The days of using data in schools once a year are over. If continuous improvement is the goal, then there is little point in examining only one source of data, state test results, which often become available only after students have moved on to the next grade and it is too late to do anything about them. Data-literate teachers use a variety of different kinds of data, some on a daily basis, some monthly or quarterly, and some annually, to continuously improve instruction and engage in collaborative inquiry. These include both formative and summative assessments. Formative assessments are assessments for learning and happen while learning is still under way and throughout teaching and learning to diagnose needs, plan next steps, and provide students with feedback. Summative assessments are assessments of learning and happen after learning is supposed to have occurred to determine if it did (Stiggins, Arter, Chappuis, & Chappuis, 2004, p. 31).

The figure below illustrates the different types of data used in the Using Data Process, including formative, summative, and other kinds of data, and gives a rough estimate of the amount of time spent with each type.

THE DATA PYRAMID: RECOMMENDED

- **Formative Classroom Assessments for Learning** (e.g., student self-assessments, descriptive feedback, selected response, written response, personal communications, performance assessments)
- **Formative Common Assessments** (e.g., math problem of the week, writing samples, science journals, other student work)
- **Benchmark Common Assessments** (e.g., end-of-unit, common grade-level tests reported at item level)
- **Data about people, practices, perceptions** (e.g., demographic, enrollment, survey, interview, observation data, curriculum maps)
- **Anually** Summative District and State Assessments (aggregated, disaggregated, strand, item, and student work)
- **2–4 times a year**
- **Quarterly or end of the unit**
- **1–4 times a month**
- **Daily–Weekly**
The widest part of the pyramid, at the bottom, illustrates the type of data that we suggest teachers spend the bulk of their time using—formative classroom assessments, done by teachers in their classrooms on an ongoing basis, including student self-assessments, descriptive feedback to students, use of rubrics with students, multiple methods of checking for understanding, and examination of student work as well as tests and quizzes. They inform teachers’ instructional decisions—day-to-day, even minute-by-minute—and serve as the basis for feedback to students to help them improve their learning. For example, in Canton City, Ohio, the middle school Data Team members use hand-held electronic devices, Texas Instruments Navigator™ and graphing calculators, to quickly assess student understanding of lessons while they are in progress. They then use this information to adjust their teaching, give specific feedback to students, and provide extra help for students who need it. Because of the strong research base indicating that these types of assessments improve student learning, we recommend that individual teachers spend the bulk of their data-analysis time developing, collecting, and analyzing these data (Black, 2003; Black & Wiliam, 1998; Bloom, 1984; Meisels, Atkins-Burnett, Xue, Nicholson, Bickel, & Son, 2003; Rodriguez, 2004; Stiggins, Arter, Chappuis, & Chappuis, 2004).

The next layer of the Data Pyramid represents formative common assessments, which are frequently analyzed by the Data Team—one to four times per month. These include some of the same sources of data as the formative classroom assessments, the difference being that teams of teachers administer these assessments together and analyze them in their Data Teams. For example, the Canton City high school mathematics Data Teams administer problems-of-the-week and meet weekly to examine student work and brainstorm ideas for improving instruction. These formative common assessments are important to the Using Data Process in identifying student-learning problems, generating short cycles of improvement, and frequently monitoring progress toward the overall student-learning goal.

The next layer of the Data Pyramid illustrates benchmark common assessments, administered at the end of a unit or quarterly to assess to what extent students have mastered the concepts and skills in the part of the curriculum recently taught. As described in Task 11, these are administered together by teachers teaching the same content, either at the same grade level or in the same subject or course. The “common” feature makes them an ideal source of data for collaborative inquiry. In fact, they are among the most important sources of student-learning data the team has because they are timely, closely aligned with local curriculum, and available to teachers at the item level (results are reported on each individual item, along with the assessment items themselves, unlike some standardized tests, where released test items are not available). Item analysis provides extremely useful information on students’ misconceptions and confusions and on the specific concepts or skills that students need help with.

Benchmark common assessments can be used both formatively, to immediately improve instruction, and summatively, to inform programmatic changes in the future, such as increasing the amount of time a particular concept is taught or changing the sequence in which it is taught. In the Using Data Process, common benchmark assessments are an important part of the identification of the student-learning problem, along with the regular monitoring that is so crucial to continuous improvement. Task 11 describes how to drill down into multiple levels of common assessments, from aggregated, disaggregated, strand, and item-level to student work.

The next layer in the Data Pyramid, data about people, practices, and perceptions, is one that is often overlooked in schools, but it is extremely important. This type of data includes demographic data about student populations, teacher characteristics data, course enrollment data, and dropout rates (see Data Examples in Task 2). The Data Team analyzes demographic data in Task 2 to understand who the people are who comprise the school community. This slice of data also includes survey, observation, and
interview data, which provide critical information about instructional practices, policies, and perceptions of teachers, students, administrators, and parents (see Data Examples in Task 14). These data become very important in exploring systemic causes of the student-learning problem identified through student-learning data and in monitoring the results of implementation of the Action Plan. They also help to assure that diverse voices—by role (e.g., student, teacher, parent, administrator) and by race/ethnicity, economic, language, and educational status—are brought into the work of the Data Team. In the Using Data Process, such data are recommended for use two to four times per year.

The top of the Data Pyramid represents summative assessment data, including state assessments as well as annual district tests. These data are used to determine if student outcomes have been met and for accountability purposes. In the Using Data Process, the Data Team takes full advantage of these data, drilling down into them and analyzing them in as much detail as possible. Along with other student-learning data sources described above, they become the basis for identifying a student-learning problem and setting annual improvement targets. They occupy a small part of the pyramid because they are only available annually and provide limited information about what to do to improve (especially if item-level data are not available). In addition, these results often arrive too late for teachers who taught a group of students during the year of the test to respond to them. The inverted pyramid shown below illustrates the practice that we recommend schools move away from—spending most of their time and energy on state assessments.

**THE INVERTED DATA PYRAMID: NOT RECOMMENDED**
Resource R5.1
Data Pyramid Preparation

1. Make one copy of the pyramid per Data Team member. Card stock is recommended. Distribute two copies per pair.

2. Cut out the pyramid and then cut along the dotted lines. Clip the pieces of each pyramid together with a paper clip or binder clip, or put them in baggies or envelopes. Distribute the pieces to the Data Team and follow the directions in the Coach Notes for Activity 5.2.