

Funds of Knowledge and Math in the Making... Similarities? Differences?


Marta Civil

The University of Arizona

civil@math.arizona.edu

About me

- Mathematics educator at a university
- Focus on equity – cultural and language issues in the teaching and learning of mathematics
- Experience in informal mathematics projects with children and parents.
- Interest in issues around different views of mathematics, what counts as math?, in and out-of-school math...




3 themes from yesterday (from the online discussion)

- Equity, access, social justice
- Everyday making; funds of knowledge
- Explicitness of math

Funds of Knowledge

- Work in low-income communities of Mexican origin.
- Funds of Knowledge are “the essential bodies of knowledge and information that households use to survive, to get ahead, or to thrive” (Moll, Vélez-Ibañez, Greenberg, et al., 1990, p. 2).
- Fact: all families have experiences / knowledge mathematically rich... but do we know how to uncover them?

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- How can we “uncover” the mathematics in contexts in which we may have no experience / knowledge of, and may be very different from our background in academic mathematics?
 - What role do our beliefs / values of what counts as mathematics play?

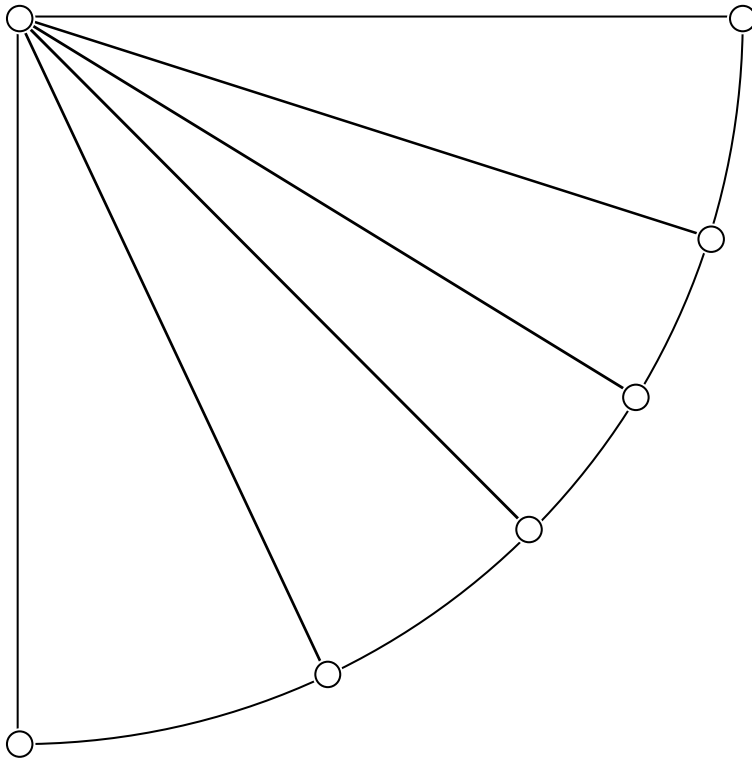
From teachers in Funds of Knowledge

- “I had to kind of pump up what my knowledge of what math is in order to see it elsewhere.”
- “If you have too much mathematics, does it erase our practical mathematics?”
- “It’s not math, it’s just measuring” [a teacher and a seamstress].



Watching a seamstress

Looking at the mathematics...



- Seamstress measured 25 cm from the corner.
- She did that several times, marking the points, then joined them.
- Obtained a quarter circle.
- Shows circle as geometric locus of points equidistant from a given point.
- This knowledge resides in many households.

More on sewing

It struck me that the math she was using was beyond my comprehension; moreover, while math for me was the subject matter I studied and taught, for her it was basic to the operation of her understanding... Without the official ideological support system, no one would have “needed” my math; ... in contrast, my mother’s math was so deeply embedded in the culture that it was invisible through eyes trained by formal education... Mathematics was integrated into her world as it never was into mine. (Fasheh, 1991, p. 58)


And knitting...

Harris (1987) describes an industrial design problem with right-angled cylindrical pipes and writes,

- “Why is it that this industrial problem is considered to be inherently mathematical whereas the identical domestic problem, that of the design of a heel of a sock, is not?” (p. 28)
- Who usually knits socks?
- Gender / Race / Social class considerations

Do we need to “uncover” the mathematics?

- As Pimm (1995) writes, “bell ringing and square dancing can be found fascinating in their own right and may leave permutations and transformation groups out in the cold!” (p. 26)
- Should we be mathematizing others’ practices?

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- Funds of Knowledge “is not about replicating what students have learned at home, but about using students’ knowledge and prior experiences as a scaffold for new learning” (Amanti, 2005, p. 135).
 - For me, my motivation for this work is about recognizing and valuing the knowledge of those whose knowledge and experiences are often marginalized.

Wrenches and Fractions



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Adjusting a recipe

- They brought a recipe for something (horchata in this clip) and they had to adjust it to a different number of people. At one point they need to figure out how much rice for 6 people if it takes $\frac{1}{4}$ kg of rice for 4 people.
- Daughter (adult; graduated from HS); mother (some elementary schooling); undergraduate student.
- The daughter says “ $\frac{1}{2}$ kg of rice”... the mother knows it’s wrong..

Tension: Preserving the purity of funds of knowledge

- One of my first projects, a construction module in a 2nd grade classroom
- School: about 50% Mexican American; 40% Yoeme; 10% White non Latino/a.
- Low-income community. (school, close to 90% free or reduced-price lunch).
- Teacher had conducted home visits when students were in 1st grade → A construction module.

Teacher's goals for mathematics

- Awareness for different shapes (e.g., looking at shapes used in building different houses).
- Measurement, including perimeter, area, and volume (e.g., measuring bricks; amount of "paint" for a house on the geoboard; making adobe bricks).
- Estimation (e.g., estimating the number of bricks on an outside wall).
- Patterning (e.g., tiling patterns; creating their own patterns with pattern blocks, beads, cubes, keys...).

The tension...


- Tensions emerged for me in terms of documenting the mathematics.
- What counts as mathematics?
- How do we negotiate the potential for mathematical content with the need to be responsive to the context (preserving the Funds of Knowledge)? (example: making something to scale)

What I noticed...

- A lot of discussion and talk among the children on the tasks. Making sense of the tasks.
- Quite a few instances of justification / explanation giving.
- Persistence; eagerness to take up a challenge, explore a question, ...
- Supportive and safe atmosphere; constant sharing of different ways of approaching problems.

Wrapping it up...

- My research with working-class Mexican/Mexican-American families shows a wealth of experiences tinkering, making, designing... often out of economic necessity.
- There is richness there, and not just in the mathematics.
- We have a lot to learn from how they describe their work



Here is how they talk about their work (Civil & Andrade, 2002; Civil, 2016)

- Learned by participation in the practice, through interactions with others
- Pride and passion in their work
- Desire (“ganas”) and persistence
- Imagination
- Want to be challenged

From a seamstress

- The more complicated a dress is, the more I like it. If it's easy, I don't like it. I can make a bride's dress from one day to the next. Embroidered and all, I can have it done from one day to the next. If it's easy, I don't like it. It's like making gelatin. I don't make it because it's very easy. So, if you want it, buy the gelatin or make it, but I'm not going to make it.... But a more complicated dress is the one I like most.... I want to see if I can really make it, I want to prove it to myself.

Funds of knowledge and math in the making...

We learned ... that mathematics practices cannot be disembodied from social context, ... Like the mothers in the study group, students must be involved in practices in which they are not only consumers of knowledge, but producers of mathematical practices. (González, Andrade, Civil, & Moll, 2001, p. 130)

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