Tinkering with technology: Parent-child collaboration and technology talk during informal learning activities

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INTRODUCTION

- Hearing and using STEM-related language can affect children's STEM competencies later in life (Pruden et al., 2011).
- Guided by standards from the International Society for Technology in Education, we created a word bank of 145 technology-related words to examine families' technology language use during and after a tinkering activity (Brooks-Young, 2016).
- We predicted that older children would use more technology language during interviews and follow-ups than younger children.
- We hypothesized that children would talk more about technology after tinkering if their parents held a STEM-related job.

PARTICIPANTS

- 26 families with 6-10 years old children (*M* = 7.4 years, *SD* = 1.1 years)
  - Gender: 39% girls, 62% boys
  - Ethnicity: 27% White, 23% Black, 4% Latinx, 31% More than one
  - Parent Occupation: 50% STEM-related, 35% not STEM-related

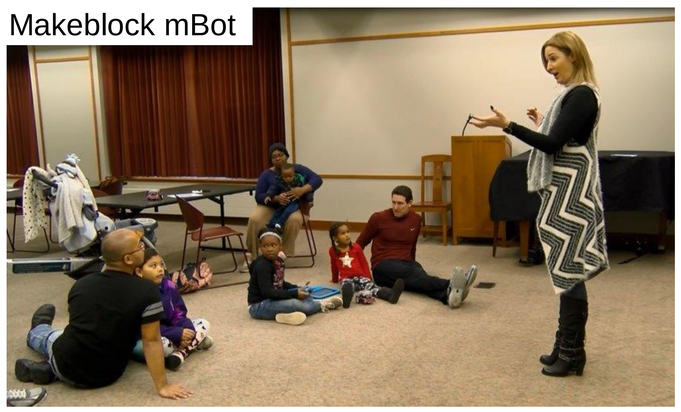
METHODS

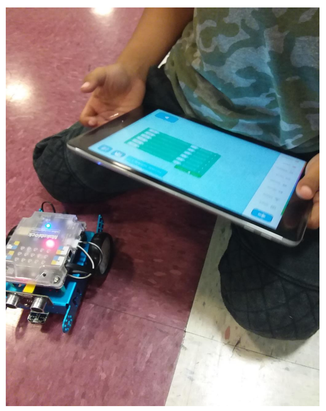
- Families participated in a technology-focused tinkering program hosted by a local library. Experts introduced themselves and the tinkering activity.

Makeblock mBot (N = 12)	Families used a tablet computer to code a small robot to move through block-based programming.
Makey-Makey Electric Music (N = 14)	Families used the Makey-Makey program on a laptop computer to make electric music by connecting alligator clips to everyday objects (e.g., bananas, foil, and playdoh).

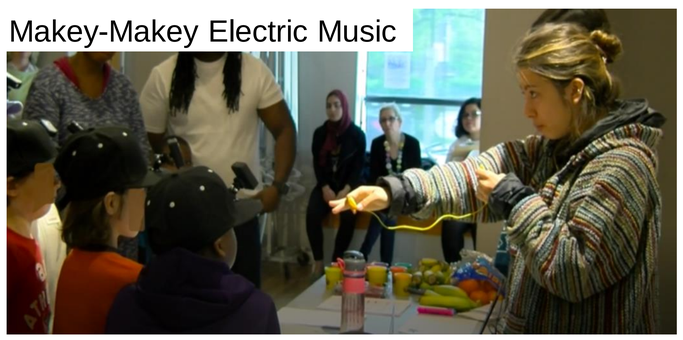
- **Post-Tinkering Interview:** A researcher interviewed children about the activity.
- **Follow-Up Interviews:** Researchers interviewed the parent and child (N = 11) two weeks later.

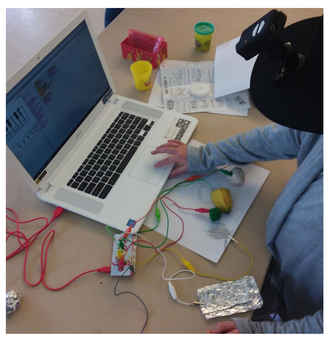
Makeblock mBot





Makey-Makey Electric Music

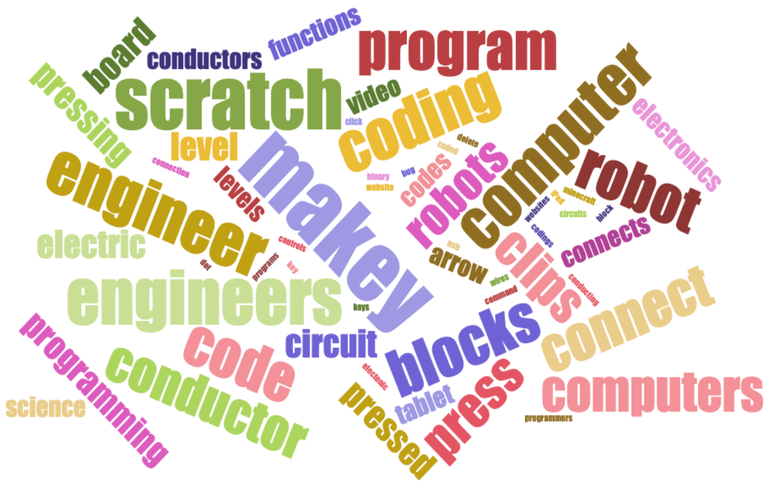




CODING & RESULTS

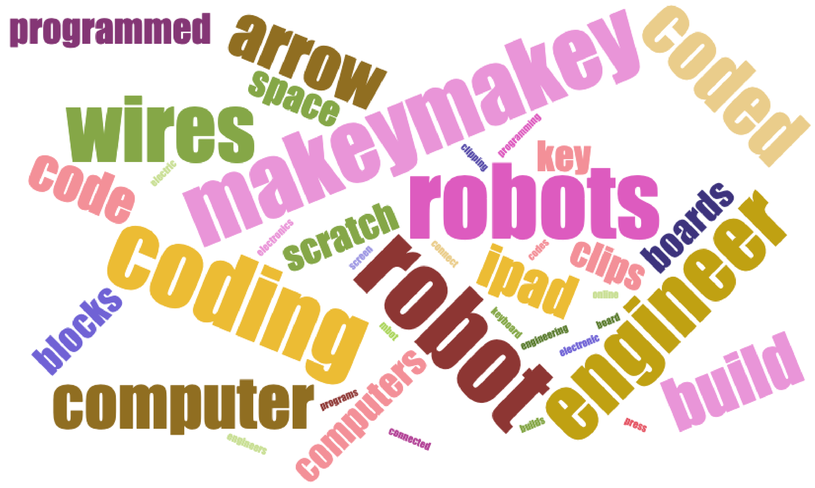
Technology Language	Transcripts of children's post tinkering interviews and parents' and children's follow-up conversations were coded for the use of 145 technology-related words.

Figure 1. Technology Words Used by Children in Post-Tinkering Interviews



- Children used an average of 4.08 total technology words (SD = 3.50, range 0-12) in their post-tinkering interviews, and an average of 2.62 unique technology words (SD = 1.86, range 0-7).

Figure 2. Technology Words Used by Children in Follow-Up Interviews



- Children used an average of 6.09 total technology words (SD = 4.85, range 0-18) in their follow-up interviews, and an average of 3.27 unique technology words (SD = 2.80, range 0-11).

- There were no differences in children's technology talk across the two programs.
- We found no differences in technology talk by child gender, child ethnicity, or parent occupation.
- Children's age was significantly correlated with the number of technology words used in their post-tinkering interviews, $r(24) = .56$, $p < .01$, but not with children's technology talk in their follow-up interviews.

DISCUSSION

- Even the youngest children in our sample were using technology language when reporting their tinkering experiences, although the amount of technology language increased with age.
- In line with existing informal STEM learning research (Marcus et al., 2017; Pagano, 2022), children's technology talk increased from the post-tinkering interviews to the follow-up interviews, demonstrating retention and elaboration of the learning experience over time.
- We are investigating how parent-child verbal and hands-on collaboration varied during the tinkering activity and whether collaboration was related to technology talk.

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