PRESIDENT'S MESSAGE

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Take action to expand your use of measurement in your personal and professional experiences.

MEASURE FOR MEASURE

Let me start by claiming that measurement is really the *first* Standard. If not for humans' social proclivity to compare—to ask, "Who has more?" or "How far is that?" or "How big is that?"—would we have created, or discovered, much of the rest of mathematics? Commerce and many other human activities depend on measurement.

Students in most other countries outperform students in the United States on tests of measurement. One important reason is that many of our students do not have experiences that allow them to make significant use of measurement concepts and processes—in mathematics, across the curriculum, or outside of school. Even in the early grades, students frequently do not encounter measurement in a hands-on manner but rather through worksheets and pictures.

How comfortable are you in recognizing and working with the measurement units that your students should be using? Think not only about the units in math but also about those derived in the natural, physical, and social sciences—including the units in financial literacy. Do you have good benchmarks for the meter and the kilogram—along with specific multiples of these, such as the kilometer and the gram—or for trillion-dollar deficits? What about derived units—kilometers per hour (speed), miles per gallon (fuel efficiency), or feet per second per second (acceleration)?

Take action to expand your use of measurement in your personal and professional experiences. Every day the news features measurements in derived units in important social and scientific contexts. Can you make these relevant to your students?

Keep in mind students' common misconceptions. First, many students do not recognize that all measurements, other than counts of discrete objects, are approximate. Second, students too often misinterpret the phrase "error in the measurement" to mean that someone made a mistake—not that a range of possible measurements occur around the reported measurement.

In measuring, the choice of the unit really matters! It should be selected on the basis of the tools available (e.g., rulers, protractors, calipers, electronic technology), the purpose of the task, and the relative error that is acceptable (Tucker 2009). Working with these criteria, should we measure the length of the classroom in meters, decimeters, centimeters, or millimeters?

NCTM advocates that every student be comfortable with and proficient in use of the metric system. There can be no retreat from this position! It is our responsibility to help students become proficient in the units of measure that they will use in school, the workplace, and their neighborhoods (NCTM 2006). In the U.S., we have the distraction of living with and using both the metric and the customary (English) systems. Despite decades of efforts by NCTM, scientific societies, and many industries, along with the passage of federal laws, we encounter many commercial and social arenas where metric units are not used.

Given our U.S. dilemma, I recommend:

Live in one system at a time! Help students establish benchmarks, learn relations between units, practice making conversions, and refine measurement decisions and reporting in that system—metric or customary. At another time, let students experience this process in the other system.

Don't be consumed with conversion across systems! Work on familiarity with benchmark comparisons where both systems are used—a yard is slightly less than a meter, a liter and a quart are about the same, a kilogram is about 2.2 pounds. Remember that conversion formulas abound on the Web.

Measurement is a process with a set of criteria, systems of units, and mathematical structure. Engage students in this process through a wide range of settings and mathematical decision making—in the math curriculum and beyond (see the measurement books in the Navigations Series). Measurement is not a worksheet strand! Ω

Reference

Navigating through Measurement (four grade-band books, for pre-K–2, 3–5, 6–8, and 9–12, in the Navigations Series).

NCTM. Teaching the Metric System for America's Future. NCTM Position, 2006.

Tucker, Tom. "On Measurement." *Math Horizons*. (February 2009): 34.

Originally published in the *NCTM News Bulletin* (April 2009).