# Have You Ever Wondered About the Use of Multiple Measures in Mathematics?

*by the California Mathematics Council State Board*

One of the current buzzwords in use in the state of California and across the nation is multiple measures. But what does this phrase really mean for students, teachers, schools, and districts? Quite simply by multiple measures we mean the use of a variety of assessment formats that allow educators to identify the strengths and weaknesses of their students so that the curriculum can be adjusted to meet the needs of those students.

## Why Do We Need Multiple Measures?

In California, data from the Standardized Testing and Reporting (STAR) program are being used in an attempt to answer the concerns of many different audiences regarding the effectiveness of public education. However, we seem to have forgotten that students come to school with different levels of preparation for school mathematics. We also need to remember that students may score well on a standardized test even though they only learned a moderate amount of mathematics during the school year; conversely, students might receive low scores on a standardized test, but make tremendous gains in mathematics when comparing their performance from the beginning to the end of the school year.

Not only should stakeholders know how well students have mastered the mathematics standards, but also how well they have progressed from the beginning of the year. Students, parents, and teachers need to know how students are progressing towards understanding and applying the targeted mathematics content so the opportunities to learn can be improved. Community members need to see how much growth has occurred whether or not the mathematics standards have been completely mastered.

If one of the goals of assessment is to improve instruction, then it must be done throughout the year. It would be unwise to change an instructional program based on a single instance of feedback that comes months after the completion of a school year. The beauty of multiple measures is that we can learn about the progress of students within a school year. We can revise curriculum for students as the need arises.

**What Are Some Options for Multiple Measures?**
The mathematics portion of the STAR program consists of standardized and criterion-referenced tests that are given to students in grades 2 through 11 at the end of the school year. The results of these end-of-year assessments provide information that may be used to alter the next year's program, rather than the current year's program. This is not enough to build a comprehensive assessment program that:

- reflects the mathematics that students should know and be able to do;

- enhances mathematics learning;

- promotes equity;

- is an open process;

- promotes valid inference;

- is a coherent process. (NCTM 2000, 22)

Student growth must be measured throughout the year in a variety of ways in order for stakeholders to see the full strength of an educational program and to provide an opportunity for changing curriculum, as needed. Hence the current mantra for multiple measures.

In California, multiple measures could make use of the STAR program at the end of the year along with the many assessment tools teachers use throughout the year. Teachers may routinely be using any or all of the following forms of assessment in their classrooms:

**Homework:** This provides immediate feedback on students? understandings of both concepts and skills.

**Paper/pencil Tests:** These may include a variety of forms, such as true/false, multiple choice, matching, and open-ended.

**Observations:** Teachers assess on a daily basis when they observe the work students are doing and discuss that work with the students. As a result of these observations and discussions, teachers may be keeping anecdotal records.

**Student Reflections:** These could include student journals as well

as student interviews.

**Student Reports, Projects, and Presentations:** These provide opportunities for students to demonstrate understanding of mathematical concepts and promote real-life connections to mathematics. Students may work individually or in groups.

**Portfolios:** These are used to demonstrate understanding and academic growth over time through a body of carefully selected student work.

All of these forms of assessment have as their goal to provide information about what is happening in the classroom and thus allow for the improvement of the educational program for students. "Just as a photograph provides a single snapshot of a child at a given time and place, a test measures how well a student answers a given set of questions on a given day" (CMC, 1).

**Who Will Use This Information?**

Traditionally, teachers have assessed students in order to measure student growth and communicate the information to parents. However, with the onset of accountability, assessment has taken on the additional task of informing a variety of audiences on the effectiveness of public schools. Ideally, assessment should be able to provide politicians with the information they need to develop strong educational policies that ensure access and equity for all students. Assessments present the general public with information regarding the effectiveness of the schools they support financially. Data from assessments should be used by administrators to determine the effectiveness of curriculum materials and teachers. The data should also be used by teachers to plan instruction, strategies, and activities to ensure that students are meeting grade level expectations and standards. Parents use information to monitor their children's progress and to select the educational setting for their children. Students can use the assessments to demonstrate mathematical understandings and skills, to set goals for themselves, to assume responsibility for their own learning, and to become more independent learners.

Given the differing perspectives of our audiences, the question becomes: Can a single assessment meet the needs of all the stakeholders? Obviously not.

## Recommendation

The California Mathematics Council recommends that a comprehensive assessment program in mathematics include a variety of assessments that enhance student learning, can be used as tools for making instructional decisions, and provide necessary feedback to a variety of stakeholders. As Carr and Harris state in Succeeding with Standards: Linking Curriculum, Assessment, and Action Planning: "Comprehensive assessment is an ongoing inquiry, a process of raising questions, collecting data to provide some possible answers, and making reasoned decisions about necessary changes in programs, practices, and resources that will affect student performance." As stated in the NCTM Principles and Standards: "Assessment should not merely be done to students; rather, it should also be done for students, to guide and enhance their learning."

## References


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