CAREER: Sparking "Number Talks" to Strengthen Mathematical Identities

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How does one early childhood teacher use young children's funds of knowledge represented in photos taken by families, caregivers, students, and self to intentionally design Number Talk instructional activities?

Project Aims

- Aim 1: Identify and document the Funds of Knowledge (FoK) students, families, and communities bring to mathematics learning spaces.
- Aim 2: Support educators to intentionally design, enact, and revise Number Talks using the FoK that students bring into learning spaces and then validate the ways they become Funds of Identity (FoI).
- Aim 3: Identify the design principles of Number Talks that positively impact FoI while determining how mathematics identity evolves as children move from kindergarten to third grade.

Theoretical Framework

- FoK are the knowledge, resources, and strengths students, families, and communities possess (González et al., 2005; Moll, 2019)
- FoI leverage the FoK that students bring into learning spaces and validate the ways that they are taken up as resources to construct their identities (e.g., Alvarez et al., 2021; Esteban-Guitart, 2016; Esteban-Guitart & Moll, 2014)
- This suggests that when students bring their FoK into learning communities, the nature and context of the learning space can enable or constrain those funds as resources for learning (e.g., Lave & Wenger, 1991)
- FoK become FoI when these resources mediate learning and support self-expression, self-definition, and self-understanding (Esteban-Guitart & Moll, 2014)

Methods

Study Context (for this poster)
- One transitional kindergarten class situated in a large suburban district in the Midwest.

Participants
- Ms. Adelman
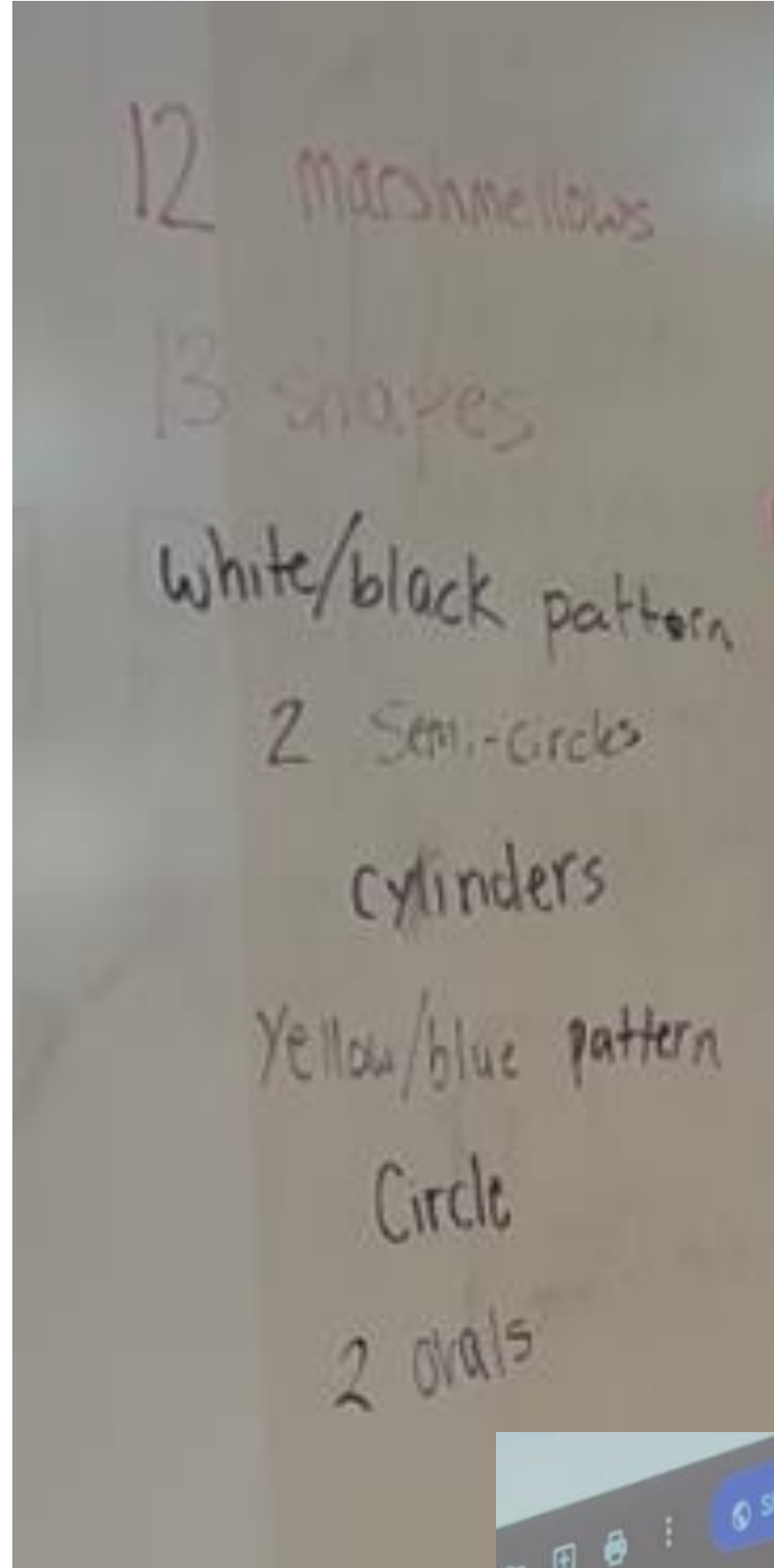- 12 transitional kindergarten children & families

Data Sources
- 80 photos from families, caregivers, and teacher
- 13 Number Talk videos between October and February

Findings

The Structure of Ms. Adelman's Number Talks	
Component	**What Ms. Adelman Does**
Setting the Stage	Ms. Adelman begins by asking, "What is math?" Students share responses such as, "patterns", "shapes", "counting", "sizes", and "numbers".
Launching	Ms. Adelman launches the Number Talk by projecting the photo on the whiteboard and asking, "How do you see math?"
Facilitating a Whole Class Discussion	Once students had the opportunity to think, they took turns to share their observations. Often this looked like students coming to the board to point to and talk about their ideas. After a student shared, Ms. Adelman wrote their mathematical ideas on the whiteboard. As the discussion progressed, Ms. Adelman took time to ask questions that probed their mathematical thinking, made connections, and acknowledged each child's contribution.
Concluding	Ms. Adelman summarized the mathematical ideas that were discussed in relation to the photo.

Number Talk 4: HMP Family Ritual

Number Talk 11: Children Engaging in Mathematics Play

Challenges and Next Steps

Challenges
- Family/Caregiver participation as evidenced by amount of photos
- Photos connecting to diverse cultures, multilingualism, and/ or storytelling
- Tension between *play-based*, *school*, and *home* math
- Shifting discussion practices from teacher directed to student centered

Next Steps
- Intentionally design parental engagement with school partners
- Continued professional learning on student-centered discussion practices
- Trace FoK to see if they become resources to to mediate learning thereby becoming FoI
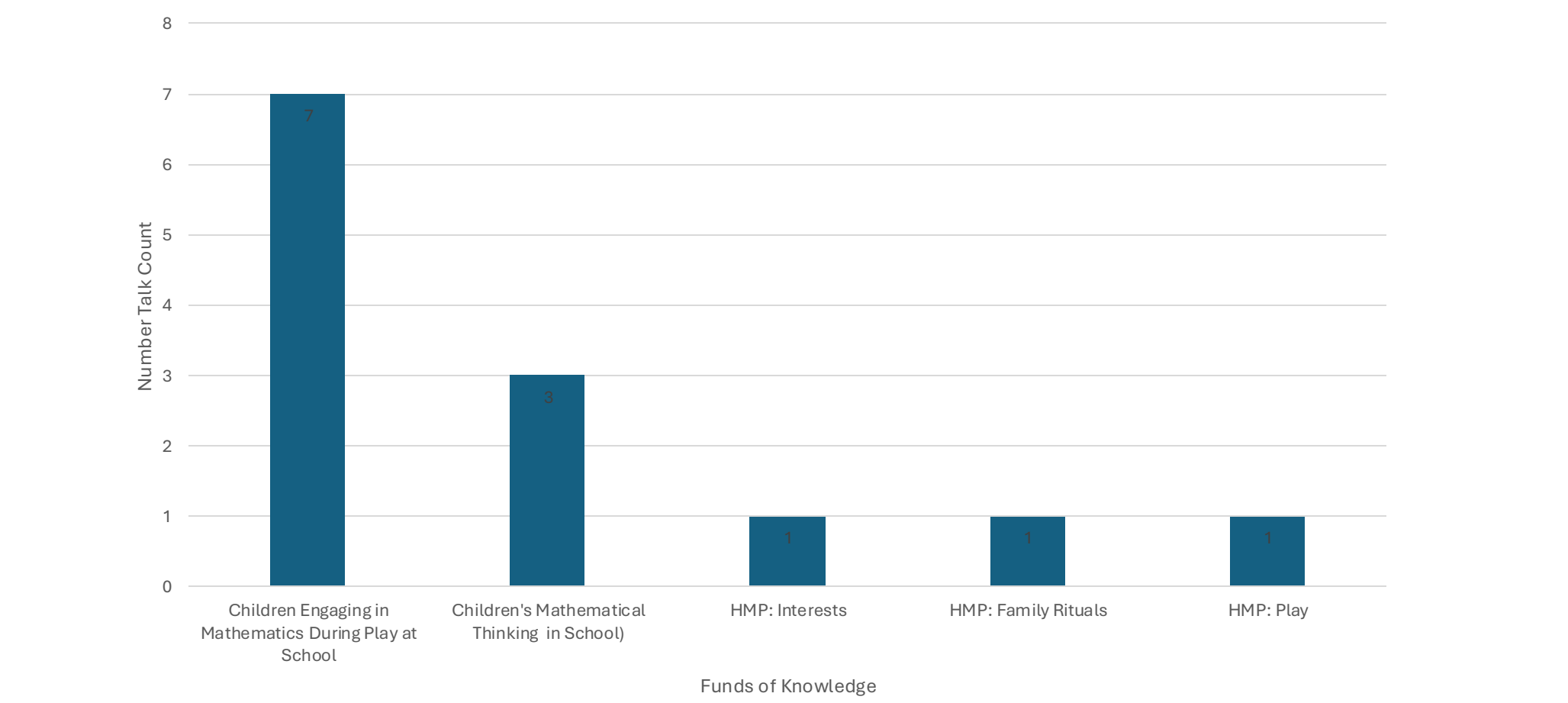
Analysis

- Exploratory case study methodology (Yin, 2014)
- Open coding across data set (Miles et al., 2014)
- Axial coding (Saldaña, 2009) to find relationships between categories and the underlying structure of the photos and images used in each Number Talk (See Table 1)
- Two coders independently coded the data, reaching 91.25% agreement

Table 1. Codes to Understand Children's Funds of Knowledge Represented in Photos

FoK Code	Description	Count
Children's Mathematical Thinking [CMT] (School)	Images capture how children are doing non-routine mathematics at school (Carpenter et al., 2017; Turner et al., 2011). Images include (but are not limited to) snack time, lining up, and organizing items that travel between home and school.	23
Children Engaging in Mathematics Play [CEMP] (School)	Images capture how children are doing math during unstructured play time in school (Carpenter et al., 2017; Turner et al., 2011). Images include (but are not limited to) dramatic play and block play.	22
Home Math Practice (HMP): Chores	HMP chores include (but is not limited to) cleaning, laundry, feeding pets, and routine shopping (Carpenter et al., 2017; Turner et al., 2011).	3
HMP: Interests	HMP interests are conceptual, procedural, creative, and socially-oriented (Neitzel et al., 2019) and can be found in the natural, physical, and material worlds (Carpenter et al., 2017; Turner et al., 2011). These interests may include (but not limited to) robotics, dance, music, art, sports, and exploring nature.	5
HMP: Play	HMP play is an activity that (a) is desired by the child, (b) involves an imaginary situation, and (c) involves rules (Vygotsky, 1978). This type of dramatic play may include dolls or action figures, construction materials, video games, or exercise play (e.g., swinging, hopping, running, and climbing).	7
HMP: Family Rituals	HMP are shared experiences with family members (Carpenter et al., 2017; Turner et al., 2011). These family rituals include (but not limited to) different cultural practices and traditions across game nights, dinnertime, movie night, bedtime stories, preparing food, getting dressed, and family outings/travel.	20

Figure 1. Photos Mrs. Adelman Used as Resources for Mathematics Learning

References