

Promoting Student Achievement Using Research-Based Assessment with Formative Benefits

A White Paper Prepared By CTB/McGraw Hill

Research shows that technology-enhanced formative assessment is a powerful solution that enables educators to more readily monitor progress and improve student achievement.

First Things First: What is Formative Assessment?

In a frequently cited 1998 study by Paul Black and Dylan Wiliam of Kings College, London, the researchers define formative assessment as follows:

“We use the general term assessment to refer to all those activities undertaken by teachers—and by their students in assessing themselves—that provide information to be used as feedback to modify teaching and learning activities. Such assessment becomes formative assessment when the evidence is actually used to adapt the teaching to meet student needs.”

The Formative Assessment for Students and Teachers State Collaborative in Assessment and Student Standards (FAST SCASS) agreed upon the following definition in October 2006 by state assessment and other education leaders.

“Formative assessment is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students’ achievement of intended instructional outcomes.”

In a regularly referenced study, Carol Boston, an author and expert on formative assessment, further says *“The goal of formative assessment is to gain an understanding of what students know (and don’t know) in order to make responsive changes in teaching and learning.”*

Formative assessment provides educators with critical information about student and classroom progress and can be used to adjust the teacher’s approach and the pace of instruction throughout the year. Formative assessment is often used as a tool for uncovering opportunities for instructional intervention because it gives teachers information about where additional practice and support may be needed. Importantly, formative assessments help deliver this information while there is still time in the school year to improve student achievement.

Whether a school consistently ranks at the top or struggles each year to meet adequate yearly progress (AYP) standards, formative assessment can provide evidence of learning gaps that enable teachers to intervene and target instruction to address specific needs—before students fall further behind. Using formative assessment, administrators and teachers receive data-driven insights and research-based predictions of how students are likely to perform on state assessments.

Formative Assessment Demonstrates Improved Results

According to the 1998 Black and Wiliam study, the use of formative assessment methodology significantly accelerated learning, especially among low-performing students. Black and Wiliam concluded that the results show that formative assessment also helped narrow achievement gaps and raise overall performance. According to the researchers, on average, students in classrooms where formative assessments are administered nearly doubled their rate of learning, gaining the equivalent of twelve months of learning benefits in just six or seven months.

After reviewing approximately 250 studies conducted across various countries, Black and Wiliam concluded, “*We know of no other way of raising standards for which such a strong prima facie case can be made on the basis of evidence of such large learning gains.*”

In summary, assessment becomes formative when it includes these two critical factors:

1. Effective formative assessment is used primarily, and often solely, to support classroom learning.
2. It provides valuable feedback on individual student and classroom progress that is actually used by the teacher to adapt teaching to student learning needs.

The Benefits of Technology-Supported Formative Assessment

Historically, implementing formative assessment required a process of collecting observations, data, and other classroom-based measurements to support targeted instruction. These methods are often subjective, however. Today, technology often empowers teachers and classrooms by providing a systemized and uniform process for presenting, analyzing, and communicating student results.

Comprehensive technology-based assessment improves student learning by moving beyond traditional assessments to help educators quickly make important decisions that impact schoolwide and districtwide student progress.

Quality technology-based formative assessment should ideally include the following features:

- An easy-to-use, highly accessible system for delivering assessment, and communicating results
- Instructional resources that enable teachers to reinforce concepts and provide opportunities for intervention
- Alignment to state, district, or other local standards to provide a common framework for understanding student progress
- Progress tracking before critical high-stakes state assessments are administered
- Data that can immediately be acted upon to affect student progress
- Support for customization and training
- Flexible systems that can accommodate and integrate with varying levels of technology in classrooms, schools, and districts

In a paper appearing in the *Journal of Science Education and Technology*, researcher Jason Ravitz (2000) examines studies conducted at the Stanford Center for Innovative Learning Technologies (CILT). He writes that researchers are looking closely at the factors around the

*“Our district has just begun using **Acuity**™ to help support our teachers and administrators. We were surprised at how easy it was to assess approximately 9,000 students in both ELA and Math. In addition, we all were amazed at the instant assessment reports that **Acuity** generated. The assessments parallel our NYS assessments and standards so teachers could immediately begin using the results to identify strengths and weaknesses in their students. They used this information to make changes in their class instruction, as well as program for individual student needs.*

*Teachers are also using the custom built tests to develop assessments that are based on our standards. The instructional support activities can be easily used to help students who need remedial skill building, and are easy to integrate into the school day. The support we have received from **Acuity** is wonderful. They respond immediately to our questions and have worked with us to help adapt **Acuity** to our needs as a district.”*

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successful use of technology to support learning. Ravitz further notes that technology can help teachers and students by improving the ability to provide formative assessment.

In *Celebrating 20 Years of Research on Educational Assessment: Proceedings of the 2005 CRESST Conference*, Anne Lewis says:

Formative assessment is central to good instruction in several ways, including focusing learning activities on key goals; providing students feedback so they can rework their ideas and deepen their understanding; helping students develop metacognitive skills to critique their own learning products and processes; and providing teachers with systematic information about student learning to guide future instruction and improve achievement. Yet teachers typically have little preparation in assessment or how to use such information well.

Today’s teachers are responsible for an ever-growing list of instructional and administrative requirements to support learning. As a result, incorporating formative assessment for individualized learning is often ignored. Alternatively, technology can give educators the tools that can make it easier to learn how to effectively implement and use formative assessment.

Helping Educators and Parents Improve Student Achievement

Because formative assessment helps teachers target instruction in the classroom, this type of assessment also benefits school and district administrators, students and parents. It helps teachers gauge how much students have learned and how well they are performing compared with other students. This information allows teachers to provide timely, directed, and detailed instruction that assists schools and districts in decisionmaking and meeting state standards.

Classroom Teachers:

When teachers know how students are progressing and where they are having trouble, they can use this information to make necessary instructional adjustments, such as remedial teaching, trying alternative instructional approaches, or offering more opportunities for practice. These activities can lead to improved student success. (Boston 2002)

Further, the 1998 Black and Wiliam study led the researchers to conclude many positive effects of formative assessment for classroom teachers and the following points about formative assessment:

- Studies show that innovations that include strengthening the practice of formative assessment produce significant and often substantial learning gains.
- Formative assessment can help all students and is particularly effective with low-performing students by helping students clearly understand where they are doing well and where they can improve.
- The research studies that Black and Wiliam examine illustrate that effective programs of formative assessment go beyond a few classroom observations and tests. Effective formative assessment programs actually require much more. The researchers say *“they require careful scrutiny of all the main components of a teaching plan. Indeed, it is clear that instruction and formative assessment are indivisible.”*

The formative assessment programs available today help teachers by providing resources that can streamline the process of offering formative assessments to students and make it easier to target instruction and improve student achievement.

Administrators:

A strong, comprehensive formative assessment program can also help district administrators benchmark student proficiency at the beginning of the year against state standards at the district, school, and class levels, and give visibility into progress throughout the year.

Equipped with reliable, data-driven diagnoses, administrators can proactively make recommendations that support positive change in the classroom, such as:

- Prompting teachers to use assessment data to modify and inform instruction
- Providing feedback to students to close learning gaps
- Creating formative assessment cohorts across districts that allow teachers to collaborate in study groups to test and practice methods that support subject mastery

Students and their Parents:

When a classroom focuses on supporting an individualized approach to student progress toward mastery, students can clearly see where they’ve been, how far they’ve come, and where they need to go next. A student struggling with fractions might, for example, view a report detailing their recent performance on fractions, receive instruction on fractions, and practice items to improve future performance. A comprehensive assessment program assesses student performance, provides detailed performance reports, and includes instructional content to improve performance.

Core Elements of Quality, Research-Based Assessment

The student progress and other reporting data from formative assessments provide teachers with the means to modify instruction to improve student learning. This quality feedback can only result from quality assessments. To be useful, the assessments must only include items that are correctly aligned to state or local standards. Assessments that claim to mirror instruction must be accurately aligned to pacing guides and assessments that claim to predict to subsequent state NCLB assessments must have content structures that mirror those of the state test blueprints.

A comprehensive, research-based assessment program that also addresses formative, classroom-based assessment requirements can create a predictive indicator to state assessments and generate powerful reports on each student's strengths and weaknesses.

Many assessments today vary greatly on a number of key features, all of which contribute to the quality of this feedback and its usefulness in helping to improve instructional outcomes.

Based on research cited in this paper, and based on CTB/McGraw-Hill observations of best practices, an effective assessment program should:

- Provide clear guidelines on the appropriate interpretation and uses of assessment results
- Support the use of appropriate accommodations for students with disabilities
- Include test-taking skill practice such as reading comprehension and writing tips
- Offer professional development opportunities via pre- and post-test training on the use of the system and report analysis, data interpretation, and the use of data to inform instruction

In addition, formative assessment solutions should provide some instructional components that are designed to:

- Provide teachers with instructional resources that can be individually assigned to students from their test results so that assessment leads directly to appropriate instruction
- Be completed in a single session using a single sign on
- Correlate to reports that identify learning gaps and provide targeted instruction by indicating likely misconceptions based on which wrong answer or “distractor” the student chose
- Align closely to the curricular goals taught prior to the assessment
- Include customizable assessments focused on a particular curricular goal
- Incorporate research-based development practices based on theoretical and empirical evidence

Solid and effective formative assessments should also include evaluative components that provide:

- A range of difficulty and breadth for greater accuracy
- A mix of item formats, including selected-response and constructed-response items
- Reports designed to facilitate the intended evaluation, including standard error of measurement when appropriate
- Proper alignment to state standards and goals that exclude items outside these domains or assessment goals

Furthermore, formative assessment offerings can sometimes contain predictive components that deliver:

- The ability to use student data that is collected in the baseline year to provide a predictive indicator in subsequent years
- A mix of items with content coverage similar to those included on the state NCLB exam
- Items appropriate for varying administration times
- Reports that claim to predict to subsequent state NCLB assessments that include an indication of the accuracy of the predictions
- Diagnostic information to provide additional guidance to individual students and groups of students

Future Innovations in Assessment

In addition, new forms of teaching and learning, and new forms of assessments are required to accomplish the technology-supported reforms that are often envisioned (Ravitz, 2000).

Ravitz discusses the future trends in quality technology-based formative assessment—many of which are available in **Acuity** from CTB. According to his synopsis, formative assessment should basically:

- Be easily accessible, providing broad access to technology that is easy to use by educators and even parents
- Develop teacher capacity by building teachers' ability to deliver formative assessment that can and will be used more often
- Be easy for classroom teachers to implement into existing classroom workflows
- Support a variety of “21st Century Skills” that include the ability to use resources and information

Education is a constantly evolving field where new ideas, laws, and practices convene to create constantly changing priorities. Educators must remain abreast of the newest solutions available to support their goals and help move students toward success

Formative Assessment in the Classroom

Acuity from CTB is an example of one of today's highest quality solutions for promoting student success with robust, technology-enabled interim and formative assessments.

Acuity heralds a new generation of comprehensive assessment programs that will change the way educators perceive assessment. **Acuity** contains all these elements of a comprehensive interim and formative assessment system: ongoing measurement, in depth reporting and analysis of performance data, and resources for targeted instruction.

At the forefront of today's assessment solutions, **Acuity** includes:

- Research-based assessment for classroom use
- Classroom-based predictive assessments to forecast student performance on state assessments
- Diagnostic assessments that outline student strengths and weaknesses relative to state standards
- Immediate feedback on student performance with reports that indicate student growth and progress
- Instructional resources for Reading and Math in grades 3–8 that teachers can use for intervention and review, including guided practice sets that walk students through activities
- A state-correlated online item bank with state-specific items for further practice and instruction
- Online tutorials, opportunities for professional development, and other teacher support

Acuity's predictive assessments mirror state NCLB assessments for Grades 3–8 in Math, Reading/Language Arts, and Science. **Acuity** also has an Algebra I program for Grades 6–12.

Informative Assessment: Interim and Formative Assessment Benefits in One Solution

It is important to note that the most effective assessments should also be flexible, because each classroom or school is unique.

Acuity delivers a solution that can fit a range of needs from classroom-based formative assessment to periodic assessment programs that are designed to prepare students for state testing.

Online student assessments can be delivered in a computer lab or via classroom computers, and are scored immediately. If computers are not available, **Acuity** features paper-and-pencil assessment options, which allow the assessments to be scanned and scored, and then uploaded into the **Acuity** program. Many schools choose a combination of both methods for delivering assessments. **Acuity's** predictive assessments can be administered three times per year to help prepare students for the state assessments, and mirror the state assessments in format and content.

The results of predictive assessments provide teachers and administrators with an early indication of how students may perform later on the state NCLB assessments and include an index of the accuracy of the predictions.

Diagnostic assessments can be administered up to four times per year and provide educators with a deep understanding of student strengths and weaknesses.

Diagnostic assessments contain 30–35 items, and are designed for each grade level and content area. Normally administered within a 45-minute class period, these assessments can be customized around commonly assigned district, state, or local criteria. They measure student understanding of standards and give individually tailored feedback.

In the case of **Acuity**, educators also have a vast database of assessment items they can use to create practice assessments that will conform to the goals set for states, districts, schools, and classrooms. Practice assessments can also be created using item banks that support teacher-created assessments. CTB provides in-depth professional development and customer service for its **Acuity** assessment program, including on-site and online professional development, remote consulting, and free technology support. System updates are delivered automatically, and a CTB-assigned implementation manager helps with desktop and network set-up and security.

More Effective Teaching, More Efficient Learning

Assessment systems like **Acuity** are solutions (not just one-time summative assessments) and they can preserve classroom instructional hours by helping to focus classroom teaching lessons and goals.

Acuity helps the teacher know when students are ready to move on to the next level and when to spend more time on practice and review. **Acuity** also gives teachers the ability to assign instructional resources for individual and small-group practice.

These resources help motivate and engage students with progress reports that mark and encourage each step toward success. Reducing the time needed to score assessments leaves more time for instruction. Teachers can easily log in to their online account to view and assign assessments, view or print reports, and assign instructional resources. After choosing a report, the teacher can then view the results of an entire grade level or a specific class.

Pinpoint Specific Problems in Time for Correction

Acuity's reports provide instructional direction in a variety of easy-to-understand formats. Reports are available at the student, class, school, and district level, and include Standards-based Performance and Growth, Roster, Item Analysis, AYP, and Longitudinal Growth.

The following is a list of just a few **Acuity** reports that allow users to drill down for deeper understanding. These reports are designed to meet specific educational needs.

Student Portfolio Report: Provides a snapshot of assessment results for a student using overall percentage points obtained

Class Assessment Report: Provides actionable data on class performance relative to state standards

Class Item Analysis Report: Identifies common misconceptions on specific skills with links to Distractor Analysis to inform classroom instruction

District or School AYP Report: Outlines performance by NCLB subgroups enabling administrators to focus on key areas

Summary

Formative assessment can accelerate learning and motivate students to succeed. Diagnostic and predictive assessments with in-depth reports provide evidence to support positive changes in classroom instructional practices.

The consistent use of all the features provided in a research-based and technology-driven assessment program and formative and interim assessments will help teachers be more efficient, and more effective throughout the year.

By engaging students in every phase of the learning process and helping them see the progress they are making, next-generation assessment solutions like **Acuity** are motivating students—and supporting them as they achieve higher levels of proficiency.

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