Understanding Research Goals, Learning Theories, and Relationships in Community-based Participatory Design

Phebe Chew, Yiwen Lin, Vanessa Bermudez, Andres Bustamante, & June Ahn

BACKGROUND

- Participatory Design (PD) involves community members in the design of learning tools to design for, with, and by communities.[1]
- However, design processes and outputs are influenced by researchers' goals and pedagogical frameworks.[2]
- Additionally, participants' various roles in design shape project outputs.[3]
- We describe a case study in a controlled design area: projects which created signs to promote learning in grocery spaces.
    - Ridge and colleagues (2015) installed signage in grocery stores and increased the number of conversations and interactions between caregivers and children in low-SES neighborhoods by 33%.[4]
- We documented the design process and outputs of three projects--two prior replications of Ridge et al. (2015) and one ongoing PD project conducted by our research team.
- This study explores how different **goals**, **pedagogical frameworks**, and **relationship configurations** influenced the design process and outputs of three PD projects.

RESEARCH QUESTIONS

1. How do learning theories and goals influence processes and outputs in participatory design?
2. How do relationship configurations between research teams and community members influence participatory design processes and outputs?

DATA SOURCES

- Transcribed interviews with 5 researchers from Projects 1 & 2 (61 pages)
- Transcriptions from Project 3's co-design sessions with community members (56 pages)
- Fieldnotes/reflections from co-design sessions and subsequent signage development meetings for Project 3 (17 pages)

ANALYSIS

- To analyze our data, we developed a codebook based off the themes that emerged and wrote analytic memos to capture the learning theories, goals, and relationship configurations that surfaced across the three projects.[5]
- Applying *Druin's (2002) Cooperative Inquiry Framework* [6] we conceptualized four roles community partners can take based on their participation in signage design processes:
    - **User**: Providing developers insight through use of the signage
    - **Tester**: Providing feedback for output prototypes
    - **Informant***:* Being involved in the design process at multiple points
    - **Design Partner**: Being regarded as equal stakeholders throughout the whole design process

STUDY SETTING

Project 1

- Examined the effect of signs on promoting math talk in supermarkets
- Researchers approached local grocery stores for permission to place signs in predetermined sections

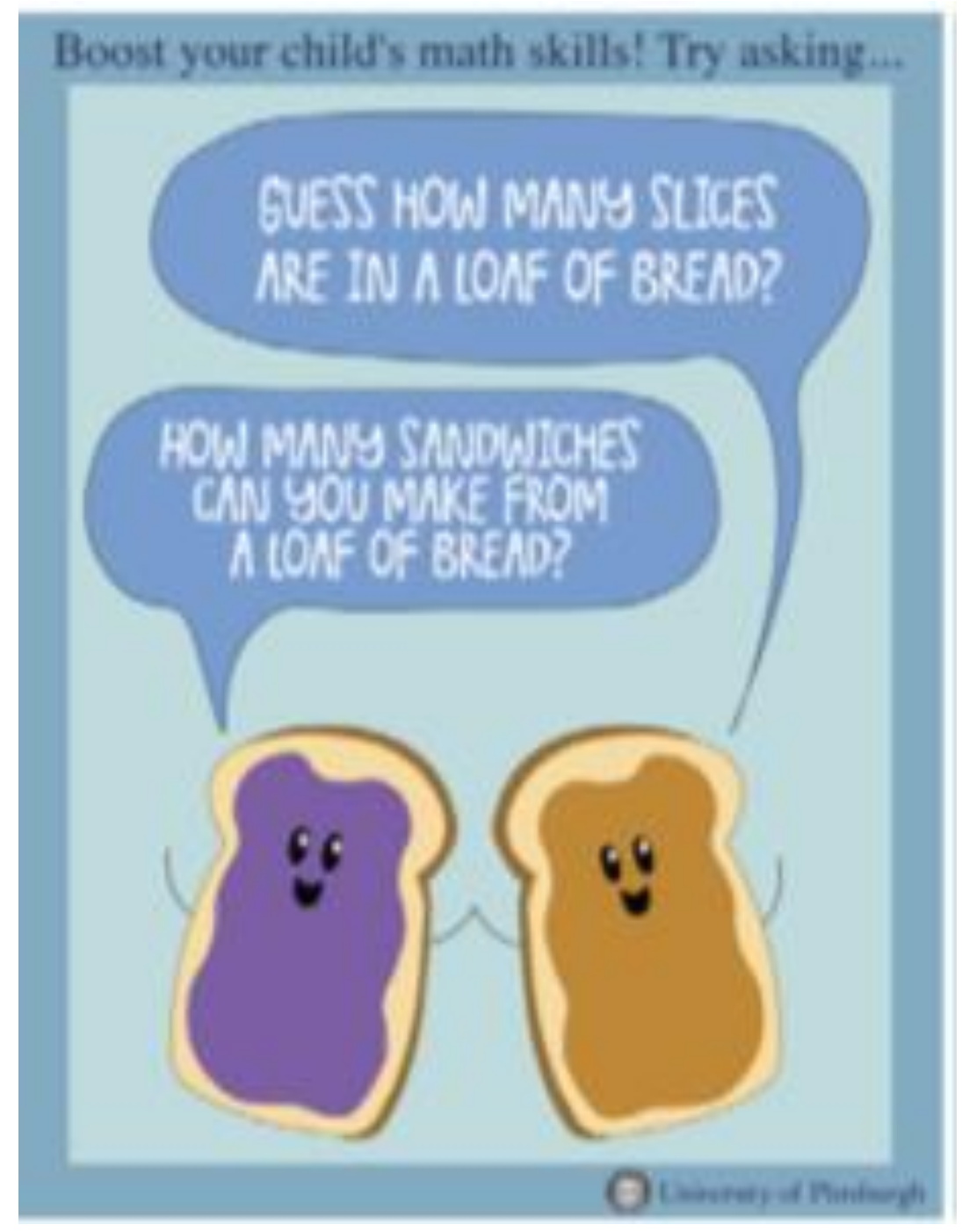

Figure 1. Math sign placed in the bread section

Project 2

- Examined whether guided play signs elicited dialogues with more elaboration compared to signs with learning pronouncements (i.e. "learning can happen anywhere!"). [7]
- Researchers partnered with a food pantry to target a low-SES population.

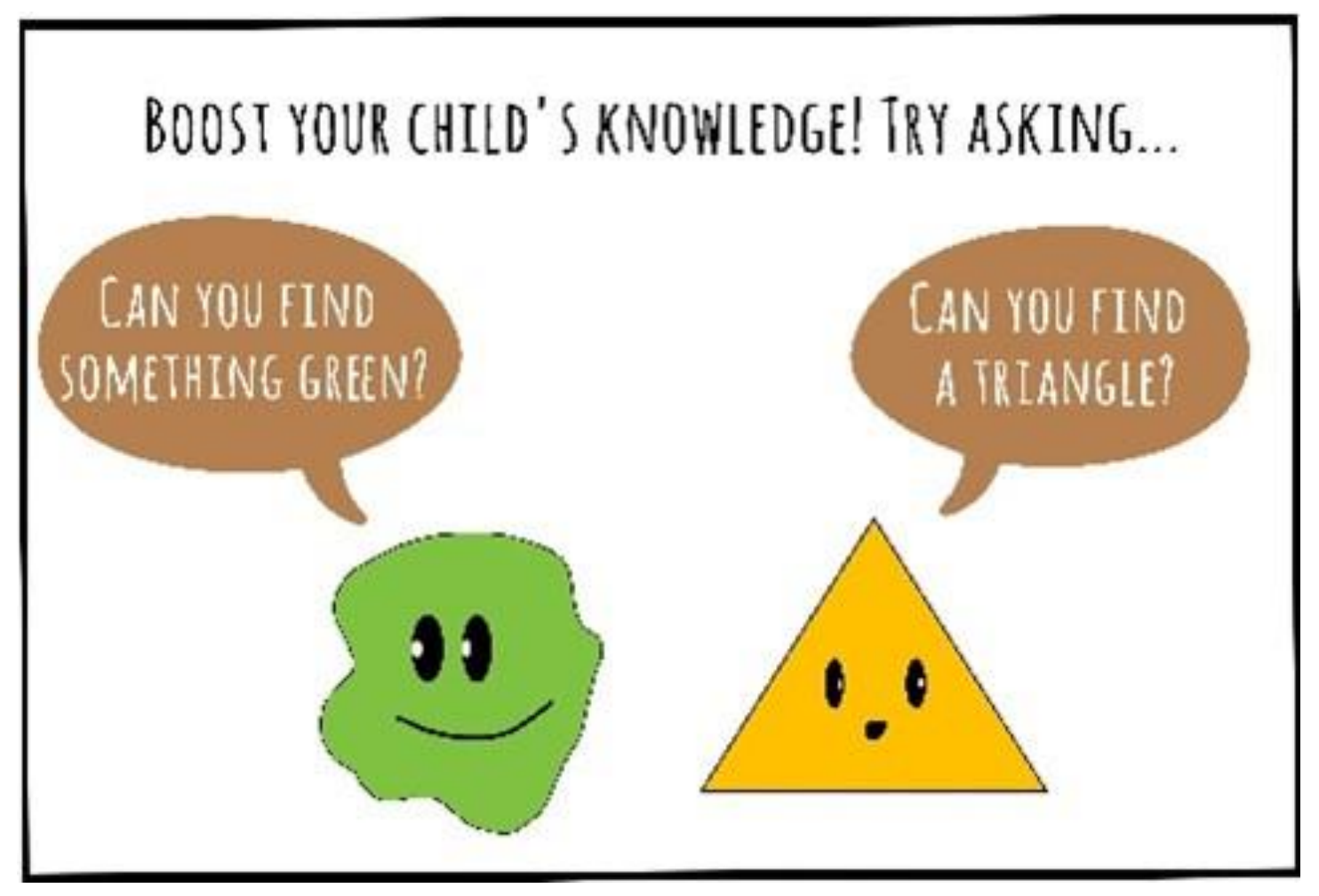

Figure 2. Guided play sign featuring shapes and colors

Project 3

- Developed signs prompting conversations around STEM learning situated in local community values and supermarket experiences
- Conducted two co-design sessions with 20 participants in a predominantly Latinx community where we asked participants to recount their grocery store experiences and edit existing flyers.

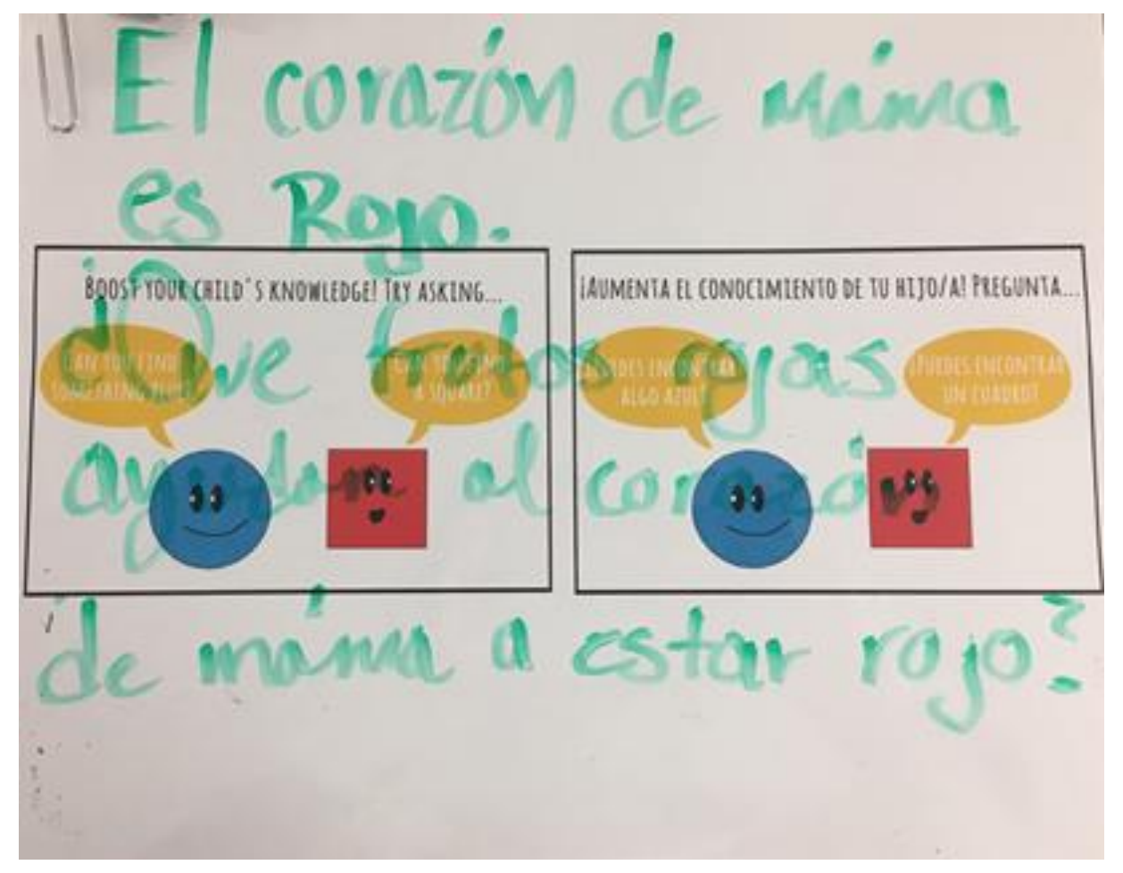

Figure 3. A flyer edited by a community member during a co-design session

RESULTS AND VIGNETTES

Project 1 Learning Goal

Promote **age-related math talk** through directive language

Project 1 Pedagogical Frameworks: Cognitive and Social

*"We decided to have one question that was **low level** targeted at the **younger kids** in our age range and then one that would be slightly **more advanced** that would require some arithmetic operation or more complex reasoning process to engage the slightly **older kids**."*

-Project 1 researcher

Project 1 Community Roles: Users & Testers (Permissive Relationship)

*"[The first grocery store we asked] said they'd have to talk to corporate [about placing signs] and then I never heard anything. And then [the second store] said yes but if you've ever been inside [that store] their signs are all really specific. Their caveat, was that t**hey would have to create the signs, and that kind of ruins the whole point of the study. So we couldn't do it with them because of that**."*

-Project 1 researcher

Project 2 Learning Goal

Promote talk with more **elaboration** and **conversational turns** across a broad scope of topics related to school readiness

Project 2 Pedagogical Frameworks: Cognitive and Social

*"We went for sort of **open-ended**, what, why, the W questions… So it was very **easy for the parents to elaborate** on the guided play kind of questions [in the signage]...So it was manipulating the kind of answers that people would give to try to get more conversations about naming colors, naming things that are rectangular, playing number games, that kind of stuff."*

- Project 2 researcher

Project 2 Community Roles: Users & Logistic Informants

*"We [tried] to choose products that were kind of in stock or in demand throughout, just so that we knew that it would be relatable. **We talked to the people in charge to see what items they typically got, what sort of products always came in**, no matter what...things like that."*

- Project 2 researcher

Project 3 Learning Goal

Promote **STEM** talk situated in local **cultural** interactions

Project 3 Pedagogical Frameworks: Cognitive, Social, & Cultural

*"This project looks for any underlying factors that affect the participants' behaviors, which can exist within the family or in these **participants' communities**. It is important for us to find these factors so that we can create posters **relevant to this community's needs**."*

-Project 3 researcher

Project 3 Community Role: Cultural Informants

*"It's kind of a **cultural** thing, for those of us who are [...] Latino, well, [...] our parents didn't measure things, it was all by rough estimate, [if] it doesn't have salt, okay, add it until it gets salty enough."*

-Community participant

DISCUSSION

Each team's unique configuration of learning goals, pedagogical frameworks, and community roles led to different affordances and constraints in their designs.

- **Project 1**
    - Affordances: direct feedback loop from users/testers yield output **usable** in the space
    - Constraints: permissive relationship/no informants can result in a **lack of alignment with community values**
- **Project 2**
    - Affordances: user/logistic informant feedback yielded signs with the distinct **routines** and **logistics** of the space in consideration
    - Constraints: **lack of alignment** with overall **culture/goals** of community partner
- **Project 3**
    - Affordances: informant feedback yielded signs grounded in **community experiences/values**
    - Constraints: lack of user feedback can result in signs with **limited usability** in the space

IMPLICATIONS & FUTURE WORK

- In future community-based PD, researchers should consider their **goals**, **pedagogical frameworks**, and the extent to which they involve **community partners** as highly influential factors to design.
- Though it is a challenge to traditional research, incorporating community members as **design partners** could help alleviate constraints surrounding **aligning community-researcher values and usability**.

REFERENCES

[1] DiSalvo, C., Clement, A., & Pipek, V. (2012). Communities: Participatory Design for, with and by communities. In *Routledge International Handbook of Participatory Design*. Routledge.

[2] Wang, M., & Shen, R. (2012). Message design for mobile learning: Learning theories, human cognition and design principles. *British Journal of Educational Technology*.

[3] Lorini, M. R., Sabiescu, A., & Memarovic, N. (2017). Collective Digital Storytelling in Community-based co-design projects. An Emergent Approach. *The Journal of Community Informatics*.

[4] Ridge, K. E., Weisberg, D. S., Ilgaz, H., Hirsh-Pasek, K. A., & Golinkoff, R. M. (2015). Supermarket speak: Increasing talk among low-socioeconomic status families. *Mind, Brain, and Education.*

[5] Weston, Cynthia, Terry Gandell, Jacinthe Beauchamp, Lynn McAlpine, Carol Wiseman, and Cathy Beauchamp. "Analyzing interview data: The development and evolution of a coding system." *Qualitative Sociology 24, no. 3* (2001): 381-400.

[6] Druin, A. (2002). The role of children in the design of new technology. *Behaviour and Information Technology, 21*(1), 1-25.

[7] Hanner, E., Braham, E. J., Elliott, L., & Libertus, M. E. (2019). Promoting math talk in adult-child interactions through grocery store signs. *Mind, Brain, and Education.*