step will occur.** Although the location and timeline for tasks may change due to unforeseen circumstances, begin with clear directions for the team.

Step 2: Identify data to monitor

Determine how to assess your improvement effort. Identifying data to monitor contributes to the foundation for the *Do*, *Study*, and *Act* phases that follow. Rather than create or collect new data, such as new surveys or extra tests, think about data you already have. For example, if teachers at your school use self-reflection logs, these logs could document implementation activities. Likewise, data might be collected through classroom attendance or teacher lesson plans. If you do collect new data, follow a systematic data collection process so data can be collected in the same way to limit bias without overburdening the team. Part of the data collection process plan should be to identify data collectors. The data collectors may be teachers or other team members who have access to the data and should be specified in the plan.

Discuss data with your team at this planning phase to specify what behaviors or learning to monitor for each of your action steps. There are two types of data to identify, and you will want both in your plan:

- **Implementation checkpoints.** These data help you determine if you are implementing the action steps as planned (e.g., the number of teachers who completed a professional development course or the number of times a teacher used a formative assessment in class). Your team will use the implementation checkpoints to answer, "Did we follow our plan to enact our evidence-based practice?"
- **Outcome data.** These data help you determine whether your evidence-based practice is yielding the expected changes (e.g., increased student engagement, increased attendance, etc.) and is aligned to the short-, mid-, and long-term outcomes outlined in your theory of action. Your team will use the outcome data to answer, "Did teachers and school leaders improve their instruction and behavior?" and "Did student learning and performance improve?"

Step 3: Make predictions

Once you have identified your action steps and the data you will monitor, you are ready to predict how your action steps will actually play out. Make predictions for both the implementation and outcome data identified above. To build these predictions, the team should envision what changes they expect will occur because of the action steps. The team will return to these predictions in the *Study* phase to assess which held true and which did not. Learning whether your plan yielded the predicted change or an unexpected change can lead to new hypotheses and new actions during the *Act* phase. Teams should make predictions for each action step (if appropriate).

When school leaders and teachers implement new programs and policies, the implicit assumption or hypothesis is that these new programs and policies will improve teacher and student outcomes. Step 3 asks you to make your assumptions explicit by writing out the changes you anticipate from each action step. For example, if one action step is that four teachers will learn to clarify and communicate learning expectations during professional development sessions, you should predict what teachers will take away from this training and ensure you will have sufficient data to confirm or reject your prediction. Prediction is critical because it allows the team to quickly determine what worked well and what did not.

Figure 2 presents the action plan template (see appendix C for an editable document). The template includes a Notes section for additional information that would be useful to the improvement team.

Figure 2: "Plan" phase— action plan template

List the action steps:				***Identify data to monitor:***		***Make predictions:***
Target person	Action steps	Start/end	Location	Implementation	Outcomes	Predict change, *where applicable*
	1.					
	2.					
	3.					
	4.					
	5.					
	6.					
Notes:						

Template adapted from Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles

Phase 2 at Deer View High School (DVHS)

DVHS is planning how to implement formative assessment as an evidence-based practice to improve student engagement. The DVHS improvement team will test their plan by implementing it with their grade 10 geometry teachers.

Step 1: List the action steps

Teachers will learn how to clarify and communicate learning expectations to students.

Teachers will learn how to gather evidence of student thinking.

Teachers will learn how to use formative assessment feedback to adjust their next day's lesson plan and instructional approach.

Step 2: Identify data to monitor

Implementation data collected through teacher interviews:

Teachers describe how they clarify and communicate student learning expectations.

Teachers describe ways to gather evidence of student learning.

Teachers describe how they use evidence of student learning to adjust their lesson plans.

Outcome data collected by review of teacher lesson plans:

Teacher lesson plan shows clarity in learning expectations.

Teacher lesson plan incorporates evidence gathering.

Teacher lesson plan shows options for responsive action.

Step 3: Make predictions

The improvement team predicts:

All teachers will clearly communicate to students the learning targets and expectations at the beginning of the class.

Teachers used to use quizzes to assess student thinking but will use exit tickets more often after attending the PLC (professional learning community) meetings.

All teachers will adjust their next day's lesson plan based on exit ticket responses.

Facilitator tips

Take the time needed to plan for successful implementation. Planning is critical for effectively building and testing evidence-based practices in your setting or context. Be sure you *invest the time to do this phase thoroughly,* and do not skip parts of developing your plan or completing the full template. The planning process will take a minimum of 2–3 meetings over

multiple weeks to draft and finalize the plan. Consider developing a timeline and agendas for a series of meetings aimed at leading your team through all of the plan steps.

Include enough detail. You should provide enough step-by-step detail for someone else to implement the plan as well as provide enough context for the new practice so that the people implementing it understand why the details are important and how the details fit into the broader plan you and your team created. Think of this step as similar to writing a detailed lesson plan. Your action plan should resemble a lesson plan written for a substitute teacher, a teacher who implements your intended lesson based only on your written plans.

Remember: Write down predictions

This process of clearly articulating your prediction is a key part of the process of continuous improvement. Do not skip this step. Write down what you think will happen.

Set realistic expectations for improvement. Align your expectations for improvement with the short-, mid-, and long-term outcomes from your theory of action. The short- and mid-term outcomes are different from school accountability measures, which often focus only on long-term student achievement outcomes. Continuous improvement entails completing each part of the continuous improvement cycle and repeatedly, systematically measuring short-term outcomes in teacher or school leader instruction and behaviors, outcomes that then lead to mid- and long-term changes in student outcomes.

Additional resources

For more information on this phase, see the following resources.

- The accompanying Continuous Improvement Coaching presentation slides: Slides 21–26.
- Appendix C for tools and templates that include an editable document for the action plan.
- Introduction to Improvement Science. This REL West blog post provides an overview of improvement science and highlights a project from Nevada that implements the Being a Writer curriculum.

Phase 3: Do

As with any construction project, you will follow the approved blueprint to build a structure. In the PDSA cycle, the *Do* phase represents building the house. This section describes two steps:

- **Implement the action steps.**
- **Monitor your data.**

What to do in this phase

In this phase, you will enact the action steps identified during the *Plan* phase and monitor the data for use during the *Study* phase. Timing of the *Do* phase is dependent on the complexity of the evidence-based practice(s) selected for implementation and may be as short as a few weeks or as long as a few months. Teams should implement their selected practice(s) long enough to collect sufficient data for decisionmaking.

Step 1: Implement the action steps

For the *Do* phase, you will execute the action steps and monitor the data you identified in Phase 2, *Plan*. Be sure your team adheres to the agreed-upon action steps, carefully document any deviations, and archive tools and artifacts as evidence of your progress. Key questions to ask during the *Do* phase:

- Are the action steps executed as written in the plan?
- Where and how is our evidence documented?

The *Do* phase might seem straightforward, but implementing a new strategy or practice coupled with a data-monitoring process can be challenging. To keep these processes manageable, your improvement team should meet regularly to review the action plan. Check with implementers to determine whether they need additional supports. You might consider meeting every two weeks or set meetings that align with expected implementation timelines (e.g., if teachers are using a new lesson every two weeks, you might meet every two weeks).

Step 2: Monitor your data

Establish a manageable and efficient protocol to help data collectors stick with the process. Your data-collection process should include:

- **Data-collection assignments.** Make explicit who is responsible for collecting the data and when it will be collected to ensure the team is clear on responsibilities and timelines. A data-organizer template is shown in figure 3, and an editable document is available in appendix C.
- **Shared space for uploading artifacts and notes.** Use a collaborative digital space (e.g., Google Drive, Dropbox, or SharePoint) to upload relevant implementation artifacts. Be sure to use your district's supported platform(s) and comply with any and all data privacy laws and regulations as you store and share data.
- **Forms, tables, or other templates for recording data.** Your data collectors will need a document to record data as it is collected. For example, if you are reviewing teacher lesson plan objectives for alignment with standards, you might create a table listing each teacher, the date of the lesson plan, and space to check "yes" if the lesson plan aligned with standards. This document will vary depending on the type of data you are collecting, so no specific template will work for every team.
- **Separate folders for implementation checkpoints and outcome data.** Implementation checkpoints and outcome data serve different purposes. Implementation checkpoints are used to determine whether actions were taken to put the activity into practice. Outcome data are used to determine whether the expected change happened due to the actions. Keeping these data in separate folders will help you easily access and assess how well you implemented the evidence-based practice during the *Study* phase and identify improvements during the *Act* phase.
- Figure 3 presents a communication template that will help organize the data identified during the *Plan* phase and produced by implementing the action steps ([13]see appendix C for an editable document). The first column is from the action plan template in the *Plan* phase, with a list of data to collect and a description of each. In the second column,

specify who will collect the data. In the third column, the person responsible will specify the date the data were collected.

Figure 3: "Do" phase — data organizer template

Identify data to monitor: [From Plan phase]	***Monitor your data:***	
Description of data [List implementation and outcome data from action plan template]	**Who will collect data?** [Name of person responsible for collecting and storing data]	**Date of data collection** [The date the data were collected, including multiple time points]
Implementation checkpoints		
1.		
2.		
3.		
Outcome data		
1.		
2.		
3.		
Notes:		

Template adapted from Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles

Phase 3 at Deer View High School (DVHS)

During the *Do* phase, three DVHS geometry teachers implemented formative assessment as planned. The teachers engaged in professional learning during PLC meetings to clarify their understanding of formative assessment practices and then implemented those practices in class. The improvement team documented the teachers' activities by collecting data on implementation checkpoints and outcomes.

Step 1: Implement the action steps

Geometry teachers participated in three PLC meetings to clarify their understanding of formative assessment practices.

Geometry teachers implemented the formative assessment action steps for three weeks.

Step 2: Monitor your data

The improvement team set up folders on the school's Google Drive to compile the implementation checkpoints and outcome data.

The improvement team gathered notes from each PLC meeting and uploaded them to the implementation checkpoints folder.

An external partner interviewed each teacher to assess his or her understanding of formative assessment practices and uploaded the notes to the outcome data folder.

The math lead teacher collected teacher lesson plans for evidence that formative assessment practices were implemented and uploaded the data to the implementation checkpoints folder.

Facilitator tips

- **Establish clear roles and timelines.** Make sure every team member understands his or her role in implementing the plan and collecting data. Everyone on the team should have access to the shared plan and timeline.
- **Share updates on progress and reminders.** At team meetings or through regular emails, provide updates about implementation progress and data collection; include weekly reminders for tasks as necessary.

Remember: Support the team!

Ensure staff have sufficient time and resources to plan for implementing the new strategy and collecting data. Team members and school leaders can support implementers by securing meeting or release time and helping with data documentation or aggregation.

- **Be flexible and adjust timelines as needed.** Ideally, you'll follow your plans as written. However, to maintain support and buy-in from the team, be ready to adjust timelines.

Additional resources

For more information on this phase, see the following resources.

- The accompanying Continuous Improvement Coaching presentation slides: Slides 27–31.
- Appendix C for tools and templates that include an editable document for the data-monitoring template.
- An Educator's Guide to Questionnaire Development. This REL Central guide describes a five-step process for designing effective questionnaires using research-based guidelines. This guide can help improvement teams gather actionable data on which to base next steps.

Phase 4: Study

Let's refer again to the construction analogy. You built your house, and now you need to examine whether the construction followed your blueprint or deviations occurred. In construction, a county official may review the blueprint and inspect the house for safety and compliance. In the PDSA process, this inspection process is called the *Study* phase.

The *Study* phase helps you to learn whether implementation progressed as planned and to identify patterns or trends that might inform your next steps. Review the predictions noted in the action plan template during the *Plan* phase and investigate whether there are any surprises in your implementation checkpoints and/or outcome data. Two steps provide the evidence on which improvements will be based in the *Act* phase:

- **Compare initial predictions with actual occurrences.**
- **Identify patterns or trends to inform next steps.**

What to do in this phase

In the *Study* phase, the improvement team analyzes the implementation and outcome data collected during the *Do* phase and compares the actual occurrences to the predictions made during the *Plan* phase. The team will also identify patterns or trends to inform next steps. This phase typically requires one team meeting.

Step 1: Compare initial predictions with actual occurrences

In the *Study* phase, the team analyzes the initial action steps to improve implementation. Facilitators should allocate at least one hour of meeting time to review the data. If there are multiple data files from the *Do* phase, the facilitator should summarize these for the team before initiating the meeting. Summaries might take the form of simple tables or graphs to facilitate analysis and team discussion.

For quantifiable data (e.g., student attendance, PLC participation, lesson plan submissions), you can provide simple descriptive statistics and counts, and then graphically present the data as bar graphs or scatter plots. For qualitative data, you can review interview data and artifacts to identify common themes. All data should be aggregated to focus on studying the implementation

process, rather than discussing individual anomalies. Two important components of analyzing data are transparency and replicability of methods. Transparency helps others have confidence in the quality of your data, and replicability ensures your processes can be duplicated if you scale or want to repeat data collection. Be sure to document the processes you used to analyze the data. Ideally, have another member of the improvement team, such as the improvement specialist, support you in the analysis and provide a second set of eyes to confirm the compilation and aggregation of the data. See appendix A for a description of improvement team members, including the improvement specialist.

For the data review team meeting, present the compiled, aggregated data (not individual raw data), as this phase is focused on improving implementation rather than highlighting the actions of an individual team member. You are not yet making decisions, so as you discuss the compiled data, describe the facts you see. Key questions to ask during the *Study* phase are:

- Did our predictions match our results for our implementation checkpoints? For our outcomes?
- What patterns do you see?
- What actions/events might have influenced implementation of the evidence-based practice?

Figure 4 builds on the action plan template from the *Plan* phase to include a new column for documenting actual occurrences (shown in green for easy reference). Please note that figure 4 shows only some of the columns from the action plan template in order to increase readability here. The extended action plan template is available in appendix C.

Figure 4: "Study" phase — data organizer template

List the action steps: [From Plan phase]		***Make predictions: [From Plan phase]***	***Study actual occurrences:***
Target person	Action steps	Predict change	Report results from data
	1.		
	2.		
	3.		
	4.		
	5.		
	6.		
Notes:			

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Step 2: Identify patterns and trends to inform next steps

The data collected during the *Do* phase helps you identify the broader patterns and trends of implementation. Using the template in figure 4, describe how your predictions align with the collected data and note any actions or events that may have influenced implementation, such as inclement weather days or other events, and summarize your findings for use in the *Act* phase.

Phase 4 at Deer View High School (DVHS)

During the *Study* phase, the facilitator aggregated and summarized the data collected during the *Do* phase for analysis by the improvement team. The team compared their initial predictions with actual occurences and discussed the patterns and trends that occurred during implementation. This analysis formed the basis for next-step decisionmaking.

Step 1: Compare initial predictions with actual occurrences

Two out of three teachers reviewed and identified clarifying questions.

100 percent of teachers included exit tickets in early lesson plans, but not in lesson plans throughout the unit.

Teachers reported they needed more time to revise their lesson plans every day.

One teacher consistently identified concepts/skills daily and adjusted lesson plans based on exit tickets.

Two teachers identified concepts/skills at the beginning of the unit and the end of the unit.

Teachers were not consistent with identifying and including concepts/skills in formative assessment every day.

Step 2: Identify patterns and trends to inform next steps.

The action steps were not fully implemented as planned, and therefore the predicted changes for each action step were not fully realized.

Specifically, not all teachers reviewed and identified clarifying questions, used exit tickets throughout the a unit, or consistently adjusted lesson plans based on formative assessment.

All teachers included exit tickets at the beginning of the unit.

Facilitator tips

- **Review, compile, and aggregate the data *before* the team meeting**. As the facilitator, you should familiarize yourself with the data *before* meeting with your team. Compile and analyze the data and aggregate it to make it easy for the team to review together. Create graphical representations such as bar graphs and scatter plots.
- **Use descriptive, not interpretive statements.** The *Study* phase should focus on what you see and can describe in the data.
- **Avoid a deficit mindset**. Implementers are working in new ways, and it takes time to develop confidence and automaticity. Be sure to point out where things are going well and stay solutions-focused when things are not going according to plan.

Remember: Foster collaborative conversations

Give everyone adequate time to share his or her thoughts on the data and actual occurrences. A protocol (like the one listed in the "additional resources" section) can be an effective way to guide the conversation.

Additional resources

For more information on this phase, see the following resources.

- The accompanying Continuous Improvement Coaching presentation slides: Slides 32–36.
- Appendix C for tools and templates that include an editable document for the extended action plan.
- Data Driven Dialogue Protocol. This facilitation protocol helps ensure equal voice for all participants during data discussions. The protocol builds awareness and understanding of the participants' viewpoints, beliefs, and assumptions about data while suspending judgments.

Phase 5: Act

After a newly-built house undergoes an inspection process, and a county official reviews the blueprint and inspects the house for safety and compliance, you receive a report on the soundness of your house. Upon finding something amiss, the official does not demand that the house be demolished and rebuilt, but instead identifies items to fix. This process resembles the PDSA *Act* phase, during which school teams decide to make adjustments.

As mentioned earlier, the improvement process—learning what worked versus what did not work and refining and improving implementation through an iterative process to impact student outcomes—is the heart of the PDSA cycle. The fifth and final phase of the continuous improvement process is *Act*. Here, you and your team will make decisions about what actions to take next based on findings from the *Study* phase:

- **Identify new learnings.**
- **Think about next steps, adjustments, and improvements.**

What to do in this phase

After the first four PDSA phases, you and your team now understand how your evidence-based practice was implemented. In this final phase, you and your improvement team will identify new learnings and determine next steps, such as what to adjust, refine, and improve. This phase typically requires one or two team meetings.

Step 1: Identify new learnings

Now you will use your findings from the *Study* phase to refine your process for the next cycle. Systematically discuss each question in this step, allowing each team member to make comments. Keep in mind that all decisions (e.g., process adjustments, adaptations) for the next cycle should be based on the findings from the *Study* phase. Consider the prompts for each question, as explained below, as you complete the *Identify new learnings* column of the extended action plan template shown in figure 5.

- **What did we learn when we studied the data and information?** The *Study* phase concludes with a summary of findings, based on patterns and trends that emerged in the data. Each team member should review the summary and identify the most important finding to guide the next cycle.
- **What revisions should we make to our action steps?** Based on the findings from the *Study* phase, team members should determine what to improve during the next implementation cycle.

Figure 5 builds on the action plan template from the *Plan* and *Study* phases to include an additional column to identify new learnings. Figure 5 includes the new columns and omits some columns from the *Plan* and *Study* phase templates. The extended action plan template is available in appendix C.

Figure 5: "Act" phase— data organizer template

List the action steps: [From Plan phase]		***Make prediction: [From Plan phase]***	***Study actual occurrence: [From Study phase]***	***Identify new learnings:***
Target person	Action steps	Predict change	Report results from data	Revise and improve action steps
	1.			
	2.			
	3.			
	4.			
	5.			
	6.			
Notes:				

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for

Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Step 2: Think about next steps, adjustments, and improvements

If data show the evidence-based practice is being implemented and resulting in the predicted outcomes, keep that evidence-based practice in place. You might also consider scaling or spreading the practice to other students, teachers, content areas, or grade levels. If data show the evidence-based practice is not being implemented properly or not resulting in the predicted outcomes, consider identifying no more than three of the suggested revisions to your action step to try in the next cycle. Avoid changing too much at once: too many changes will burden implementers and obstruct your efforts to discover which change is effective.

- **What are our immediate next steps?** Identify the actions the team needs to take immediately. Here, focus on one or two priorities. Keep in mind, the *Act* phase sets up the next *Plan* phase, when the team will update the full action plan (or template) with the revised activities (if any) and predictions. Your top priority, or the most feasible need, should be addressed in your immediate next step.
- **What are our long-term next steps?** If you identified more than one change, outline a process for addressing other changes over time.

Figure 6 is a discussion template with key questions to help facilitate conversations around next steps, adjustments, and improvements to the next round of the PDSA cycle.[13] Use this template in conjunction with the fully completed action plan template. The full discussion template is available in appendix C.

Figure 6: "Act" phase — reflection template

What did we learn when we studied the data and information?
What revisions should we make to our activities and/or predictions?
What are our immediate next steps?
What are our long-term next steps?

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Phase 5 at Deer View High School (DVHS)

During the *Act* phase, the DVHS improvement team used the data analysis from the *Study* phase to identify new learnings and determine next steps. They decided to adjust their implementation plan and conduct one more PDSA test cycle with geometry teachers prior to implementing formative assessment practices with other teachers and students.

Step 1: Identify new learnings

Learning: Teachers seem overwhelmed. Recommendation: Host a meeting with the geometry teachers to discuss challenges with implementation and brainstorm solutions. Additional time for team planning may be needed.

Learning: All teachers are not clear on how to implement formative assessment practices. Recommendation: Teachers may need additional professional development. Using "lesson plan study" during PLC meetings may help teachers better implement the formative assessment practices.

Learning: Updating lesson plans on a daily basis may be an unrealistic expectation. Recommendation: Asking teachers to update lesson plans weekly may be more feasible.

Step 2: Think about next steps, adjustments, and improvements

The DVHS geometry teachers and improvement team realized they needed another PDSA cycle to implement the recommended adjustments and to refine their knowledge and skill of formative assessment practices prior to implementing this evidence-based practice with other DVHS teachers. The improvement team decided to prioritize using a "lesson plan study" approach to help teachers effectively operationalize formative assessment practices.

Facilitator tips

- **Avoid changing too much at one time.** Be gentle with yourselves as you decide which changes to make. Limit the number of changes to keep the process manageable for the next cycle. Instead of trying to change everything at once, focus on improving one aspect of the theory of action at a time.
- **Resist the urge to implement a complete do-over after one PDSA cycle.** Although your initial test may not have gone as planned, look for ways to adjust implementation rather than abandon your theory of action for a new idea. Adjusting your implementation plan and engaging with a second PDSA cycle will help you decide whether to continue this improvement initiative or abandon the practice completely.

Remember: Aim for consensus

The team should aim for consensus! Take the time to reflect on the data and new learnings, to pave the way to shared understanding of the most appropriate action(s). Having consensus improves the likelihood of success because everyone will be working toward a common aim.

Additional resources

As you and your team work on the *Act* phase, you may find one or more of the resources listed below helpful.

- The accompanying Continuous Improvement Coaching presentation slides: Slides 37–42.
- Appendix C for tools and templates that include an editable document for the extended action plan.

Final Thoughts

To sum up, continuous improvement seeks to increase the effectiveness or efficiency of a system by making small-scale changes that are repeatedly evaluated by a series of tests (see Endnote 3). This Facilitators' Workbook details the improvement process through one test cycle, during which your improvement team addresses your school's concern, selects an evidence-based practice to implement, and engages in the PDSA process to test your theory of action. Once your team completes the initial cycle, you repeat the cycle, updating your action steps in the *Plan* phase and detailing how adjustments will be enacted. This process continues until your team is confident its evidence-based practice is leading to desired outcomes. At this point, the team might consider scaling-up the evidence-based practice across their school or district. This iterative process can help improvement teams work through the complexities of change prior to implementing a schoolwide initiative.

Once your evidence-based practice is fully implemented, you will test its impact on long-term student outcomes such as student performance metrics. Starting with a strong foundation and guided by your theory of action, you will be able to document how your improvement steps led to short-term outcomes for educators, mid-term student learning outcomes, and finally long-term student performance outcomes.

Appendix A: Forming a Continuous Improvement Team

A continuous improvement team comprises staff members who will support a school site's continuous improvement process. This appendix gives a general overview of how to form such a team as well as recommendations for team membership. REL Appalachia encourage facilitators to form this team before beginning Phase 1 of the continuous improvement process.

Why form a continuous improvement team?

Change in any school or district is driven by school staff members. PDSA cycles in educational settings require school or district staff members to execute an action plan, and this will not happen if they are not invested in the process. Sharing responsibility for the process can increase the likelihood for success. Identifying the right team members and sustaining their participation are key to conducting a successful PDSA cycle.

Who should be on the team?

A continuous improvement team comprises a facilitator/coach, team members, a content expert, and change agents. Table A1 provides a general overview of possible continuous improvement team members, but it is not intended to be prescriptive.[14] Content experts and implementers can be identified once the team has selected the program, policy, or practice to test. Involving parents, community members, and students at various stages of the continuous improvement cycle may be useful to build buy-in for proposed changes.

Table 1. Continuous improvement team roles and responsibilities

Role	*Responsibilities*	*Skills/Characteristics*
Facilitator/Coach	• Oversees continuous improvement team's work plan • Recruits continuous improvement team and sustains members' buy-in • Often serves as the improvement specialist	• Has a foundational understanding of the continuous improvement process • Has some subject-matter knowledge on the focus of the improvement project
District/school leader	• Authorizes change in practices and policies in a district or school setting	• Has vision for how to implement change • Supportive of the continuous improvement process
Team member	• Participates in all action plan tasks related to planning meetings and executing the action plan	• Has experience as a teacher, administrator, or other school or district staff member • Well-respected by colleagues
Content expert	• Shares insight and content knowledge on the topic being improved	• Has subject-matter knowledge on the topic being improved
Change agent	• Implements the change in policy, program, or practice	• Has a basic understanding of the continuous improvement work plan goal and is in a position to make the changes

Table adapted from Park, S., & Takahashi, S. (2013). *90-Day Cycle Handbook*. Stanford, CA: Carnegie Foundation for the Advancement of Teaching. https://www.carnegiefoundation.org/wp-content/uploads/2014/09/90DC_Handbook_external_10_8.pdf

Tips for forming a team

- Recruit team members before an action plan is designed—they will help drive the action plan from the beginning.
- Encourage team members to be actively involved in planning, implementation, and reflection of the action plan to build ownership. This will build each member's capacity in PDSA cycles and keep them invested in the plan.

Additional resources

- Role and Responsibilities of Implementation Team Members. This infographic from REL Southeast presents an overview of system-level leadership roles and responsibilities at the school, district, and state level that can be established to support the implementation of an intervention.

Appendix B: Facilitating Your Meetings

Educators are incredibly busy individuals, whose top priority is working with students. Given this priority, scheduling improvement team meetings at convenient moments and facilitating them effectively are critical to sustaining improvement initiatives over time. Effective meetings depend on developing objectives and agendas before convening the team as well as formulating a list of "to-dos" at the end of each meeting. Establishing processes for team discussion and decisionmaking upfront will also help keep meetings on track and ensure that all voices are heard. Finding the best day/time to schedule meetings may be a challenge, so it is important to plan ahead and take advantage of days when school is not in session. Teacher planning times should be used sparingly so that teachers can attend to the needs of their students.

As a facilitator, your task is supporting educators in learning to improve. Think of this role as similar to a general contractor at a construction site managing electricians, plumbers, HVAC specialists, and so forth. The general contractor need not be an expert in every area, but their work is critical in making sure a house is well built and passes inspection. A continuous improvement process facilitator relies on educator expertise and helps improvement team members adhere to a structured process for devising a theory of action, implementing and monitoring the improvement process, and determining next steps for continuous improvment. Facilitators must be well organized and prepared to help the team make important decisions.

A PDSA meeting agenda template is available in appendix C to help you organize meetings. It can be used to share progress made by implementing the change idea (*Do* phase), discuss questions and concerns (*Study* phase), review the data the team has collected (*Study* phase), and identify next steps for using the change idea in the coming week (*Plan* and *Act* phases).

Below are facilitator tips to help all members of the improvement team feel like part of the process, see value in the process, and continue to improve and reflect on their own practice.

Facilitator tips

- Schedule a series of meetings that accommodate team members' schedules.
- Rotate which team members take responsibility for moderating meetings to build and sustain buy-in.
- Ensure that the meeting location and room configuration offer a setting that encourages participation of all team members. For example, gathering the team around a table in a conference room or library might facilitate conversation more readily than meeting in a classroom, an auditorium, or the principal's office.
- Balance your content and improvement expertise. Your role as facilitator is to support your team in the improvement process and to demonstrate how or if a strategy can work in your context.

Additional resources

- Using Inquiry Cycles in PLCs to Improve Instruction. This infographic from REL West illustrates how inquiry cycles can improve teacher collaboration and student outcomes by focusing on instructional practice. An inquiry cycle is a type of continuous improvement process. Continuous improvement teams can apply this model to test a change if they are working in a professional learning community (PLC), such as a grade-level team.
- Transforming Educational Systems Toward Continuous Improvement: A Reflection Guide for K–12 Executive Leaders. This reflection guide from the Carnegie Foundation for the Advancement of Teaching helps school leaders and facilitators use continuous improvement by suggesting key dispositions staff need to lead a continuous improvement cycle. These dispositions include a growth mindset, scientific reasoning, and systems thinking. The reflection guide provides a series of questions that facilitators can ask their improvement team during the *Plan* phase to create the action plan.

Appendix C: Tools and Templates

This appendix contains tools and templates to facilitate the continuous improvement planning process; they can be modified to meet your needs.

Phase 1: "Set the foundation" — *Five Whys* tool

Directions: Review various data from your school or district. Start by looking at an outcome that is important to the success of your school. For example, in high schools, the outcome of concern is often the high school graduation rate and the number of students who graduate college- and career-ready. Reflect on those data and ask, "Why am I seeing these results?" Write in your response, then ask yourself "Why" for that response. For example, if graduation rates are low and your response is that students aren't passing mathematics, then ask yourself "Why aren't students passing mathematics?" Continue asking yourself "Why" to narrow your understanding of the problem.

Why
- Why [Reflect on data]:
- **Response #1:**

Why
- Why [Reflect on response #1]:
- **Response #2:**

Why
- Why [Reflect on response #2]:
- **Response #3:**

Why
- Why [Reflect on response #3]:
- **Response #4:**

Why
- Why [Reflect on response #4]:
- **Response #5:**

Template adapted from Institute of Education Sciences. (2015, February 11). *Root cause analysis: How adaptive leaders use root cause analysis to collaboratively solve student achievement needs*. [video]. Youtube. https://www.youtube.com/watch?v=81iB75kjag8

Phase 1: "Set the foundation" — *Hexagon* exploration tool scoring template

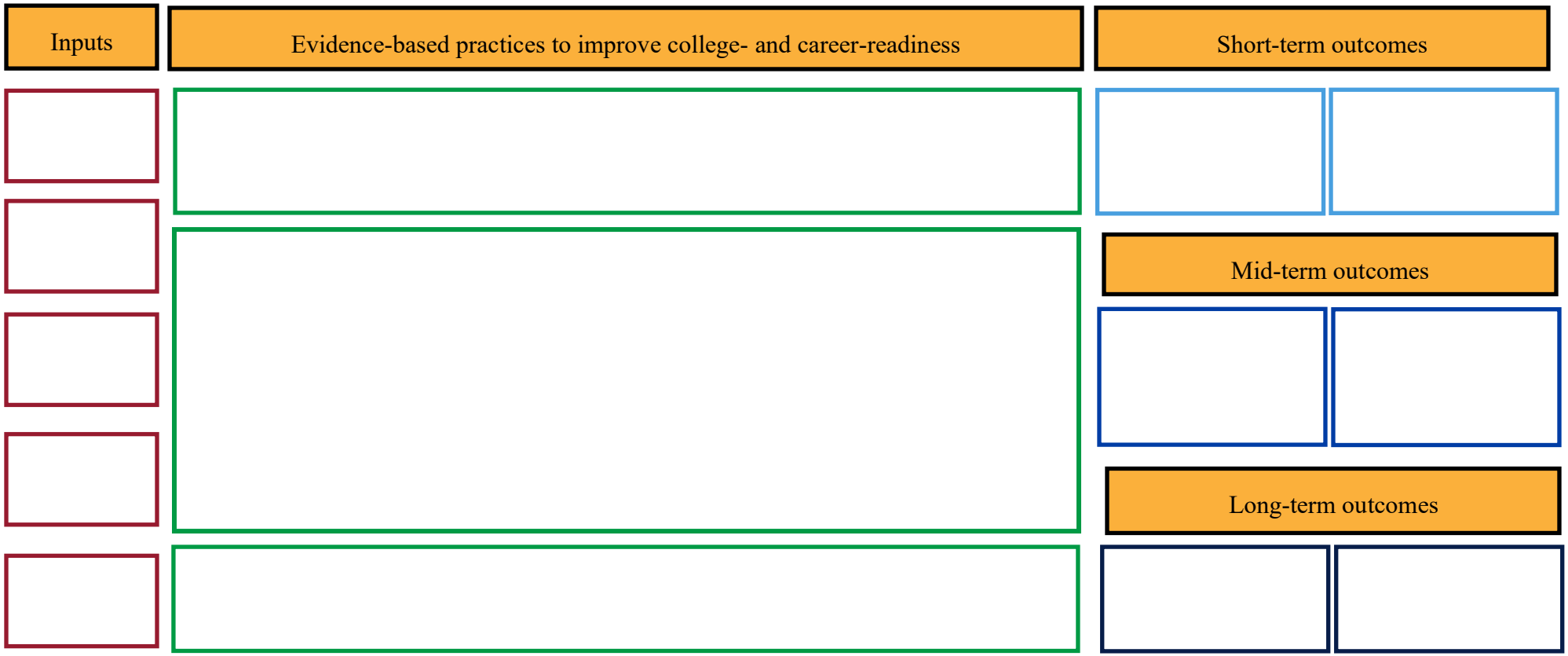
The *Hexagon Exploration Tool: Discussion and Analysis Guide* can be accessed from the National Implementation Research Network, Frank Porter Graham Child Development Institute, at the link below. This guide describes each indicator and includes rubrics to help improvement team members assess proposed evidence-based practices. The scoring template below can be duplicated for team members to use as they rate each indicator of a given practice.

		Practice #1	**Practice #2**	**Practice #3**
	Indicators			
Practice	Evidence			
	Supports			
	Usability			
Implementing site	Need			
	Fit			
	Capacity			

Template adapted from Metz, A., & Louison, L. (2019). *The hexagon tool: Exploring context*. Chapel Hill, NC: National Implementation Research Network, Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill. Based on Kiser, Zabel, Zachik, & Smith (2007) and Blase, Kiser, & Van Dyke (2013). https://nirn.fpg.unc.edu/sites/nirn.fpg.unc.edu/files/imce/documents/NIRN%20Hexagon%20Discussion%20Analysis%20Tool%20v2.2.pdf

Phase 1: "Set the foundation" — theory of action template

Problem Statement:



Template adapted from Shakman, K., & Rodriguez, S. M. (2015). *Logic models for program design, implementation, and evaluation: Workshop toolkit* (REL 2015–057). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands. https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015057.pdf

Phase 2: "Plan" — action plan template

List the action steps:				***Identify data to monitor:***		***Make predictions:***
Target person	Action steps	Start/end	Location	Implementation	Outcomes	Predict change
	1.					
	2.					
	3.					
	4.					
	5.					
	6.					
Notes:						

Template adapted from Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles

Phase 3: "Do" — data organizer template

Identify data to monitor: [From Plan phase]	***Monitor your data:***	
Description of data [List implementation checkpoints and outcome data from action plan template]	**Who will collect data?** [Name of person responsible for collecting and storing data]	**Date of data collected** [The date the data were collected, including multiple time points]
Implementation checkpoints		
1.		
2.		
3.		
Outcome data		
1.		
2.		
3.		
Notes:		

Template adapted from Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles

Phase 4: "Study" — data organizer template

List the action steps: [From Plan phase]		*Make predictions: [From Plan phase]*	*Study actual occurrences:*
Target person	Action steps	Predict change	Report results from data
	1.		
	2.		
	3.		
	4.		
	5.		
	6.		
Notes:			

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Phase 5: "Act" — data organizer template

List the action steps: [From Plan phase]		***Make prediction: [From Plan phase]***	***Study actual occurrence: [From Study phase]***	***Identify new learnings:***
Target person	Action steps	Predict change	Report results from data	Revise and improve action steps
	1.			
	2.			
	3.			
	4.			
	5.			
	6.			

Notes:

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Phase 5: "Act" — reflection template

What did we learn when we studied the data and information?
What revisions should we make to our activities and/or predictions?
What are our immediate next steps?
What are our long-term next steps?

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Appendix D: Case Study Scenario

Deer View High School

Deer View School District is a fictional, small rural school district with one comprehensive high school, a separate technical school, one middle school, and four elementary schools.

The Deer View High School (DVHS) profile:

- 575 students across grades 9–12.
- 67 percent of students qualify for the free/reduced-price meal program.
- Offers a few Advanced Placement courses, extracurricular clubs, and sports.
- 82.5 percent high school graduation rate.
- Students who are not economically disadvantaged (do not qualify for the free/reduced-price meal program) have a 95 percent high school graduation rate.
- Students who are economically disadvantaged (qualify for the free/reduced-price meal program) have a 70 percent high school graduation rate.

The principal realized that many DVHS graduates were unprepared to enroll in credit-bearing postsecondary courses, which would diminish their likelihood of completing a postsecondary degree or certification program.

The principal formed a school improvement team with the department chairs in math and English, the director of counseling, and the assistant principal. Later, the principal invited the district improvement specialist to join the team to provide coaching and additional supports. In total, the school improvement team had six members (five school-level staff members and one district-level staff member).

Phase 1: Set the Foundation

The principal told the improvement team that many DVHS students were graduating unprepared to enroll in credit-bearing postsecondary courses, which negatively impacts students' ability to complete a postsecondary program or certificate. The improvement team's goal was to improve students' postsecondary readiness by following the continuous improvement process. They would start this process by defining the problem and creating a theory of action.

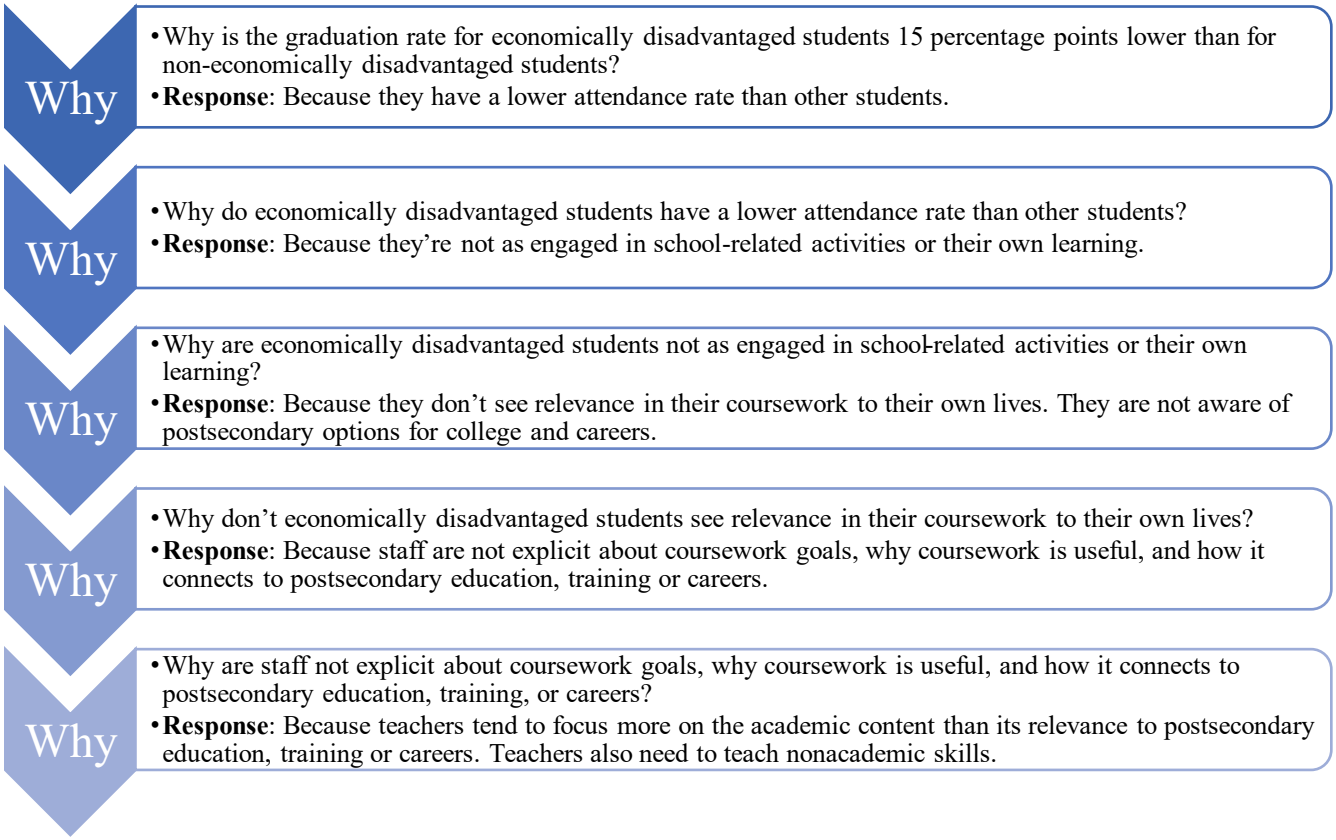
Step 1: Define the problem

The principal set out to clearly articulate the problem and uncover root causes with his improvement team. The improvement team compiled school accountability data: attendance, absenteeism, dropout rates, and student proficiency scores in math and English. The team also examined grades in specific courses such as Algebra I and II as well as reports on school climate from students, parents, and staff.

The improvement team used the *Five Whys* process to define the problem, starting with a comparison of the graduation rate of economically disadvantaged versus non-economically disadvantaged students in the school (see figure D1). As the team responded to each "why," the district improvement specialist facilitated the discussion to move away from reasons outside the school's locus of control and focus on what could be improved inside the school.

Based on their review of data and their reflections in the *Five Whys* tool, the improvement team developed the problem statement: Students are not prepared for postsecondary transition due to inadequate development of academic and nonacademic competencies.

Figure D1: "Set the foundation" phase — *Five Whys* tool, Deer View High School (DVHS)



Template adapted from Institute of Education Sciences. (2015, February 11). *Root cause analysis: How adaptive leaders use root cause analysis to collaboratively solve student achievement needs*. [video]. Youtube. https://www.youtube.com/watch?v=81iB75kjag8

Step 2: Create your theory of action

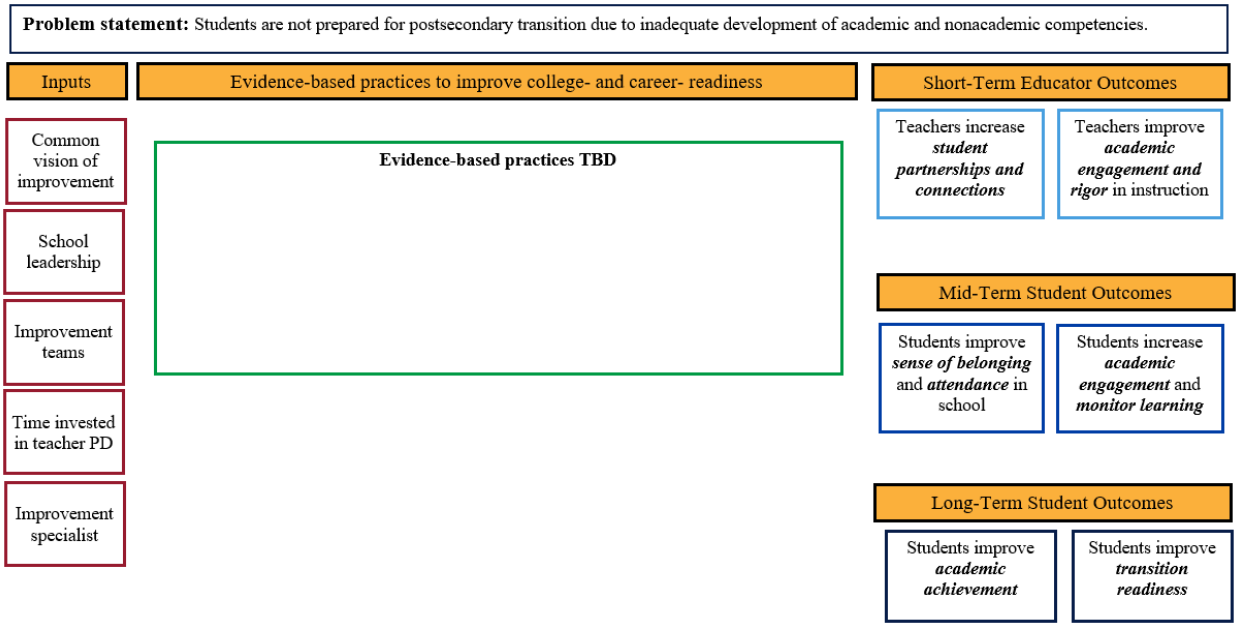
After developing the problem statement, the improvement team proceeded to create a theory of action (see figure D2). Using a backward-design process, the team first decided their ultimate goal was for all students to be ready for college and careers upon graduation. The team then brainstormed the long-term and mid-term outcomes they hoped to achieve. Working backwards, the team noted that students need access and opportunities to be prepared for college and careers, such as access to rigorous courses and opportunities for internships. The team also noted that students need to demonstrate high performance in their courses and on state assessments.

During a team meeting, the math and English teachers said they noticed students often give up on learning when things get hard. The school counselor shared that she often saw students only when they are about to drop out of school, rather than when they are proactively thinking about college and careers. These observations led the improvement team to think that students need to develop additional academic, cognitive, social, and emotional competencies. That is, the goal of the continuous improvement process would be for students to develop a strong sense of belonging and to increase attendance in school, and for students to increase their academic engagement and ability to monitor their own learning.

The principal led the team in a discussion to identify the change agents and define short-term outcomes. The principal asked, "Who is going to help students develop ownership of their learning?" At first, the math and English teachers answered, "That is the job of the students. Students must own their own learning." The school counselor insisted that her counseling team did not have time to meet regularly with all 575 students in the school to support their sense of belonging. The assistant principal commented that he meets only with students who are in trouble, such as those who are chronically absent. The principal facilitated the discussion toward the idea that that all school staff should increase connections with students, and classroom teachers should explicitly discuss the relevance of their subject's content and processes to careers and adult life. The improvement team ultimately agreed that these explicit changes to adult behavior would improve students' academic engagement as students would find more relevance in what they were learning. The principal noted that these two staff and teacher actions could be their short-term outcomes.

The improvement team listed inputs necessary to achieve these short-term outcomes. Inputs included a common vision for improvement, strong school leadership, dedicated time for teacher professional development, the improvement team, and an improvement specialist from the district. The improvement specialist, a member of the district's department of professional learning, would focus on professional development and training and has no associations with any performance reviews of the principal or teachers.

Figure D2: "Set the foundation" phase — theory of action (draft), DVHS



Template adapted from Shakman, K., & Rodriguez, S. M. (2015). *Logic models for program design, implementation, and evaluation: Workshop toolkit* (REL 2015–057). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands. https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015057.pdf

Step 3: Select an evidence-based practice

After drafting the theory of action, the improvement team met to brainstorm evidence-based practices that would help school staff increase their connections with students and teachers improve academic engagement and instructional rigor. The improvement specialist conducted research to identify the following potential options:

- Multi-tiered support system (MTSS)
- Formative assessment
- Social-emotional learning (SEL) blocks of time

Led by the improvement specialist, the improvement team used the *Hexagon* exploration tool to review the three options. Each team member rated each option on a scale from 1 to 5 on the six *Hexagon* exploration tool indicators. The improvement specialist aggregated the ratings across the team members, with a higher score representing best alignment to the indicators (see table D1).

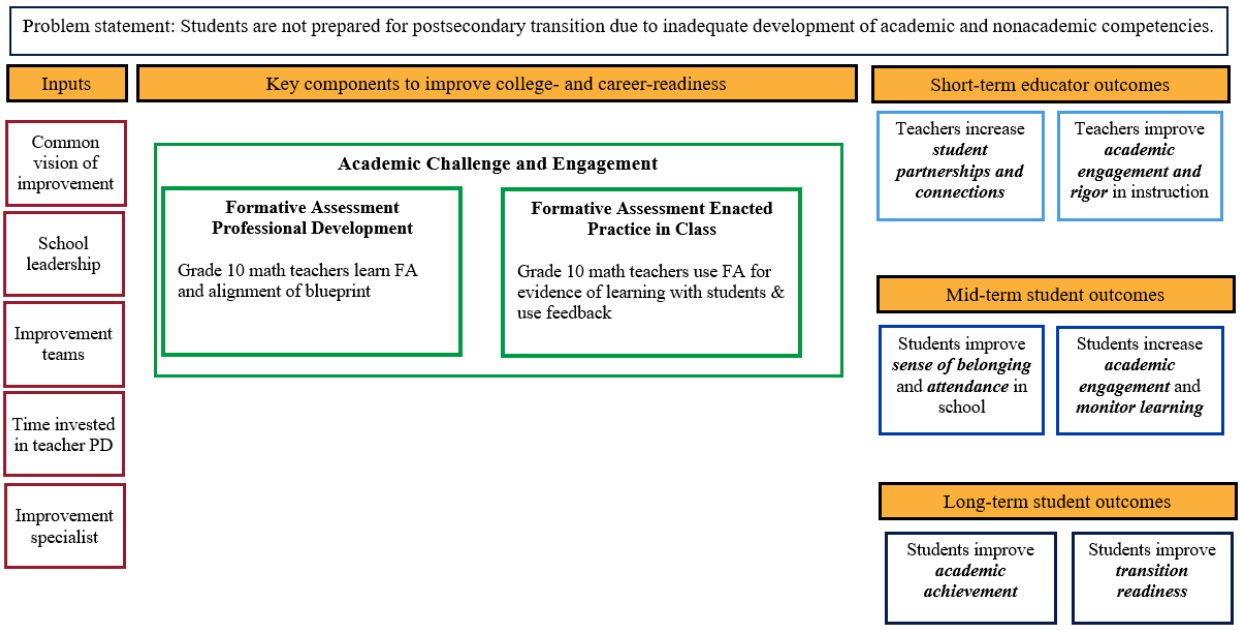
Table D1: *Hexagon* exploration scoring tool — aggregate rating, DVHS

		Practice #1	Practice #2	Practice #3
	Indicators	**MTSS**	**Formative Assessment**	**SEL Blocks**
Practice	Evidence	3.8	4.7	4.3
	Supports	3.2	4	4.2
	Usability	3.5	4	4
Implementing site	Need	4	4	4
	Fit	3.2	4.5	3.8
	Capacity	3.8	4.5	4

Note: Improvement team's aggregated rating based on a 5-point Likert scale, with 5 representing best alignment. Template adapted from Metz, A., & Louison, L. (2019). *The hexagon tool: Exploring context.* Chapel Hill, NC: National Implementation Research Network, Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill. Based on Kiser, Zabel, Zachik, & Smith (2007) and Blase, Kiser, & Van Dyke (2013). https://nirn.fpg.unc.edu/sites/nirn.fpg.unc.edu/files/imce/documents/NIRN%20Hexagon%20Discussion%20Analysis%20Tool%20v2.2.pdf

The results from the *Hexagon* exploration scoring tool revealed that formative assessment had the highest alignment score overall. The improvement team selected formative assessment as the evidence-based practice to implement.

Figure D3: "Set the foundation" phase— theory of action (final), DVHS



Template adapted from Shakman, K., & Rodriguez, S. M. (2015). *Logic models for program design, implementation, and evaluation: Workshop toolkit* (REL 2015–057). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands. https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015057.pdf

Phase 2: Plan

The improvement team identified two key components of their formative assessment strategy to address academic challenges and engagement: (1) Formative Assessment Professional Development, and (2) Formative Assessment Enacted Practice in Class. The team added these components to the center of the theory of action (table D1).

Table D1: "Plan" phase — action plan, DVHS

List the action steps:				***Identify data to monitor:***		***Make predictions:***
Target person	Action steps	Start/end	Location	Implementation	Outcomes	Predict change
Geometry teachers Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where am I going?] 1. Teachers will learn how to clarify and communicate learning expectations to students. 2. Teachers will learn how to motivate students to understand why unit content is important to learn.	9/3/20 – 9/21/20	Meet in room 202 for PD	Interview: Teachers state understanding of learning expectations	Lesson plan: Teacher lesson plan shows clarity in learning expectations (Yes/ No)	Teachers will easily learn how to clarify and communicate learning expectations. All teachers' (3 out of 3) lesson plans should reflect this at the start of the lesson. This should not be new content for teachers.
Geometry teachers Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where am I now?] 3. Teachers will learn how to gather evidence of student thinking. 4. Teachers will learn how to probe student thinking.	10/1/20 – 10/19/20	Meet in room 202 for PD	Interview: Teachers state understanding of ways to gather evidence of student meta-cognition.	Lesson plan: Teacher lesson plan incorporates evidence gathering (Yes/ No)	Teachers will first use student quizzes as evidence of student learning. Teachers will be able to use daily exit tickets to address student meta-cognition.
Geometry teachers Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where to next?] 5. Teachers will learn how to use formative assessment feedback to adjust lesson plan and instructional approach the next day.	10/30/20 – 11/15/20	Meet in room 202 for PD	Interview: Teachers state how they used evidence of student learning to adjust lesson plan.	Lesson plan: Teacher lesson plan shows options for responsive action (Yes/No)	Teachers will be able to adjust their lesson plan daily by using the evidence (exit tickets).
Notes: School improvement specialist coach (Ms. Hale) will conduct interviews with teachers and collect their lesson plans. Math department chair (Ms. Neal) will facilitate weekly PLC meetings with PD focus. The principal will have weekly check-ins with Ms. Hale and Ms. Neal for improvement leadership meetings.						

Template adapted from Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles

Step 1: List the action steps

First, the improvement team wanted to implement formative assessment professional development (PD) to train teachers on how to incorporate formative assessment in their lesson plans. Rather than train all the DVHS teachers, the team decided to target a few teachers to test out the use of formative assessment.

The team decided to focus on teachers who were highly motivated to improve their instruction, had good relationships with their students, and had bought into the idea of formative assessment. The team decided to select the three geometry teachers to pilot formative assessment: Mr. Knowles, Ms. Riddell, and Ms. Neal (who is also the chair of the school's math department and the content expert on the improvement team). The team identified all the geometry teachers as change agents since they will participate in the initiative.

The principal and improvement team next examined the action plan together (table D1). The DVHS action plan shows that the improvement team selected formative assessment as its evidence-based practice, and that the team uses teacher professional development to support teachers in using formative assessment in their classrooms. The plan also shows who will participate in the teacher professional development, what the professional development will entail, the timeline for the professional development, and the location of the professional development.

Step 2: Identify data to monitor

How would the team know whether the professional development was effective? In identifying what evidence would be persuasive, the principal and improvement team considered what types of data they already have, what data would be easy to collect, and what data could be studied quickly. The implementation data focus on whether the action steps were completed. For these data, the principal and the team decided to collect teacher interviews. The outcome data focus on whether the action steps yielded the intended result. For these data, the team decided to review the teachers' lesson plans.

Step 3: Make predictions

For the action plan template, the principal and the improvement team reviewed each professional development focus to predict the changes in teacher instructional behavior they expected as a result of the action steps.

Phase 3: Do

During the *Do* phase, the DVHS improvement team laid out an action plan for implementing formative assessment and identified implementation checkpoints and outcome measures to monitor. In this phase, Ms. Neal led her geometry teachers in a series of formative assessment professional learning community (PLC) meetings.

Step 1: Implement the action steps

Ms. Neal, who serves as the chair of the mathematics department, met with the geometry teachers in their weekly PLC meetings as planned. The district improvement specialist, Ms. Hale, attended these PLC meetings to support Ms. Neal, help facilitate discussion, and take notes. The professional development at the PLC meetings focused on how to operationalize the three questions related to formative assessment:

The first PLC meeting focused on planning lessons, specifying learning targets, and communicating learning expectations to students (*Where am I going?)*. The second PLC meeting addressed how to gather evidence of student progress toward learning targets, with a focus on using student exit tickets (*Where am I now?)*. The teachers discussed the possibility of using Google Sheets to track exit tickets, but decided to use simple Post-it notes for each student instead. The third PLC meeting focused on learning to adjust instruction based on the analysis of student exit ticket responses (*Where to next?)*. Teachers also discussed how they would share what they learned from the exit tickets with students so that students would understand that their teachers were responding to their learning needs.

Step 2: Monitor your data

The improvement team completed the data organizer in table D2, specifying who would collect the data identified in the action plan and the date the data were collected. The team decided that to achieve the most objective input, Ms. Hale, the district improvement specialist, should interview the teachers. The team also decided the teachers should be interviewed at the end of each of the three main components of the formative assessment PLC (*Where are we going? Where am I now? Where to next?*).

As chair of the math department, Ms. Neal was assigned to collect and document three weeks of geometry lessons (or 15 lesson plans from each teacher for a total of 45 lesson plans). The improvement team recognized that this task would require a great deal of time from Ms. Neal, so the principal relieved her from afternoon bus duty.

Table D2: "Do" phase — data organizer, DVHS

Identify data to monitor: [From Plan phase]	***Monitor your data:***	
Description of data [List implementation checkpoints and outcome data from action plan template]	**Who will collect data?** [Name of person responsible for collecting and storing data]	**Date of data collected** [The date the data were collected, including multiple time points]
Implementation checkpoints		
1. Interview of Ms. Neal, Mr. Knowles, and Ms. Riddell	School improvement specialist (Ms. Hale)	- 10/1/20 - 10/30/20 - 11/29/20
Outcome data		
2. Lesson plans for week of 10/1/20 from Neal, Knowles, Riddell	Math chair (Ms. Neal)	- 10/5/20
3. Lesson plan for week of 10/25/20 from Neal, Knowles, Riddell	Math chair (Ms. Neal)	- 10/30/20
4. Lesson plan for week of 11/15/20 from Neal, Knowles, Riddell	Math chair (Ms. Neal)	- 11/20/20
Notes: Ms. Neal took meeting notes for each PLC meeting. Attendance at PLC meetings = 100%.		

Template adapted from Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles

The improvement team created a folder on Google Drive so the data collectors could upload information and share all the information collected with the rest of the improvement team. Ms.

Hale uploaded her meeting notes to Google Drive. Ms. Neal collected the lesson plans, scanned them, and uploaded the digital copies to Google Drive.

Phase 4: Study

During the *Do* phase, Ms. Neal led a series of PLC professional development sessions on formative assessment with the geometry teachers. Ms. Hale interviewed the teachers to collect data on implementation and Ms. Neal collected lesson plans from teachers to get feedback on outcomes. In the *Study* phase, the improvement team will analyze the data collected during the *Do* phase to compare their initial predictions with actual occurrences and compile the evidence for next-step decisionmaking.

Step 1: Compare initial predictions with actual occurrences

After implementing of the formative assessment professional development and collecting the first round of data, Ms. Hale, the district specialist, reviewed the implementation checkpoints and outcome data. For the implementation checkpoints, she conducted an initial review of interview data to identify themes and highlights. For short-term teacher outcomes, she collected lesson plans and summarized key teacher behavior changes (identified in the action plan from the *Plan* phase) into a spreadsheet. This summary table can be found in table D3.

The improvement team then met to review the summary data. Ms. Hale facilitated the meeting and reminded the team to keep their review descriptive and that they are all learning together through the PDSA process.

The improvement team analyzed the interview and lesson plan data by reviewing Ms. Hale's summary notes and observations to collectively determine if each action step had been implemented as planned, and whether the action steps had resulted in a teacher behavioral change. Ms. Hale, the meeting notetaker, added the collective analysis to the action plan in table D4.

Table D3: Ms. Neal's summary table of results: Did teacher lesson plans show options for responsive action?

	Week 1					Week 2					Week 3					Summary
	10/1	10/2	10/3	10/4	10/5	10/25	10/26	10/27	10/29	10/30	11/15	11/16	11/17	11/18	11/19	
Neal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100% of the time (15 out of 15)
Knowles	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	20% of the time (3 out of 15)
Riddell	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	60% of the time (9 out of 15)

Table notes: Ms. Neal collected and read all 15 lesson plans per teacher (for a total of 45 lesson plans). She used a spreadsheet to code whether the teacher lesson plans show options for responsive action based on student exit tickets the day before with a Yes = Lesson plan showed options for responsive action, or No = Lesson plans did not show options for responsive action.

Table D4: "Study" phase — data organizer, DVHS

List the action steps: [From Plan phase]		***Make predictions: [From Plan phase]***	***Study actual occurrences:***
Target person	Action steps	Predict change	Report results from data
Geometry teachers: Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where am I going?] 1. Teachers will learn how to clarify and communicate learning expectations to students. 2. Teachers will learn how to motivate students to understand why unit content is important to learn.	Teachers will easily learn how to clarify and communicate learning expectations. All teachers' (3 out of 3) lesson plans should reflect this at the start of their lesson. This should be review for teachers.	Two out of three teachers reviewed and identified clarifying questions [Data source: Meeting notes and teacher interviews]
Geometry teachers: Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where am I now?] 3. Teachers will learn how to gather evidence of student thinking. 4. Teachers will learn how to probe student thinking.	Teachers will first use student quizzes as evidence of student learning. After the PD, teachers will be able to use daily exit tickets to understand student metacognition.	100% of teachers included exit tickets in early lesson plans **but not throughout the unit.** Teachers reported more time needed to revise their lesson plans **every day**. [Data source: Review of teacher lesson plans]
Geometry teachers: Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where to next?] 5. Teachers will learn how to use formative assessment feedback to adjust lesson plans and instructional approaches the next day.	Teachers will be able to adjust their lesson plan daily by using the evidence (exit tickets).	Oneteacher consistently identified concepts/skills daily and adjusted lesson plans based on exit tickets. Two teachers identified concepts/skills at the beginning of the unit and the end of the unit. Teachers were not consistent with identifying and including concepts/skills in formative assessment **every day.** [Data source: Review of teacher lesson plans]
Notes: All data in Google Drive with subfolders for teacher interviews, meeting notes, and lesson plans. Spreadsheet used to organize themes from the interviews and lesson plans. The team has now bolded the significant patterns and trends in the data that are to be considered in the next phase.			

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Step 2: Identify patterns and trends to inform next steps

After completing the action plan, the team stepped back to identify patterns or trends in the implementation or outcome of the formative assessment professional development. Each team member responded to the following questions:

- Were the action steps implemented as planned?
- How did our predictions align with our results?
- Did anything happen that may have affected implementation or outcomes?

During this discussion, the team went back to the action plan to highlight the key patterns and trends in the data that would now be important to consider during the final phase, the *Act* phase.

Phase 5: Act

During this phase, the team reflected on the cycle thus far. Although the action steps focused on only three geometry teachers trying out formative assessment, the team had learned a lot about what works and what can be challenging. This final phase of the PDSA cycle began by identifying new learnings.

Step 1: Identify new learnings

By comparing predicted changes to what actually happened, the improvement team learned a great deal. First, they discussed a renewed appreciation for the hard work and craftsmanship involved in quality teaching. Second, they started thinking about how to revise and improve the action steps for the next round of formative assessment professional development as well as how to fully use formative assessment in the geometry classroom.

Table D5: "Act" phase — data organizer, DVHS

List the action steps: [From Plan phase]		***Make prediction: [From Plan phase]***	***Study actual occurrence: [From study phase]***	***Identify new learnings:***
Target person	Action steps	Predict change	Report results from data	Revise and improve action steps
Geometry teachers: Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where am I going?] 1. Teachers will learn how to clarify and communicate learning expectations to students. 2. Teachers will learn how to motivate students to understand why unit content is important to learn.	Teachers will easily learn how to clarify and communicate learning expectations. All teachers' (3 out of 3) lesson plans should reflect this at the start of their lesson. This should be review for teachers.	Two out of three teachers reviewed and identified clarifying questions [Data source: Meeting notes and teacher interviews)	*Try out group discussion and "lesson plan study" during PLC meeting to get 100% teachers to understand how to communicate and clarify learning expectations.*
Geometry teachers: Mr. Knowles Ms. Riddell Ms. Neal	[PD Focus: Where am I now?] 3. Teachers will learn how to gather evidence of student thinking. 4. Teachers will learn how to probe student thinking.	Teachers will first use student quizzes as evidence of student learning. Through the PD, teachers will be able to use daily exit tickets to understand student metacognition.	100% of teachers included exit tickets in lesson plan at the beginning **but not throughout the course of the unit.** Teachers reported more time needed to revise their lesson plans **every day**. [Data source: Review of teacher lesson plans]	*We need to identify ways to find time for our geometry teachers to work on lesson plans. The implementation team should host a meeting with the geometry teachers to discuss this, hearing their ideas for ways to find more time, as any solutions need their support.* *** Consider sustainability and burnout.*
Geometry teachers: Mr. Knowles Ms. Riddell	[PD Focus: Where to next?] 5. Teachers will learn how to use formative assessment feedback to	Teachers will be able to adjust their lesson plan daily by using the evidence (exit tickets).	One teacher consistently identified concepts/skills daily. Two teachers identified concepts/skills at the beginning of the unit and	*We need to identify appropriate professional development to build teachers' skills related to learning goals including concepts and skills related to formative assessment. Then,*

List the action steps: [From Plan phase]		*Make prediction: [From Plan phase]*	*Study actual occurrence: [From study phase]*	*Identify new learnings:*
Target person	Action steps	Predict change	Report results from data	Revise and improve action steps
Ms. Neal	adjust lesson plans and instructional approaches the next day.		the end of the unit. Teachers not consistent with identifying and including concepts/ skills in formative assessment **every day.** [Data source: Review of teacher lesson plans]	*we need to offer our geometry teachers the professional development as soon as possible.* *** Consider and discuss more professional development or trying out formative assessment in one classroom at a time. Teachers seem overwhelmed and need more small-scale practice.*
Notes: The chair of the English department wanted to start sitting in on some of the formative assessment PLC meetings to see if there are useful takeaways to bring back to the English department.				

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Step 2: Think about next steps, adjustments, and improvements

The team used the four questions from the reflection template (table D6) to guide discussion and decisionmaking about next steps.

- What did we learn when we studied the data and information?
- What revisions should we make to our hypotheses or predictions?
- What are our immediate next steps?
- What are our longer-term next steps?

Table D6 summarizes the implementation team's responses to each question.

Table D6: "Act" phase — reflection, DVHS

What did we learn when we studied the data and information?
Despite teachers' comfort, confidence, and enthusiasm for adding formative assessments to their teaching practices, they did not all do so consistently over the course of the cycle.
Teachers need more time to incorporate formative assessments into all lesson plans.
Teachers' inconsistency in identifying and including concepts/skills in formative assessment and updating lesson plans daily suggests a need for more professional development.
What revisions should we make to our activities and/or predictions?
We need to revise the expectation for daily revisions to lesson plans, as that frequency may be unrealistic. Instead, we propose weekly revisions to lesson plans. *Rationale: We need our teachers to be able to meet the expectations; failure to meet expectations over and over will result in defeat and eventually teachers will give up. If they meet the expectation and begin to see how it contributes to improved student learning, they will be more likely to want to engage more deeply and find ways to incorporate changes daily.* *We need to offer professional development related to formative assessment.* *We need to offer geometry teachers more time for lesson planning.*
What are our immediate next steps?
We need to update the planning template to scale back our expectations for daily revisions to lesson plans and communicate the changes to the geometry teachers.
What are our longer-term next steps?
We need to identify appropriate professional development to build teachers' skills in setting student learning goals and incorporating formative assessment concepts in lessons. Then, we need to offer our geometry teachers this expanded professional development as soon as possible.
We need to give our geometry teachers more time to work on lesson plans. The implementation team should host a meeting with the geometry teachers to discuss this, hearing their ideas for ways to find more time, as any solutions need their support.

Template adapted from Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015–080). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf

Final thoughts

Any significant change requires strategic leadership and patience, since professionals need time to develop expertise with a new practice and to incorporate that practice into daily routines. The DVHS geometry teachers and improvement team recognized they would need another PDSA cycle to implement the recommended adjustments identified in the next steps in table D6.

The team plans to enact these recommended adjustments during quarter two of the school year, study the data from their second PDSA cycle, and then decide whether to expand the use of formative assessment with more teachers in quarter three. The team members are committed to learning as much as possible about how to effectively implement formative assessment practices before training the entire teaching staff to use formative assessment.

References

[1] Bryk, A. S. (2009). Support a science of performance improvement. *Phi Delta Kappan*, *90*(8), 597–600. https://doi.org/10.1177/003172170909000815
[2] Bryk, A. S., Gomez, L. M., Grunow, A., & LeMahieu, P. G. (2015). *Learning to improve: How America's schools can get better at getting better.* Cambridge, MA: Harvard Education Press.
[3] Morris, A. K., & Hiebert, J. (2011). Creating shared instructional products: An alternative approach to improving teaching. *Educational Researcher, 40*(1), 5–14. https://journals.sagepub.com/doi/10.3102/0013189X10393501
[4] Tichnor-Wagner, A., Wachen, J., Cannata, M., & Cohen-Vogel, L. (2017). Continuous improvement in the public school context: Understanding how educators respond to plan-do-study-act cycles. *Journal of Educational Change, 18*(4), 465–494. https://doi.org/10.1007/s10833-017-9301-4
[5] Langley, G. J., Nolan, K. M., Norman, C. L., & Provost, L. P. (2009). *The improvement guide: Practical approach to enhancing organizational performance* (2nd ed.). San Francisco: Jossey Bass.
[6] Coalition for Evidence-Based Policy. (2013). *Randomized controlled trials commissioned by the Institute of Education Sciences since 2002: How many found positive versus weak or no effects.* Washington, DC: Coalition for Evidence-Based Policy. http://coalition4evidence.org/wp-content/uploads/2013/06/IES-Commissioned-RCTs-positive-vs-weak-or-null-findings-7-2013.pdf
[7] Seftor, N. (2016). *What does it mean when a study finds no effects?* (REL 2017-265). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://files.eric.ed.gov/fulltext/ED569996.pdf
[8] Russell, J. L., Correnti, R., Stein, M. K., Thomas, A., Bill, V., & Speranzo, L. (2020). Mathematics coaching for conceptual understanding: Promising evidence regarding the Tennessee Math Coaching Model. *Educational Evaluation and Policy Analysis, 42*(3), 439–466. https://journals.sagepub.com/doi/abs/10.3102/0162373720940699
[9] Shakman, K., & Rodriguez, S. M. (2015). Logic models for program design, implementation, and evaluation: Workshop toolkit (REL 2015-057). Washington DC: U.S. Department of Education National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Northeast & Islands. https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/REL_2015057.pdf
[10] What Works Clearinghouse. (2019). *What Works Clearinghouse review protocol for teacher* excellence (version 4.0). Washington DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/wwc/Docs/ReferenceResources/Wwc_te_protocol_v4.0_508.pdf
[11] What Works Clearinghouse. (2019). *What Works Clearinghouse review protocol for school leadership (version 4.0)*. Washington DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/wwc/Docs/ReferenceResources/Wwc_sl_protocol_v4.0_508.pdf
[12] What Works Clearinghouse (n.d.). *Using the WWC to find ESSA tiers of evidence*. Washington DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/wwc/essa
[13] Collis, S., & Foster, K. (2018, March 7). *TIME for Care: Quality improvement for practice managers* [PowerPoint slides]. SlideShare. https://www.slideshare.net/NHSEngland/improving-services-leading-change-implementing-change-in-rapid-cycles
[14] Cherasaro, T. L., Reale, M. L., Haystead, M., & Marzano, R. J. (2015). *Instructional improvement cycle: A teacher's toolkit for collecting and analyzing data on instructional strategies* (REL 2015-080). Washington DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/edlabs/regions/central/pdf/REL_2015080.pdf