Five steps for structuring data-informed conversations and action in education

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Key findings

This guide provides a framework and the tools and vocabulary needed to support data-informed conversations and action in education. It walks users through five key steps in using data for decisionmaking and strategic action: setting the stage, examining the data, understanding the findings, developing an action plan, and monitoring progress and measuring success.

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Summary

Using data strategically to guide decisions and actions can have a positive effect on education practices and processes. This facilitation guide shows education data teams how to move beyond simply reporting data to applying data to direct strategic action. Using guiding questions, suggested activities, and activity forms, this guide provides education data teams with a framework and the tools and vocabulary needed to support an informed conversation around the data they generate or acquire. The guide walks data teams through five key steps in using data for informed decisionmaking and strategic action: setting the stage, examining the data, understanding the findings, developing an action plan, and monitoring progress and measuring success.

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Why this guide?

All educators, whatever their role, use data to inform their decisions. For example, suppose that math scores in a school have been rising. A data team (box 1) looking at the math scores for all students in the school might say, "This is great! These students are clearly learning a lot." Or they might say, "Overall, students appear to be doing well, but are there some children whose math skills haven't improved?" In the first case the team might respond to the improved math scores by exploring whether the new after-school math tutoring program had contributed to the higher scores. In the second case the team might look at the scores for each grade and classroom to reveal any gaps in student gains and provide more support to lower performing students and their teachers. Both situations involve data-informed decisions.

This guide provides grade-, school-, and state-level education data teams—composed of teachers, administrators, staff, and other stakeholders—with steps, sample questions, and resources for using data more systematically and rigorously in education decisionmaking. Data teams can print out the templates in this guide and use them to direct their own data-informed conversations.

Data and data teams

Using data to inform education policies and practices is becoming a greater priority for educators, spurred by the increased accountability requirements of the No Child Left Behind Act of 2001 and by a growing understanding of the importance of data in education decisionmaking. Additionally, states and other entities are simply collecting more data. Individual school and institutional datasets are being shared and, for that reason, are being structured more consistently. Computer systems and software allow for quicker and easier access to data. With the higher stakes associated with student performance, growing expectations of education institutions, and increased awareness of the power of data, education organizations are expected to be data-informed—making decisions and taking action based on the facts presented through data.

Data can enable policymakers to make objective decisions about education systems, provide states with information on program effectiveness, and give teachers and administrators information on student learning to influence instruction, programming, and

This guide provides education data teams with steps, sample questions, and resources for using data more systematically and rigorously in education decisionmaking

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Box 1. What is a data team?

Data teams are groups of individuals dedicated to data inquiry and the outcomes it supports. Data teams address challenges, field questions, and collect insights from the greater community of organizations. These teams monitor student and school performance and efforts to improve performance within the organization. Data teams also have primary responsibility for organizing, analyzing, and coordinating data-informed responses.

Some data teams are diverse—with representation from school-, district-, and state-level personnel, policymakers, researchers, data managers, and family and community members. Other data teams comprise individuals with similar roles, such as teachers of the same grade or subject or members of a school's leadership or planning committee. The composition of data teams varies by the question of interest, but ideally all members enrich and strengthen both the process and the results of data-informed conversations.

professional development. Additionally, providing students with data on their progress can motivate and engage them in learning (Hamilton et al., 2009). As educators become comfortable with the processes described in this guide, they will be able to convene and lead their own data teams, supporting colleagues in data inquiry and building a committed group of educators accustomed to using data to take action. Although forming a data team is not required in order to have a data-informed conversation, a collaborative team can identify the resources and personnel needed to collect and organize data and provide diverse perspectives on questions, analyses, and actions.

What this guide does

This guide aims to build capacity for using data more comprehensively and effectively in the Regional Educational Laboratory (REL) Pacific Region and elsewhere. It focuses on helping educators use data that have already been collected—through the National Center for Education Statistics, REL Pacific, departments and ministries of education, school data systems, analytical and simulation software provided with textbooks, longitudinal data systems, and other means.

Crafting clear research questions is crucial for enabling data-informed conversations

This guide describes five steps in data-informed conversations that lead to strategic decisionmaking and action:
1. *Setting the stage.* What question is to be addressed in this data-informed conversation? What information is needed to answer the question? Is the information available?
2. *Examining the data.* What patterns do the data reveal, or what "snapshot" observations can be made about the question?
3. *Understanding the findings.* What are the possible causes for the patterns?
4. *Developing an action plan.* How can a data team create an effective plan for addressing the issue?
5. *Monitoring progress and measuring success.* How can a data team know whether progress is being made on the issue?

Each step is described in more detail below.

Step 1. Setting the stage

This step identifies the question to be addressed, the information needed to answer it, and the feasibility of accessing the information.

What is the question?

Crafting clear research questions is crucial for enabling data-informed conversations. The data team starts by framing the "what" question as simply as possible. The question may be very broad to start with, as in "What do the data tell us about our middle school students' math achievement level?" But while it is important to begin the conversation by identifying the issue, the question needs to be more specific (box 2). Narrowing the question makes identifying and interpreting data clearer and easier.

Answering the "what" questions can lead to other types of questions, such as those that look at relationships between two variables ("Is there a relationship between middle school students' gender and performance on standardized math achievement tests?") or those that

look at whether one variable influences another ("Does having an after-school tutoring program increase middle school math performance on standardized tests?").

Keeping long-term goals in mind helps ensure that current and short-term activities align with the larger mission. Defining clear short-term objectives that support long-term goals also contributes to a continuous data-informed conversation. Tracking long-term goals might also require data that are not currently being collected. Realizing that can initiate a discussion on future plans for data collection.

Keeping long-term goals in mind helps ensure that current and short-term activities align with the larger mission

What information is needed to answer the question?

After clarifying the question of interest, the data team needs to identify sources of information to answer it. Answering the question posed in box 2 ("What do the data reveal about the math achievement of our middle school students?") requires access to the results of standardized math tests for middle school students. Some questions also require separating data into smaller groups of interest. For the question on the relationship between student gender and standardized math performance, data would need to be separated by gender.

At this (or any) time, the initial question can be further narrowed or expanded, but if the research question changes, the data-use process will need to be revisited from the beginning.

Is this information available?

It is best to review data sources that have already been analyzed and reported or that exist in raw form, such as from departments of education, school-level records or databases, and regional educational laboratories—and to bring them all into the conversation. For example, some education agencies issue annual reports with information that has already been analyzed and reported for entire schools and districts. In that case further analysis might not be needed. But if analyses have not already been done, or have not been completed in a way that answers the research question, looking for raw data is the next step. For the example in box 2 possible sources of standardized math test results include the Stanford Achievement Test 10th edition (SAT-10) or state or jurisdiction benchmark assessments.

Having just one data source might not be enough for decisionmakers to have confidence in the results of the analysis. Having multiple sources of information lessens the likelihood of ending up without enough data to answer the question.

Common types of education data include demographic, perceptual, performance, and program data (table 1). The type needed depends on the question.

Data can be collected at the national, state, regional, district, school, classroom, and student levels. Data can be gathered at single points in time (cross-section data) or at multiple points (longitudinal data) to show how the same student or groups of students performed over time. While cross-section data are useful for questions about what is happening now, only longitudinal data can provide a comprehensive look at trends and patterns.

Sometimes the data are insufficient to answer the question. That in itself is an important finding. A lack of adequate or reliable data to address important questions can inform recommendations for future data collection, even if the questions cannot yet be answered.

Guiding questions
- What is the question to be addressed in this data-informed conversation?
- What information is needed to answer the question?
- Is this information available?

Template 1 can be used to record questions and potential data sources for addressing the question.

Sometimes the data are insufficient to answer the question; that in itself is an important finding

Table 1. Common types of education data

Type of data	Description	Examples
Demographic	These data include descriptors of students, such as gender, ethnicity, and socioeconomic status, and descriptors of the organization, including enrollment and attendance.	• Percentage of students in each ethnic category. • Number of students who live within five miles of the school. • Average attendance rate for the school year.
Perceptual	These data provide information on how stakeholders feel or what they observe about the organization or its activities. They include stakeholder (student, parent, staff, community member, graduate) surveys or questionnaires and observations.	• Parents' perceptions of school quality. • Students' opinions on the importance of education. • Community members' thoughts about a new school calendar.
Performance	These data include information on how students are performing and on their education outcomes. The data include information on types of assessments, grades and grade point averages, graduation and dropout rates, mobility rates, suspensions and expulsions, remediation rates, college acceptance and attendance rates, and career readiness.	• Percentage of students who scored proficient or above on the state standardized assessment. • Percentage of students who enroll in a four-year college after high school. • Number of suspensions in the middle school over the last school year.
Program	These data include descriptive information on how education and related activities are conducted within the organization. They include the textbooks used, the levels of staffing or professional development at the school, the schedule of classes, curricular sequences, instruction strategies, the nature and frequency of assessments, extracurricular activities, and even the school setting.	• Teacher-student ratio in the school district. • Number of competitive sports offered in the high school. • Average number of years of experience for all elementary school teachers in the state.

Source: Authors.

Template 1. Setting the stage: recording questions of interest and data sources

What is the question?	What information is needed?	What information is available?
1.		
2.		
3		
4.		
5.		

Source: Authors.

Step 2. Examining the data

Step 2 examines the data for patterns and initial observations and then explores any data limitations.

Looking for patterns and making observations

Looking for patterns in the data and making "snapshot" observations are a first step toward answering the question. For some questions data from one period (such as one test or one school year) may be sufficient. For example, if the question relates to math proficiency for the current school year, only one year of data is necessary. If the question relates to patterns of middle school math proficiency over time, several years of data are needed, and the data team will be looking for patterns across years. Only after examining the data do patterns become apparent, whether surprising (such as a steep increase in average reading scores in one year), expected (such as average daily student attendance dropping toward the end of the school year), or repeated (such as teachers missing certain items on a certification exam each year).

Before beginning data analysis, it is important to discuss any limitations in the data

During this step it may be possible to begin characterizing findings from the data as strengths and challenges. *Strengths* are results in the data that indicate a success; *challenges* are results that indicate that something is blocking improvement or higher achievement.

Strengths and challenges can be captured through observations that arise from examining the data. These observations should be:
- *Specific.* Focus on only one item in the data. They are straightforward and clear because they involve single sources.
- *Factual.* Incorporate only the data—no assumptions, inferences, or biases.
- *Related.* Begin to answer the question.

For example, while investigating middle school math achievement, a data team might make the following observation about a possible success: "Each year during 2009–12 students showed a 5 percentage point increase in average achievement scores between grades 6 and 7." The following observations might be made about a challenge: "While student math scores improved overall, the scores of male students showed a 2 percentage point decline between 2009 and 2012." These observations are not opinions but statements of facts observed in the data.

Exploring data limitations

Before beginning data analysis, it is important to discuss any limitations in the data, so that the findings are appropriate. In particular, the data team should consider whether different sources of data can be compared, as some test data are not designed for comparison across grades and years. That is why the increase in math scores in the previous example should not be unequivocally considered a success—more information on the context is needed to know for sure. Similarly, data that are not the same (for example, SAT-10 scores and grade point averages) cannot be combined and analyzed together. Such data need to be viewed separately, as they convey different information or perspectives on the question.

Additionally, while data can inform decisions and provide the first step in investigating relationships between programs and outcomes, establishing causality requires further

exploration of the initial observations and findings and rigorous analysis. Data may not have been collected or stored in a form that permits comparisons between groups or that supports the level of analysis needed to draw robust conclusions. In that case, the data team should look into conducting further research and evaluation studies, if feasible, to examine any causal relationships of interest.

Guiding questions

- What "snapshot" observations can be made about the question, or what patterns are evident?
- Are these observations or patterns related to the original question? If so, how?
- What strengths or challenges arise from the data?

Template 2 can be used to track observations. Template 3 can be used to list strengths and challenges.

Step 3. Understanding the findings

Observations are the basis for identifying the driving factors that underlie the patterns, strengths, and challenges shown in the data and for informing future action plans. For example, the math results in the previous example could lead a school principal to say, "Now that we see there is a challenge in improving math scores for male students between grades 6 and 7, let's figure out why."

A key step in understanding data results is to begin a discussion among the data team and interested colleagues about one or two key challenges. Understanding why challenges may be occurring can help address them and might affect the findings related to the original question. These driving factors will be the focus of the action plan for addressing the challenges and improving results.

Choosing a key challenge

A review of the data often reveals several challenges. The data team seldom has the time or resources to explore all the challenges they uncover, so they will have to focus on just a few. Some challenges will be more actionable than others and thus might have a higher or lower administrative priority. Actionable challenges have driving factors that educators can address or influence directly. Other challenges might be more difficult to address immediately, such as social factors that influence students at home (such as lack of supervision, low socioeconomic status, single-parent homes). When possible, data teams should focus on challenges that are actionable and have a high priority in the school or district; however, they should also keep in mind other short- and long-term objectives, even though they might not be immediately actionable. These objectives serve as a broader context for the team's ultimate goal.

Brainstorming possible driving factors for strengths and challenges

One way to identify driving factors for a key challenge (and thus the extent to which it is actionable) is to ask a series of "why" questions followed by "because" responses (figure 1). The data team can begin to consider possible driving factors behind the challenge by understanding the facts and making educated guesses about the driving factors. As the

While data can inform decisions and provide the first step in investigating relationships between programs and outcomes, establishing causality requires further exploration

Template 2. Examining the data: observation tracking

Data source(s):

Observations	Is this observation …		
	Specific?	Factual?	Related to the question?
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Source: Adapted from Nebraska Department of Education (2012).

Template 3. Examining the data: strengths and challenges

Observed strengths	Observed challenges
Example: Over the last three years overall math achievement scores have improved between grades 6 and 7.	*Example: Over the last three years math achievement scores have declined for male students between grades 6 and 7.*

Source: Adapted from Mid-continent Research for Education and Learning (2010).

Figure 1. Identifying the driving factors

Key challenge: The number of middle school students who meet or exceed proficiency on math standardized tests has declined during the past two years.

Challenge (why): Why have test scores declined?

| Potential driving factor (because): Students spent less time on math topics each year. | Potential driving factor (because): Students were learning different math content over the past two years. |

| Challenge (why): Why did they spend less time on math topics? | Challenge (why): Why were students learning different math content? |

| Potential driving factor (because): Math topics were not integrated throughout all subjects as in earlier years. | Potential driving factor (because): Teachers were adjusting to changes in standards and curriculum. |

| Challenge (why): Why were math topics not integrated into all subjects? | Challenge (why): Why were teachers adjusting to these changes? |

| Potential driving factor (because): Cross-subject team meetings were held less frequently than in previous years. | Potential driving factor (because): New standards and curriculum were introduced with limited professional development opportunities. |

Once the potential driving factors are identified, data teams should check that the data support the ideas

Source: Authors.

experts in the jurisdiction or school, data team members are the most familiar with the students, issues, and community, and their knowledge forms a foundation for brainstorming possible explanations. It is important to stick to the available facts. Opinions and attitudes can bias how data are interpreted, and data teams must remain as objective as possible in reviewing the data and observations and refrain from drawing conclusions based on personal feelings or experiences.

To understand the findings, data teams should revisit any data limitations. As discussed, data might provide an initial understanding of the questions but be unable to support any causal conclusions. Data teams must recognize any limitations and uncertainty in the findings as they explore them further.

Once the potential driving factors are identified, data teams should check that the data support the ideas. In the example from figure 1 the data team would need to determine

whether the observations "Students spend less time on math topics each year" and "Students were learning different math content over the past two years" are correct by exploring whether adequate data are available on how much time middle school students have spent in math classes in the past four to five years. If the assumptions are supported by the data, the driving factor can remain. If they are not, the data team should consider other potential driving factors that are supported by the data. This process should be repeated as many times as needed to identify a strong set of potential driving factors.

Guiding questions
- What are the possible causes for the observed patterns?
- What school-based factors might have contributed to the challenges identified in step 2? Why might these challenges exist?
- Do the data support the identified factors?

Template 4 can be used to identify driving factors.

Step 4. Developing an action plan

Action plans typically include short-term objectives and a long-term goal

Step 4 involves developing an action plan to reduce challenges and promote successes. The first part of the plan is to identify the key stakeholders who will be involved. In the example, if the jurisdiction or school identifies the math achievement of male middle school students as a key challenge, many people will need to be involved to effectively address the issue. Without the support of key stakeholders, even the best plan is unlikely to succeed. Stakeholders might include school principals, curriculum and instruction specialists, assessment staff, teachers, and parents.
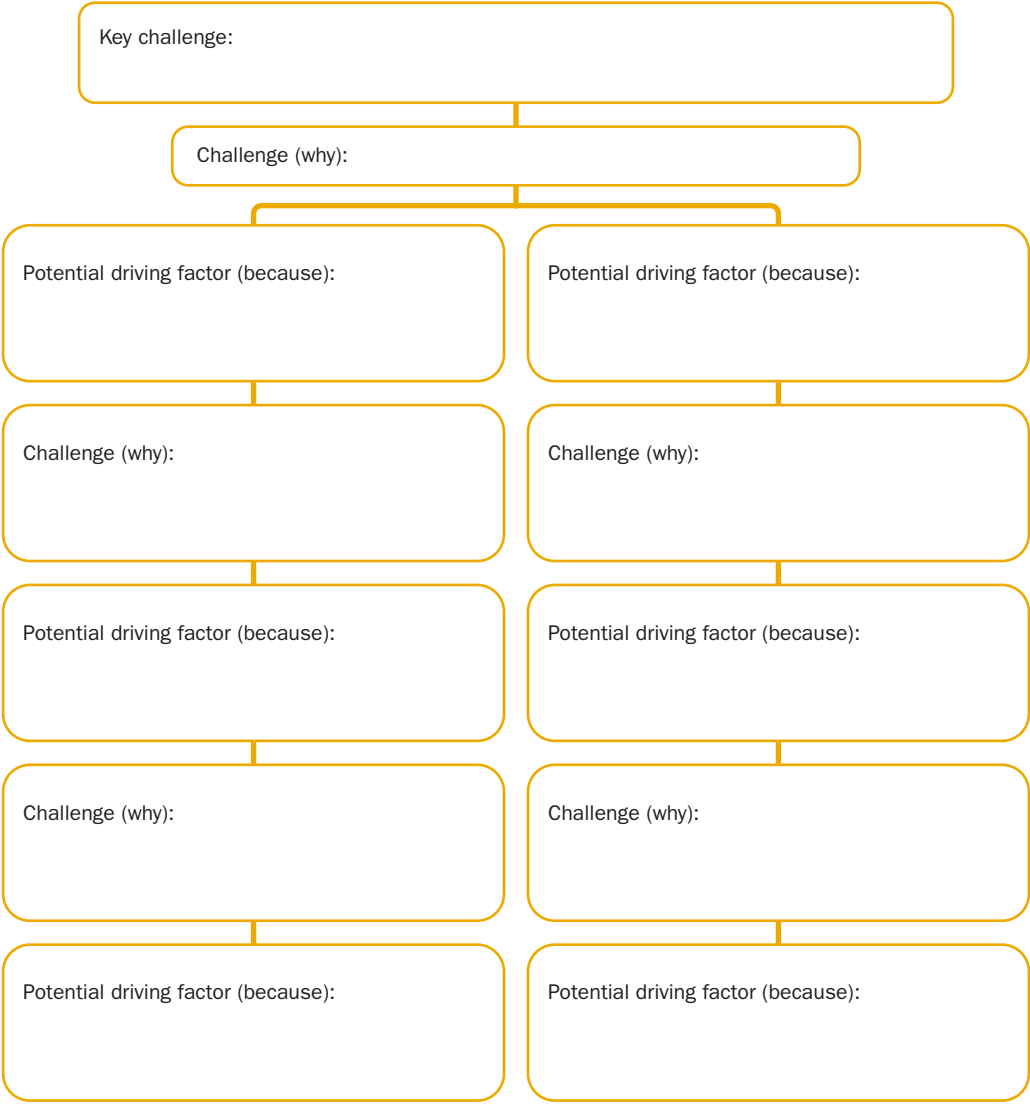
Setting goals and objectives

Careful planning helps data teams take the right actions to tackle the challenges they have identified. Action plans typically include short-term objectives and a long-term goal. Short-term objectives allow for tracking progress and identifying steps toward a larger goal. Having a long-term goal makes clear what the plan hopes to accomplish in the end. Clarity and agreement on objectives and goals can be improved by following the structure of SMART (specific, measurable, attainable, relevant, timely) goals (table 2).

Table 2. SMART goal criteria

Goal	Criterion
Specific	Setting specific goals helps identify the people involved, exactly what the goal seeks to accomplish, a location and timeframe, any requirements and constraints, and precise reasons why the goal should be accomplished.
Measurable	Measurable goals allow progress to be tracked and help identify steps toward achieving short- or long-term goals. Markers of a measureable goal include answers to several questions: how much, how many, by when, and how will the team know that the goal has been accomplished.
Attainable	To be attainable, goals must be reasonable for the data team to accomplish within the given timeframe and resource constraints, such as abilities, financial capacities, and attitudes.
Relevant	To be relevant, goals must have meaning to stakeholders. Relevance ensures that achieving the goal will make a substantial and positive change.
Timely	All goals should include a timeframe. Having an end date confers a sense of urgency and motivates the team to work diligently toward achieving the goal.

Source: Top Achievement (2012).

Template 4. Understanding results: driving factor identification

Key challenge:

Challenge (why):

Potential driving factor (because):

Potential driving factor (because):

Challenge (why):

Challenge (why):

Potential driving factor (because):

Potential driving factor (because):

Challenge (why):

Challenge (why):

Potential driving factor (because):

Potential driving factor (because):

Source: Authors.

Developing the plan

An action plan can be created for achieving objectives and goals by brainstorming potential strategies and actions to reach the goals. A strategy can be reviewed in terms of:
- *Time.* Is it possible, given the data team's time limits?
- *Resources.* Is it possible, given the team's resources and level of buy-in from key staff?
- *Relevance.* Will it affect the top driving factor? Is it related to the goal?
- *Data availability.* Are data available to inform and monitor the team's action plan?

Strategies and actions are the foundation of the plan. Once these are determined, necessary resources and a reasonable timeframe can be identified.

An action plan may also include steps to explore initial findings through a more rigorous research study. Incorporating such studies into an action plan allows data teams to identify the resources and data collection efforts needed for the studies. Well-designed and well-conducted studies can provide information on whether an action or program (for example, an after-school tutoring program) is the cause of certain outcomes (for example, an increase in math scores in grade 7). Rigorous studies, with thoroughly examined findings, establish a solid foundation for decisions.

An action plan can be created for achieving objectives and goals by brainstorming potential strategies and actions to reach the goals

Guiding questions
- How can an effective plan be created to address the issue?
- What should change?
- When should the changes occur?
- What resources, including personnel and time, will be needed to lessen each challenge?
- What activities will contribute to reaching the goal?
- Are the proposed activities possible using the available resources?

Template 5 can be used to set SMART goals. Template 6 can be used to organize the team for action.

Step 5. Monitoring progress and measuring success

The final step involves monitoring progress to keep the action plan on track and measuring success to determine whether the goal has been reached.

Monitoring progress—how and why?

Data team members should regularly revisit their action plan. If the plan gets off track, perhaps through dropped responsibilities, turnover of key staff, or unforeseen challenges, the team should troubleshoot to determine what to do to get the plan back on track. Team members should regularly check in with one another, identifying challenges, making changes as needed, and celebrating successes.

Measuring success—how to know when the goal has been reached

Assessing progress is essential in using data to achieve desired improvement. As an action plan is being implemented, it is important to assess whether its strategies are being properly

Template 5. Developing an action plan: setting SMART goals

Goal		Is this goal SMART?
Specific	What is the goal trying to accomplish?	
Measurable	How will this goal be measured?	
Attainable	Is the goal achievable, given the available time and resources?	Yes/no
Relevant	Does the goal have meaning for those whose decisions it will influence?	Yes/no
Timely	What is the end date for the goal?	

What resources are required to pursue this goal?

What important dates are associated with this goal?

What milestones will be measured along the way?

What activities will need to be completed to attain this goal?

Notes

Source: Adapted from Get Organized Wizard S.M.A.R.T. Goal Planner (http://www.getorganizedwizard.com/community/personal-organizing-tips/600-how-set-smart-goals.html).

Template 6. Developing an action plan: organizing the team for action

Strategic statement:

Action steps	Resources	Deadline and responsibilities	
What will be done?	What is needed to do this step?	Who will do it?	By when?
1.			
2.			
3.			
4.			
5.			

Source: Adapted from Nebraska Department of Education (2012).

executed and its goals are being achieved. Some action plans will be short term and lend themselves to quick evaluations using school-level data systems; other action plans will be more long term and may require more time to implement (such as strategies relying on annual standardized test outcomes).

When assessing the effectiveness of an action plan, the data team should collect the same type of data from the same data source used to identify the challenge or success. When data are from different sources, differences in how the data were collected could yield different results. In the previous example the SAT-10 was the initial source of data on math achievement; if a different test is used as the main data source the following year, the results will not necessarily be related.

Evaluation provides opportunities for team members and colleagues to observe the results of their efforts. When data team members see positive impacts on student achievement, that strengthens their motivation to continue their efforts. In addition, evaluating the effectiveness of the strategies and actions allows the team to determine what is working and what is not. If actions or strategies are not working, the team can adjust them.

Evaluation provides opportunities for team members and colleagues to observe the results of their efforts

Educators make decisions every day that affect the students in their classrooms and school systems. Using data to inform these decisions helps ensure that they are guided by available information, are grounded in factual observations, and lead to better outcomes for all.

Guiding questions
- How can a data team know that progress is being made on addressing the issue?
- Is a plan in place to monitor progress toward the goals?

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