Measuring Success: Deepening Instruction, Increasing Student Learning

by Jenny Pfeffer, Teacher Induction Advisor—Racine Unified School District, Wisconsin

I enjoy teaching mathematics, but beginning my unit on measurement in our second grade dual language classroom was honestly something I would put off starting in previous years. Using they struggled with measuring objects and were not clear as to what the U.S. customary or the metric system entailed. Although they were familiar with a few of the vocabulary words, the meaning was fuzzy, and suddenly "kilos" and

"inches" were meaning

the same thing! I began to closely examine what

it was that I wanted my

unit. While I cared that

they knew how many

inches were in a foot,

students to gain from this

wasn't it also equally, if not

more, important that they

could successfully estimate

using the appropriate unit of measurement? This

the length of an object

pre-assessment helped

to clarify that my focus

the pictures on the workbook pages as well as a few unifix cubes did not seem very motivating for spring, a time when students are itching to be out in the changing weather. Last year I taught second grade at Wadewitz Elementary School in the Racine Unified School District, where I job-shared a classroom with Susan Kwapil. I taught mathematics in Spanish, as did Susan on



Students collaborate during hands-on rotation stations focused on units of measure and measurement.

the days she was teaching. She also created, with the students, anchor bridge charts in Spanish and English throughout the unit.

My desire for this unit was that my students would grasp the big idea of how we use measurement in our daily lives and could then connect that to their own lives. When I was trained in Achievement Inspired Mathematics for Scaffolding Student Success (AIM4S^{3™}) I hoped for the best, and in turn, I received just that. I used the main components of AIM4S^{3™} to enhance my instruction and reverse the way I taught math. Instead of teaching lessons and hoping for the best at the end of the unit, I was deliberate in using the standards to plan my unit, including my decisions for goals and assessments, as well as daily activities. This particular measurement unit turned out to be one of my favorite units ever taught, and I think my students would be in full agreement.

As a pre-assessment for schema in measurement, we did an inquiry in which the students shared their knowledge and questions on the topic. Later, in an oral interview, my students expressed that would lie in the estimation and real-life decisionmaking that kids would actually use. I wanted them to remember that units, or space, can look completely different, depending on the use or the need.

Inviting my students to measure their school supplies with a ruler gave me a quick validation that the majority of my students did not know how to successfully measure an object beginning at the edge and reading the number of units that corresponded to the end point of the object. I realized that my students needed to experience that it is the spaces on a ruler that are key and not the numbers (Van de Walle, Karp, & Bay-Williams, 2012). To help build this understanding, we did an activity that drove home the idea of equal spacing by providing rulers of different sized units to three different groups of students. The students were asked to measure and graph the number of units of the same object, however they did not realize they did not have the same sized units on their rulers. When different answers were graphed and compared, they saw that nobody was wrong. The distances came out to be equal when put on a graph with equal spaces. Our numbers appeared different because we were not all using the same

—continued on page 3—

-continued from page 2-

units of measurement. This activity and hands-on experience changed the way the students viewed units of measurement and opened the door for teachable moments regarding nonstandard and standard units of measurement, leading us to the metric and U.S. customary systems.

The living walls in my dual language classroom made an enormous impact on student growth and conceptual understanding, as well as increasing my ever-so-lively second graders' stamina for active engagement in my lessons. I facilitated the creation of our Compendium—a class resource chart

including key vocabulary, visual representations of key content we were studying, our standards, and the students' inquiry questions. When building the Compendium, I used real life examples such as measuring and recording the difference in height between two friends in the class. Later, excitement filled the room as children eagerly found and compared the differences in height among their friends using our work on the Compendium as a support.

The connections made among estimation, measurement, and subtraction made the knowledge accessible

for all students and relatable to past units. Having the standards right in front of us helped to keep us focused. Now more than ever I noticed kids actively using my walls to aid in their learning. They used the supporting anchor charts, created by my coteacher Susan Kwapil, as well as our Compendium in almost every lesson. These bridge charts helped students connect their two languages through the unit content as well as compartmentalize the attributes of measurement. The visuals aided the students in answering their own questions and helped the concepts stick because students were identifying the cognates and key terms. Embracing the living walls, students soon came to understand that our creations were tools for learning as well as a lighthouse for key concepts. We did a number of interactive read alouds throughout the unit, including titles such as Eric Carle's *Inch By Inch* and *How Big is a Foot*, by Rolf Myller, to further extend the theme around measurement. Students recognized the challenge of non-standard units of measure in *How Big is a Foot* because of their early explorations in this unit. The students and I saw the connections made as we reviewed the Stop and Jots (Listen and Respond). The transfer of knowledge amazed me as much as it did the kids. For the first time in a long time, everyone had an image in mind to sketch with the new schema they held.

—continued on page 12—



This measurement Compendium, built with students during the first part of the unit, became a living document as pieces were processed and highlighted during students' continuing investigations. The anchor chart below supported students in understanding measurable attributes and the language used to talk about them. It was part of "The Bridge" lessons during this unit.





–continued from page 3—

Further investigating volume, height, and length finally allowed me to dive deeper into the concepts, instead of the shallow surface skim I had done in the past as I followed a textbook. In a lab format, students were able to put their knowledge into practice, providing them an introduction to the measurement tools, as well as time for collaboration and reflection. Students experienced a different set of hands-on rotation stations focused on units of measure and measurement three times throughout the unit, but they were also actively measuring and exploring on a daily basis.

At the end of the unit, our culminating task was to have the students decide which of their school supplies would fit into their pencil box. They used a combination of estimation, the skill of measurement, and also two-digit subtraction. Our students showed great gains as 21 of our 23 students accurately measured and completed this post-assessment task with confidence. Throughout the unit, students remained highly engaged in the activities and readalouds and took away key understandings of the attributes of measurement.

It is with good reason that this was a favorite unit for the students and for me, as well. My experience with AIM4S^{3™} helped me to be more informed and intentional in my planning for this unit's goals, instructional tasks, and assessments. The Compendium provided a road map for the unit, helping us to go much deeper conceptually in planned activities that were grounded in standards and responsive to students' strengths and needs. Students became more active, independent, and resourceful participants in their learning over the course of the unit, making it a successful experience for us all.

