Who Measures What in Our Neighborhood?

K-1 Classroom

Phase 3

Sharing Results, Findings, and Understandings

Students share what they have learned with their parents at the open house.

A display of students' categorized list of what they now know about measurement.

In a multi-age classroom there is a complexity of learning exhibited. At University Primary School, teachers assessed what the children learned by examining the documentation. They looked for growth in basic skills, increased knowledge in the content areas, and a clearer understanding of the "big ideas." During Phase 3, students reviewed and reflected upon their work with the goal of communicating what they had learned. To conclude the project, students brainstormed and summarized what they had learned about *Who Measures What In The Neighborhood*? (Student Measurement Topic Web 2).

The students' reflections demonstrated that they now have a better understanding of how measurement is a part of every day life. The vocabulary that they used in their second web showed that they increased their knowledge of types of measuring tools. This vocabulary extended beyond the typical kindergarten and first grade mathematics curriculum. By using graphic organizers to analyze and draw conclusions from their data, students met and often exceeded Illinois Learning Standards for kindergarten and first grade. (See Measurement Learning Activities across the Curriculum).

Students became familiar with items in their surroundings that could be measured. Students updated parents on their measurement activities in monthly newsletters. In the February issue, students wrote about all of the things they measured in the classroom. In the May issue, students reported on their representations from their field studies. The students' and parents' reflections revealed that students became more comfortable using measuring tools for their own purposes.

A comparison of the web created at the end of the project (Student Measurement Topic Web 2) and the web (Student Measurement Topic Web 1) completed at the beginning of the project showed that some students gained the ability to distinguish between standard and nonstandard

units of measurement and students realized that measurement was essential for data collection in many fields of study. Evidence of new understandings appeared in their written reports.

To conclude the project, students discussed how they would tell the story of what they learned about *Who Measures What In Our Neighborhood?* Students worked in small and large groups sharing comments, listening, and discussing the products that they were constructing for the open house. They chose a number of ways to share their findings. Some groups finished their representations that told about their fieldwork, others worked on a fabric quilt, murals depicting the concepts learned, stories, homophones, poems, and PowerPoint presentations.

Products

Representations of Information Gained from Site Visits

Upon their return from a site visit, students met in a small group with a teacher and looked at their sketches and digital photographs. They made choices about what they wanted to represent, if they wanted to work alone or in a group, and what materials they wanted to use. The small group that went to the sheep farm worked on different representations for display at the open house. Students made a separating gate, a turning gate, a bag of wool, a spring scale, sheep and the sheep barn with a manger for 2 bales of hay, and an automatic drinking water trough. CS wrote a report about his trip to the barn.

> I went to the sheep barn. A special pen separates the babies from the mommies. A chute pours down food. There is special food that is only for the babies. A giant scale is there to weigh the grown-ups.

This is a separating gate that allows the lambs to go under to eat their special lamb food called creep.

CS and HB represent the separating gate with cardboard.

Display of the separating gate and the explanation of how it is a measuring tool for sheep farmers.

The farmers groom the sheep and give them an ear tag in a turning gate.

Students represent the turning gate with boxes and junk.

A display of a turning gate with a "boxes and junk" sheep inside ready for grooming.

At the open house students also displayed representations from the Water Survey – Ground Water Section, Ceramics Studio, Credit Union, and Water Survey Atmospheric Section. They felt these representations communicated what they had learned about the researchable questions from Phase 1 - "Who measures what in our neighborhood," as well as "What tools are used for measuring," and "What things get measured." When students explained their representations they shared how the measuring tools worked and why the people they saw used them. They felt confident that they had answered their other research questions, "How do measuring tools measure," and "Why do people measure?" At a whole group meeting, students summarized and charted their field experiences.

Who measures in our neighborhood?	What do they measure and with what tools?	Why do they measure?
Fire Service Institute	Hoses and nozzles	They need big circumference hoses for big fires.
	Ladder	They need to get the right size ladder for the height of the building.
	Water and pressure gauges	They control how much water comes out.
	Smoke detector	Measure the clean air.
	Inside fire truck cab	
	Gas gauge	Tells how much gas is in the tank.
	Speedometer	Tells how fast the truck is going.
	Odometer	How many miles it's gone.
Illini Credit Union	Coin counter	Counts how many coins.

	Coin wraps Dollar counter Cash register	Sorts coins by size and type. Counts and measures the size of dollar bills. Counts how much dollar and cents.
Ceramics Studio	Caliper Clay is weighed Potters wheel Glaze Kiln temperature & Combs	Measure around pots so the pot is the right size. Potter knows how fast and how slow to make the wheel go. Glaze is a powder that is mixed and put on the pots. Combs bend to tell that the kiln is hot enough.
Water Survey - Ground Water Section	Baler Coil Black box thermometer	Measures water in a well. Coil goes down in the well and measures how deep the water is underground. Temperature of the water underground.
Sheep farm	Separating gate Spring scale and the sling Turning gate Ear tag dispenser Lambing jug Scale Loft Stantion	Keeps the grown up sheep from eating the Creep food. Measures how heavy is the lamb. Turns the sheep so the farmer can record their health and put in a number ear tag. Measures ink. Pen for one mother and newborn lambs (usually one or two). Weighs bags of wool. Hay and grain is stored there. Bales of hay are counted, grain is ground and mixed. Holds some mother sheep by the head just right so they can't get out.

Model of a Fire Truck

Students made a model of a fire truck to communicate what they had learned from the Fire Institute. They studied their field sketches and the digital photographs, and revisited their sketches and photographs many times in the course of constructing the truck out of boxes and junk. They worked collaboratively on the model over several weeks.

A display of the fire truck made out of boxes and junk.

The completed quilt displayed at the open house.

Measurement Quilt

With the help from a parent who is a seamstress, students made a classroom quilt about measurement. They measured to cut the fabric into squares, drew a picture about measurement with fabric markers, and stitched strips of fabric to the squares using the pressure foot on the sewing machine to hold the fabric. Some students stitched the squares together in the same manner. The parent completed the quilt by sewing the backing and all of the squares together. Students found a prominent place in the classroom to display the quilt for the open house.

Murals - "What's Important about Measuring?"

After children brainstormed what they had learned about "Who measures what in our neighborhood," themes emerged. Groups of students chose to create murals. They reiterated four major concepts that became themes for the murals:

Measuring is important for making things the way you want.
Measuring is important for good health.
Measuring is important for making maps and globes.
Measuring is important for finding out what is heavy and what is light.

Students held a planning session before beginning the murals. The group illustrating, "Measuring is important for making things the way you want," discussed and recorded their ideas:

You have to measure to make buildings.
You have to measure how deep a hole is.
You have to measure paper airplanes.
You have to measure how much you weigh.
You have to measure how much money you have to buy something.
You have to measure how big something is.
You have to measure if it fits.
You have to measure how much milk you have so it doesn't spill.

Students collaborated to make a mural entitled, "What's important about measuring?"

The mural "What's important about measuring?" displayed at the open house.

PowerPoint Measurement Presentations

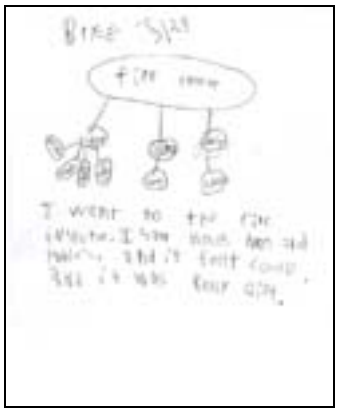
Toward the end of the project, one of the assistant teachers taught several students how to create PowerPoint presentations to communicate what they had learned. This integration of technology had two primary goals: (1) to expose the students to PowerPoint as a tool for communication, and (2) to give the students an opportunity to reflect on their own learning process through the measurement project. First, the assistant teacher gave a group of advanced readers a lesson on how to use the software. He demonstrated the features of PowerPoint on the teacher's computer and showed students how to get instructions from the "help" menu in the PowerPoint program. The students in this small group then explored creating their own presentations on other classroom computers.

The next day, the assistant teacher helped additional students prepare presentations. The teachers created a format for the presentations to include a sample of students' work from each phase of the project. Students selected a memory drawing to explain their prior experiences with measurement. Then they chose one or two of their observational drawings, or a relevant digital picture from fieldwork to demonstrate how they researched their questions. Students chose a product from Phase 3 to demonstrate their own growth in learning. While using the software, students chose the type of presentation they wanted and the slide template. Some of the students typed their answers. For other students, the assistant teacher facilitated their reflections by typing and manipulating the computer. After students chose their designs, the teacher helped them insert their digital pictures (either scanned drawings or digital photographs) into their presentation. At the open house, students took their parents to a computer that demonstrated their personal stories of how they learned about measurement (See PowerPoint Gallery).

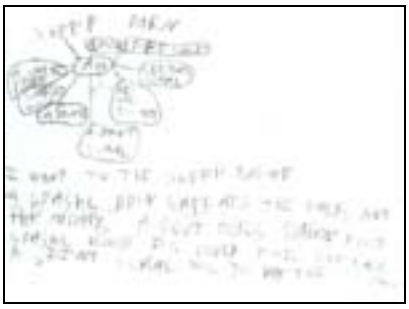
Reports, Poems, Homophones and Stories

Throughout the project there were many opportunities to write. Students wrote articles for newsletters that kept parents informed of their measurement activities. They wrote thank you letters on behalf of the class to the experts and field site guides. The teacher made non-fiction

books about measurement available in the classroom. After mapping their ideas, students wrote reports about their field site visits.



BK, first grader, mapped and wrote about his field trip to the Fire Institute.



CS made a web of his ideas before writing his report on the sheep farm.

The teachers read a number of poems to the students in whole group meetings. The teacher identified poetry elements such as metaphors and similes. Using their new measurement vocabulary, they wrote poetry and homophones during language and literacy time. They were displayed for the culminating open house.

Chicks
By AC

Chicks were resting and huddling.
They looked like a piece of yellow cotton.
Then they tried to fly.
Flapping, Flapping their wings.

Helping My Mom
By JC

I'm mixing the cake mix
A bowl
2 eggs
1 cup of water
Mix
It was fun
So now I'm helping my mom.

Soccer Goals
By MB

In soccer
You have
Six or twelve
Players

You kick
You dribble
You score Goals

In soccer
You have
Twenty minutes
Ten in each
Half

In February, students noticed that some of the messages on valentines were homophones. Students started playing with words and discovered many different homophones. Some students drew pictures, recorded their ideas and enjoyed sharing them at group meetings. The following homophones were about measurement:

Measurement Homophones

WJ	Hours – Hours in a day	Ours – Belongs to us
HB	Flour – You put in a cake	Flower – Grows in your garden
BK	Days – You know we have days and nights	Daze – Sort of crazy
JK	Foot – Ruler	Foot – That I walk on
NB	Ruler - What we measure with	Ruler – A king
TB	Cents – Money	Sense – When it sounds right, it makes sense.

The teachers read a variety of versions of *The Gingerbread Boy*. The teachers chose *The Gingerbread Boy* because it involved recipes and measuring. Children compared and contrasted the characters. They listed the similarities and displayed a comparison chart of stories written by Jan Brett for the parents.

Similarities:
- Hedgie is in three books.
- Fox is in two books.
- Woods setting in three books.
- Pig is in two books

Titles	Characters	Setting
Gingerbread Baby	Gingerbread Baby, Mom, Dad, Pig, Matti, Chicken, Cat, Dog, Goat, Sisters, Fox , Milk man	House, river, barn, gingerbread house, woods/outside, oven, bridge
The Hat	Hedgie, Cat, Dog, Horse, Pig, Lisa, Gander, Chicken	Outside in the woods, by a clothesline, house, farmhouse
Hedgie's Surprise	Henny, Hedgie, Tomten, Tomten's mother, Chicks, Goosy-goosy babys	Barberhouse/hay, field, pond, nest (Hen and Hedgie), Tomten's house
The Mitten	Owl, Mouse, Badger, Bear, Rabbit, Nickie, Hedgie, Fox, Grandma, Groundhog	Haystack/loft, woods, mitten, house.

One of the stories was entitled *Gingerbread Baby*. After reading and comparing stories, students wrote their own version of the *Gingerbread Boy* using information about measuring in the story. The temperature of the oven played a significant role in the students' stories. Teachers and peers worked with students to expand and clarify their stories. Students shared their edited versions on a book display rack at the open house.

Gingerbread Baby and Boy
By HB

A long time ago, there was a lady on a snowy day and she opened a cookbook to page 28, which is gingerbread girls and boys. She put the temperature too hot. The temperature was 100 degrees. She made a lady and a boy gingerbread cookies. They had stripes. She put them in the oven. She peeked in the oven and the gingerbread lady and boy ran away. Too bad!

She caught them with a pan, but they escaped and ran away singing, "I am the gingerbread lady with my son. As fast as we can be, we like to hide. And no one can catch us."

The son said, "Can you catch us, bet you can't, because we are free. Ha, hee, ho. Ha, hee, ho. Ha, hee, ho."

The gingerbread lady and gingerbread boy met five cats and escaped. They met two dogs and played a trick on the dogs. They met a fox and the fox gobbled up the gingerbread lady and boy. The End.

The Gingerbread Boy
By MB

Once upon a time there was a gingerbread man and woman who lived by the ocean. They had a baby whose name was the gingerbread boy. He made friends with a fox. He plays tag with the fox.

One day it was 193 degrees. The gingerbread boy lost his legs because of the heat.

Just then a big storm came and made a big wave. It washed the gingerbread boy, who got soggy and crumbled.

The gingerbread boy looked like a statue broken into pieces. That was the end of the gingerbread boy.

The End.

Music Measurement Activity

The teacher sang songs and played pieces of music with a strong rhythm. **(**See Secondary Resources). Students tapped the beat, noting 4 beats or 3 beats to the measure and the strong beat in the waltz – "ONE, two, three." Students discussed how counting the beats and the measures were some of the ways that musicians measured music. They enjoyed the homophone "measure" (related to music) and this project where they measure.

One of the teaching assistants is also an accomplished violist. He asked the students to determine the kind of measurement he does when he plays the viola. The violist played a scale on one of the strings. The children observed that the tone was getting higher and then lower. Then he asked them to look at his left hand fingers. What were they doing to the string? After a debate, the students agreed that the he made the strings longer and shorter, controlling the height of the tone. He discussed the fact that he had to learn to position his fingers on the strings in order to play in tune. If he would not make a precise measurement and position his fingers properly, he would play out of tune.

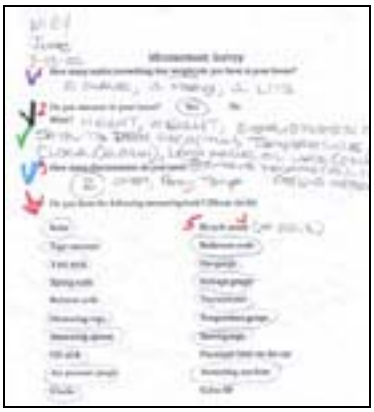
Display

Students surveyed parents about measuring devices found at home and wanted to display the results for the open house. Their questionnaire included the following:

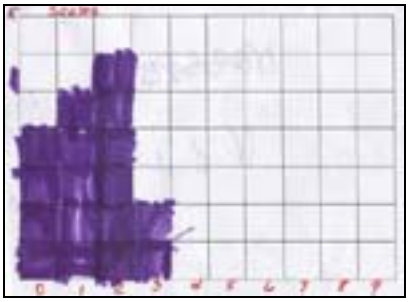
1. How many scales (something that weighs) do you have in your house?
2. Do you measure in your house? What?
3. How many thermometers do you have?

4/5. Do you have the following measuring tools? (please circle)

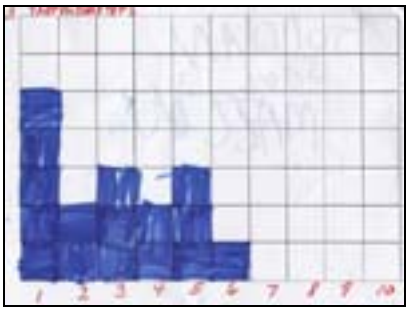
In small groups, teachers helped students analyze their questionnaire data. They prepared bar graphs to display the results for each question. One child read the parent response and marked it off on the survey. The other child transferred that data to the bar graph. This allowed readers and non-readers to work together in this multi-age classroom. Students analyzed all of the items on the questionnaire and communicated their conclusions and results.



One family's response to the questionnaire.



This graph shows that six families reported that they had two scales.



This graph shows that five families reported that they had one thermometer.

Fewer families knew about the passenger limit listed on cars.

Students concluded:

HB: The most scales that anyone has are 2. I was surprised that people didn't have 3 scales and that 4 families have no scales.

MW: It tells me that most people that we surveyed have one thermometer. The most thermometers that anyone has are 6.

TB: This graph tells me how many bicycle pumps, bathroom scales, bathroom scales, gas gauge, mileage gauge, thermometer, temperature gauge, speed gauge, passenger limit on the car, answering machines, and caller IDs there are in each house that we surveyed.

New Vocabulary Related to Measurement

Children wanted to make a list to share with their parents of all the new words that they had learned throughout the project investigation on measurement. They became skillful at integrating new vocabulary words into their conversations about measurement.

New Vocabulary Word	Definition
Air Cleaner	
Air Gauge	It shows how many units of air (PSI) are in the tire.
Altitude	When you are high, sometimes it beeps when you are losing altitude and sometimes it stops beeping to show that you're getting more.
Antifreeze	It's stuff that makes stuff not freeze. You use it to make rain not freeze to ice.
Baler	It's a thing that if you stick it in the well it fills up with water and you pull it out and you put a little thermometer in it to tell you how hot it is or how cold it is. I saw the baler at the Water Survey building. A baler is clear in the middle and you have to be careful when you take it out because there are holes on each side. You have to hold your hands on each side.
Balance Scale	
Bicyclologist	A person who helps people learn how to ride their bikes and studies bikes
Bobbin	

Bungee cord	Cord that stretches
Cage	The cage is where you put the sheep in. It has bars and a door that goes up and it is flat on the bottom and the sides. It looks like a circle on the top.
Calibrated weights	They're weights that are very heavy, even the little tiny ones. They are brown. Mr. Klein brought them in the classroom.
Caliper	It's a measuring tool that you use to make pots.
Cash drawer	It's where you put money in and you also save people's money in there in case they want some. They also have money rolls in them. I saw them at the Credit Union.
Chewing Their Cud	The sheep eat grass and then swallow it and then spit it up and chew it again. It's gross.
Chute	There is a lot of food at the top of the chute. Then the farmer turns a little knob that makes the block move out of the way and the food pours down the chute into a bucket.
Clipper	It clips the sheep's toenails.
Coil	It's a long white string and it's rolled up in a circle.
Coin counter	It's something that the people at the credit Union use. They have a bag of coins and they dump the bag into the coin counter and it counts all the money and how much they have of each coin.
Coin wrap	It's a wrap that carries coins at the Credit Union.
Cone	It helps you know the temperature of the kiln to bake clay.

Creep Food	It is a kind of food only for baby lambs to eat. It has a lot of vitamins in it.
Dollar counter	It counts the dollar bills. They are not in a bag.
Dye Tattoo	It's for sheep. They need to put a number on the sheep's back so they can tell the sheep apart because they all look the same.
Ear Tags	Sheep wear them on their ears. They wear them so their owners can keep track of them. They wear them all the time.
Flag	I saw one at the Weather Survey building by the snowboard.
Foot Pedal	
Fulcrum	
Gas Gauge	It tells you how much gas is in your car. Is it full? Is it low? A gas gauge will tell you.
Glaze	It's a kind of paint that will paint pots for you.
Global Positioning System	It shows where you are in the sky and how far you've gone, what state your in, what place.
Hay and Straw	The sheep eat hay and they lay on the straw. The hay is green and the straw is yellow.
Kiln	It's an oven that people that make pottery, they use it to cook their pots.
Lambing Jug	These are little, tiny pens where only the mom sheep and the babies go in.
Loft	It's a place where farmers store hay and water and all the other foods. It's usually at the top of the barn.

Mileage	It tells you how far you go.
Note	Dollar bills are called notes - one's, five's, ten's, twenty's - they are all called notes.
Odometer	Is a measuring tool that measures how far a machine travels. You might find one on your car or your bike. It shows how many miles your car has traveled all together since it was first driven.
Oil Stick	It's a stick that you dip in your car's oil to see how much oil is in your car. Then there are numbers on it that show you how much.
Pack bags	They're bags that hold tons and tons of things. They are very big. And they can hold about 200 pounds of stuff or more. I saw them at the sheep barn and they use them to hold the wool in.
Parkers/landers	People that help you land your airplane by waving their flags to show you where the runway is.
Peek Hole	
Potter's Wheel	
Pressure Foot	
PSI	That stands for pounds per square inch of air pressure. You use it to measure how much air is in your cars wheels.
Radar	
Rain catcher	It measures rain. It's something that catches rain and sees how much there was. And then you dump it out.
Sectional map	It's a piece of paper that shows the way to go for an airplane.

Sheering	Sheering is when you cut the wool of the sheep.
Sling	It's something that will hold a lamb up when you are trying to measure it.
Snow board	A white board with a flag sticking up. You use it to measure the snow.
Speedometers	This is a speed gauge. It tells you how fast you are going. You can find it in a car.
Spring scale	The regular scales that you have at home are spring scales.
Strobe lights	They are little things that give the plane directions for where to land and they look like little short light sabers.
Thermometers	
Thread	
Tire Valve	It's a valve that you use when you are pumping up the tire. You put the hose on it and the tire gets bigger and bigger as you pump it up with air.
Wind indicator	A thing that spins around and says how fast the wind is going.
Wool	Sheep have wool. It keeps them warm. The farmers cut it off in the spring. It is called sheering. You can make coats and things out of it. When we touched the wool, it felt oily. It has special oil in it. After you touch it, it makes your skin feel softer.

Open House

The teachers and students decided that they would hold an informal open house where parents could come any time throughout the school day. The Open House was held on the last day of school. The display in the room included products, webs from the beginning and the end of the project, a model of the fire truck, and the "Measurement" quilt. Murals and posters depicting "What's Important about Measuring" hung from the ceiling. Students reflected on their learning

and teachers placed their reflections next to their work. It is also important to note that the teachers wanted to share with the parents not only the products of the investigation, but also the process of learning. Next to the representations and beside the murals, the teachers placed a series of pictures depicting the process of the products.

Students prepared what they would say as a tour guide and they practiced their speeches by having the preschoolers come to visit the display first.

Open House Speech Dictated by the Students

Hi, I'm glad you're here.
We are studying measurement.
We want to show you some things we made and tell you some things that we learned.

We went on field trips and made these representations.
Our whole class helped make this quilt.
We all helped make this fire truck
We hatched these chicks from eggs and are studying how fast they grow.
We made pillows.

This is what I made. This is what my friend made.

When students' parents arrived, they guided their parents through the room. They prepared a small program booklet and listed the things to do while touring the classroom.

Read the walls.
See the murals.
See the pillows.
See the quilt.
Read your child's PowerPoint presentation.
Watch the movie taken in our room.
See and read about the chicks.

The process of finding out "Who Measures What in Our Neighborhood?" is displayed on the back wall of the classroom.

Teachers gave parents a questionnaire asking them what they thought their children had learned about measurement. In the next section (Evaluation), the teachers evaluate the project. They share reflections of teachers, students, and parents and assess growth in all areas of the curriculum by examining documentation and student portfolios.