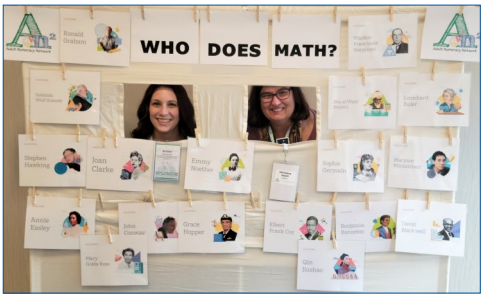
ANN's 28th Annual Institute

An In-Person and Virtual Event

by Patricia Helmuth



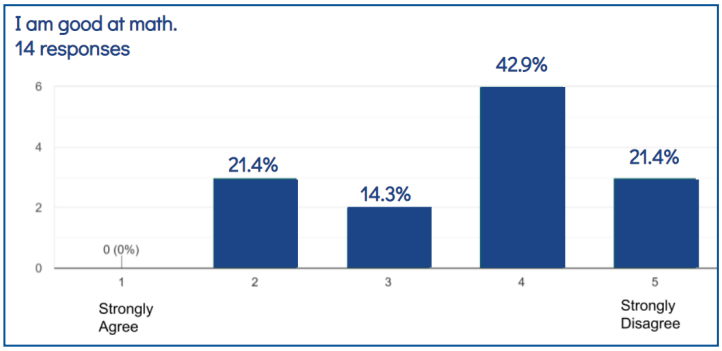
On April, 10 2022, the Adult Numeracy Network (ANN) hosted the first full-day COABE preconference session that also included a half-day virtual component. The ANN *Teaching and Learning Institute Planning Committee* had been working tirelessly to pull everything together so that attendees at both the in-person event and the virtual session could have a shared experience. Jon Doherty joked that his favorite episode of the "Preconference Planning Committee" was entitled: *Editing Slide #6.* He had been working virtually for two years with ANN members he had never met in person and that was about to change.

As participants were filtering in for the in-person event in Seattle, Washington, excitement was in the air. It had been two years since ANN had been able to host an in house event due to the pandemic. Heidi Shuler-Jones expressed it this way: "When I saw my ANN friends coming down the hallway to the Teaching & Learning Institute room, I could hardly contain my joy at being in the same space after being apart for so long!"

Connie Rivera took in the excitement as she walked past the ANN banner, the table that was set up with the ANN table runner, and stations set up in all parts of the room with math activities. She went on to explain: "I saw containers of rice, graph paper, baskets, colored paper, familiar faces (donning fun math t-shirts), and new faces—all the ingredients that held promise of collaboration, fun, and discovery." Connie was excited as she anticipated the day's events.

Math Myth-Busters (Do Try This at Home!)

The theme of the conference focused on dispelling math myths. There were two areas of focus: (1) math content myths, and (2) myths and misconceptions about who does math and what it means to do math. To get the conversation started, all participants, both in-person and virtual participants, were asked to respond to the following data obtained from a survey that was administered to adult education students:



If these are your students,

what is your reaction to this information?

However, Jon's group noticed that four out of the five days Malaika's commute home actually did take longer, so it could be said that in general, her commute home takes longer (about 20 minutes), while her commute to work usually takes less time (about 16 minutes).

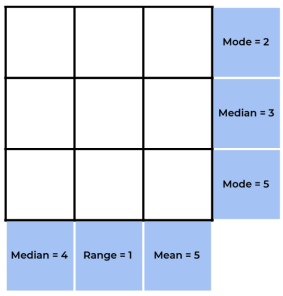
After that, Jon's group decided to apply math formulas to the situation to find the mean, median, and mode. These are all ways of finding an average, but what do you notice about their conclusions when they applied these formulas?

1. The average (mean) daily commuting time is 20 minutes each day both to and from work. By using this formula, it was concluded that the commute times would be the same.
2. The average (median) commuting time home is 20 minutes and to work is 16 minutes. By using this method it was concluded that the commute home is longer.
3. The average (mode) commuting time home is 20 minutes and to work is 16 minutes. Using this method the conclusion reached here was also a longer commute home.

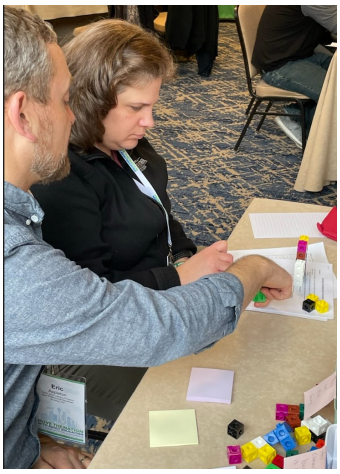
Looking over this real-life example, how much time do you think Malaika should give herself to travel to and from work? Should she use a math formula? Are there other factors to take into consideration?

Jon summed up his experience after working with this problem: "Overall, I feel that *Malaika's Commute Times* would be a productive activity for students at any level. For students with little familiarity with measures of central tendency, it would be an excellent way to introduce and discuss them in context. For students who know how to calculate measures of central tendency, the problem offers a way to discuss the advantages and disadvantages of each method and, to paraphrase Mark Trushkowsky, "they are more complicated and fuzzier, than most people make them out to be."

Measures of Central Tendency Puzzles



In this activity, participants discovered that finding mean, median, and mode was more than just a procedure. By using snap cubes and a 3 x 3 grid, participants were challenged to create a set of data using the clues provided for each row and column. The goal was to build towers of snap cubes that would accurately reflect the mean, median, mode, or range that appeared in the blue squares next to the 3 x 3 grid. The directions included a hint: there might be more than one solution to a puzzle!



Rebecca Strom shared her experience in working through a puzzle:

"I really loved this activity and the conversations that came from discussing the different measures. It is super easy to confuse mean, median, and mode, but this provides opportunities to explore, talk, reason, and play! For me, the most helpful aspect of the activity was using the blocks to think about the mean. Using cubes to distribute first, made it easy to figure out. I like that there are no rules about which digits you have to use, if you can repeat a number, etc. It really is open ended, and grows in complexity!"

Rebecca used this activity to reflect on the types of questions her students might see on a GED exam.

"A common GED-prep question might read:

> If Min took four tests and her scores were 78, 75, 95, and 85, what score would she need to get on her 5th test to get an average (mean) score of 85?

This is a super challenging question for students! Being able to use the cubes really helps build conceptual understanding of calculating the mean of a data set. Students can *see* that mean is a way of taking different sized groups of things and redistributing them into equal groups. In the above GED type question, they get to use that knowledge to work backwards."

Rebecca believes that using these puzzles with her students will help them experience constructing meaning about measures of central tendency and to think beyond the procedures that may typically be used to solve questions about mean, median, mode, and range. So, immediately following the ANN Teaching and Learning Institute, Rebecca adapted this activity for a virtual classroom by creating a Jamboard lesson that she could use with her students and share with other adult education instructors.

Some takeaways from the "What is Average?" stations:

- Traditional procedures that are typically used to compute mean, median, and mode do not always tell the whole story.
- When looking for the average for a set of data, examine the context to determine whether mean, median, mode, or range is the most appropriate measure.
- If students engage with activities where sense-making is emphasized rather than getting an answer using a formula, students will be able to apply that knowledge to *new situations*.

Where Do Formulas Come From?

At our **In-person** session in Seattle, there was a table with rice, paper, pencils, scissors, note cards, and a prompt. From these everyday accessible items, a rich conversation and meaningful math learning experience grew. Amber Delliger explained:

"We were tasked with comparing the Volume of Cylinders and Cones to try to help us to better understand the similarities and differences of their respective formulas. Everyone came to the activity with different background knowledge:

- One teammate started making shapes using her experience in making quilts.
- Another helped us consider some mathematical concepts by wondering aloud, "Do these circles need to be the same size? Are we using the right thing for height? "

It was exciting to work together to come up with a plan to measure the volumes of both the cylinder and the cone by using the rice. Our plan was to fill the cone with rice first and then pour the rice into the cylinder. After pouring the first cone full of rice into the cylinder, we marked the fill line on our paper cylinder. We felt pretty confident about our construction, but after we poured the second cone full of rice into the cylinder, there was a moment of excited anticipation as we realized it was going to take three cones to fill up the cylinder.

As my teammate poured the final cone full of rice into the cylinder, I found myself holding my breath. When the final grains were smoothed out, it was beautiful and magical. Our third pour filled the cylinder perfectly to the top!

It was so exciting to be part of this activity! Our team had gone from a prompt on paper to a fully-realized model right in front of our eyes. We were convinced that it was because we worked together, shared our vast prior knowledge, and bounced our thinking off one another throughout the activity that nudged us forward to such a satisfying problem-solving solution. We celebrated like we had won the Super Bowl! We were so proud of what we had accomplished together.

After our hype subsided a bit, our conversation turned to our students and how we might support them in working through this problem or similar problems. We want our students to have those 'Aha!' moments too!"

Where Do Formulas Come From? - Virtual Session

In our **Virtual** session, we explored this same question in a breakout room where we were given a link to a GeoGebra activity that focused on surface area. The facilitator of the activity, Jeniah Jones, gave us some tips on how to interact with the rectangular prism. We found we could use the sliders (to the right of the prism in **Image 1**) to change the dimensions of the rectangular prism. The figure could also be changed by dragging the turquoise dots. By manipulating the sliders we also discovered we could change the colors on the sides of the prism from being opaque, to saturated, or no color at all! (See **Images 2 & 3**.)

Image 1

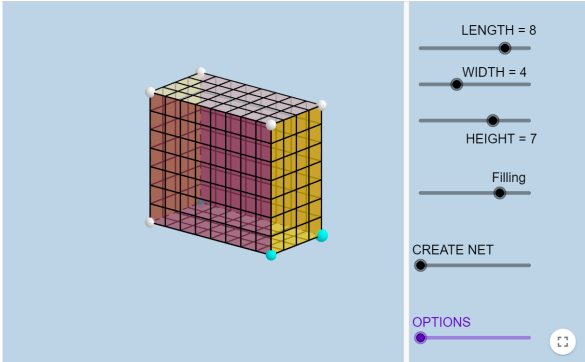


Image 2

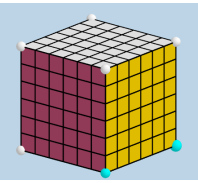
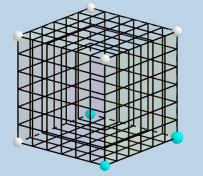
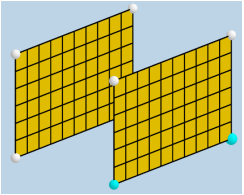
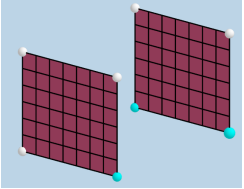


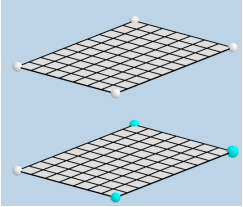
Image 3



Surface Area: Intuitive Introduction







After we had spent some time making different sized rectangular prisms, we started to think about surface area. Jeniah broke the prism apart so we could only see two sides, and then she asked, "What is the area of one side?" That was followed by, "How do you know?". She then continued the process of only showing us two sides of the prism at a time until we had found the area for all sides of the figure.

Lastly, she showed us a new rectangular prism with different dimensions and asked each of us to individually think about the surface area of the entire shape. Then, she asked us to share our solutions when we were ready. We discovered that we all had the same solution but the fun had only begun! Jeniah again asked, "How do you know?", so we all shared our problem solving strategies and found out that we had each approached the problem somewhat differently. What was the same? We had all engaged with sense-making.

Some takeaways from the "Where Do Formulas Come From?" activities:

- Formulas don't come from teachers or textbooks—they come from reasoning.
- We make the formulas when we engage with sense-making!
- Using visual models and everyday items to explore math is meaningful and leads to lasting impressions about what "doing math" means.
- When students engage in these sense-making activities they are empowered as *creators and owners* of math.

Formulas that appear in math textbooks came from somewhere. They didn't invent themselves. They come from people just like you, and me, and our students, who are trying to make sense of the world around us. We notice patterns, and shapes, and how things fit together, and we create ways to represent those generalizations. We can give our students that power to invent and discover by providing them with rich activities to discover formulas. Later, they will recognize those same formulas when they appear in math textbooks. By doing this, students will own the math, understand why formulas work, and be better prepared to take high-stakes exams. More importantly, they will be able to connect to the math they see in their everyday lives.

In Reflection—A Powerful Moment

While planning the session, one important theme emerged as the committee shared stories about how they had worked diligently to make things easier for students so students wouldn't struggle too much, get discourage, feel bad about themselves, or give up.

Motivated by concern and care for students, they reflected on how sometimes this form of helping—showing students how to solve problems—was actually depriving students of the opportunity to grow through productive struggle. More than that, it was unintentionally sending students the message that math was beyond their understanding.

Sarah Lonberg-Lew shared her personal journey in regards to this big idea:

> "I'm really good at explaining things so they can be understood easily. My students told me I was so patient, that nobody had ever broken things down so they could understand it before and that they finally understood. We all felt really good about it. I felt like my students were learning and they felt like they finally understood something that had been mysterious and frustrating to them. My students told me I was the best math teacher they'd ever had.
>
> This felt so good, and it was a long time before I realized that something that is underneath that is the idea that my students' success depended more on my ability to explain things than on their ability to reason. I worked hard to make procedures easier for them, and I didn't consider the impact of my doing so much work to lighten their cognitive load.
>
> This idea came up as we were planning this institute and this poem came to me as a reflection on teaching that way. So this is a letter from me—to my students of that time."

A MATH TEACHER'S ADAPTATION OF
THIS IS JUST TO SAY
BY WILLIAM CARLOS WILLIAMS
(ADAPTED BY SARAH LONBERG-LEW)

This is just to say

I made the math
easier
for you

so you wouldn't
fail
or feel bad
or struggle

Forgive me
I didnt' think
you were capable.

What are your reactions to this poem? To this big idea? Participants at the conference spoke of getting chills at they read it. It was a powerful moment and strengthened our resolve to bring back to our students all we had learned and discussed at the institute.

See You Next Year!

Heidi Schuler-Jones summed up the feeling after the in-person event in Seattle, "Happy dances and long hugs were in abundance that day as we reconnected with our math friends. For new people entering the room, I'm sure it must have felt like they were crashing a reunion, but I think in a short time they realized this was a group of friends for them, too, as we all settled into doing math together. How can you not bond with people when you're playing with rice, snap cubes, grid paper, fraction strips, colored discs, and Desmos?!? As many people said throughout that day (and the rest of COABE's Math & Numeracy Strand sessions), 'I've found my people!'"

So, here's an invitation for next year. Come to Atlanta, Georgia on April 2, 2023, so you can mix, mingle, learn, "see old friends in person and experience community that develops over the course of the conference." Watch for updated information about the 2023 ANN Teaching and Learning Institute at our website and in our next newsletter. See you in Atlanta!

Malaika's Commute Times

Malaika times her commute to and from work each day for a week.

Day	Mon	Tues	Weds	Thurs	Fri
To work	15 mins	16 mins	16 mins	37 mins	16 mins
To home	18 mins	22 mins	22 mins	18 mins	20 mins

Which takes longer?(circle one)

Her commute to work Her commute back home They are the same

How do you know? Explain your reasoning.

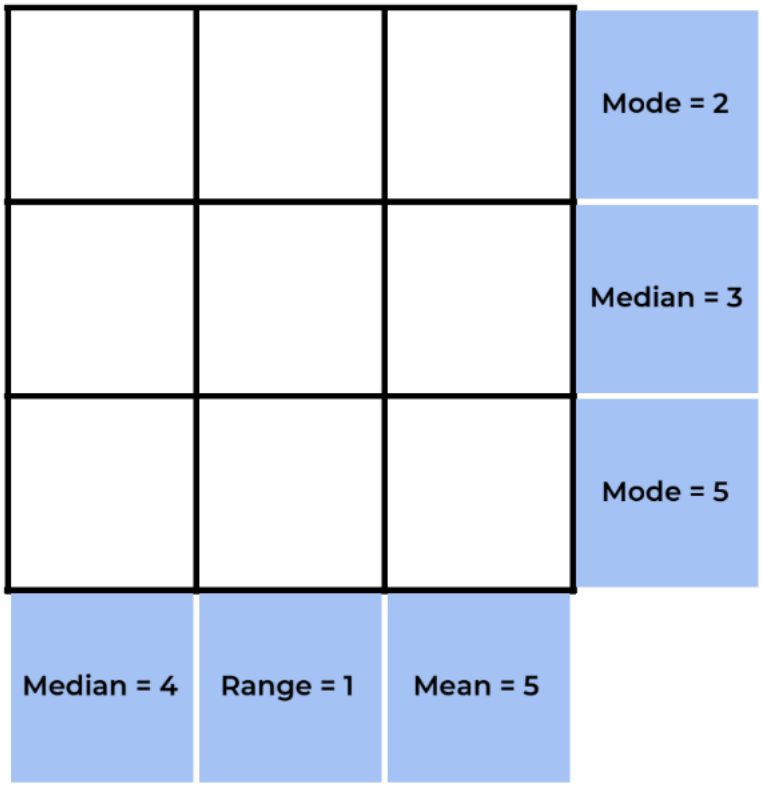
Based on this information, how long do you think Malaika should give herself to get to work?

Source: CollectEdNY

Measures of Central Tendencies Puzzle

Use the clues for each row and each column to build a set of data described in the puzzle.

- Build towers of snap cubes in each square to represent the mean, median, mode, and range that are indicated on the outside squares.
- Be prepared to discuss which information was most helpful as you worked through the puzzle.
- There may be more than one possible solution.



Source: CollectEdNY