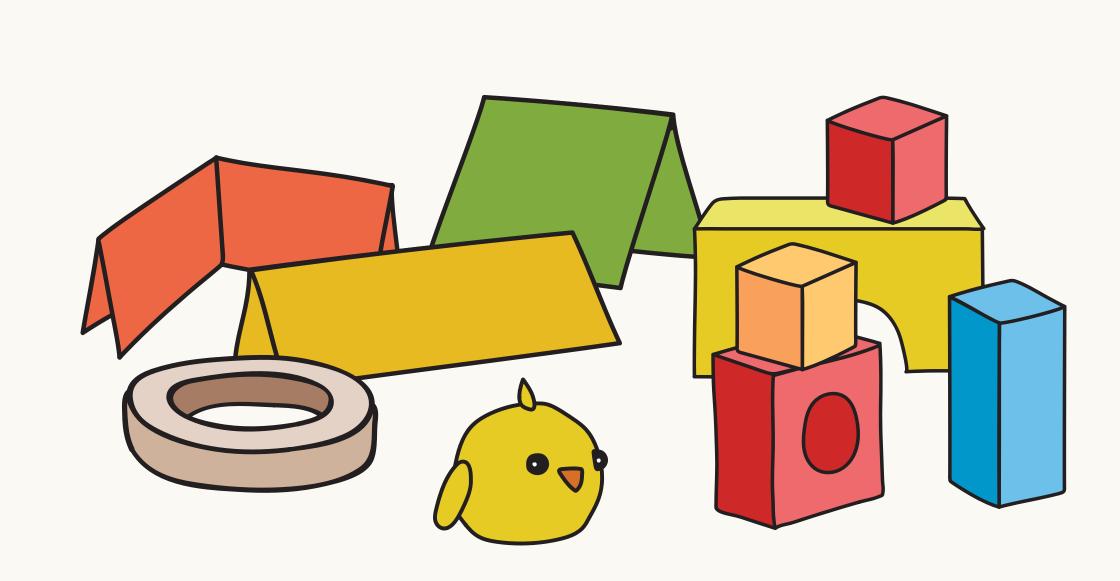
Playful materials catalyze imaginative play and shift the nature of engineering design for preschool-age children and their families

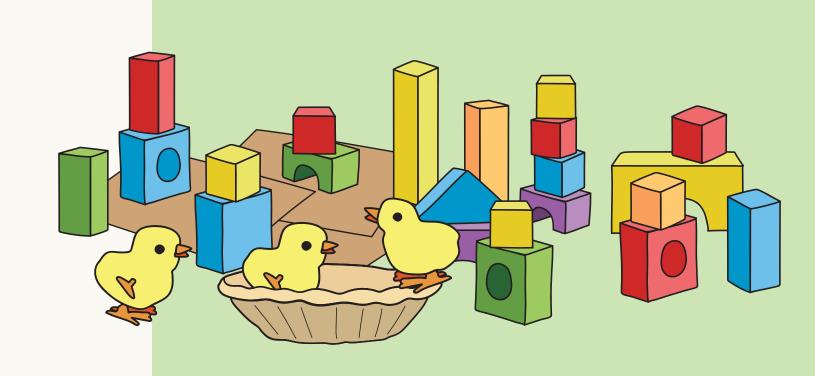




Project Overview

In collaboration with Metropolitan Family Service (MFS), we conducted a **three-year design-based**research study to better understand how the characteristics of hands-on, home-based family engineering activities influence how preschool-age children and their parents engage in the engineering design process.

Sixteen Spanish- and
English-speaking families with
preschool-age children (ages 3 to 5) were recruited
from MFS's early childhood and family engagement
program to iteratively test three home-based
engineering activities in their homes and record



themselves with their phones
the first time they engaged
with each activity. Both the
video and interview data
were analyzed in the original

language of participants by a bilingual research team using quantitative and qualitative techniques to identify improvements to the activities and inform theory development.

Project Team:

- Gina Svarovksy (PI), University of Notre Dame
- Scott Pattison (co-PI), TERC
- Amy Corbett (co-PI), MFS
- Maria Perdomo (co-PI), MFS
- Smirla Ramos Montañez, TERC
- Catherine Wagner, University of Notre Dame
- Viviana López Burgos, TERC
- Sabrina De Los Santos, TERC



UNIVERSITY OF NOTRE DAME Center for STEM Education



Families used their imagination and activity narrative elements to set the design context

Talk about the story or context motivating the engineering design challenge was a rich and ongoing part of the family interactions and appeared to be driven by families' imaginations and connections to the stories, characters, and materials.



Families evaluated and revised their solutions based on imagination-driven constraints

Typical classroom engineering design activities are based on physical design goals, with concrete constraints and measures of success based on the physical properties of the materials. In contrast, families in this study often developed their own set of imagination-based criteria for the success of their designs that they then discussed using their subjective evaluation of success.

Families creatively modified the design space

In traditional engineering design activities, the challenge and constraints are set at the outset and remain relatively fixed throughout the process. In contrast, we observed families continuously modifying or adding to the original design goals and constraints based on their own interests and the evolving imaginative design context.

Imaginative play fostered user-centered design

User-centered design is a critical but often overlooked aspect of engineering design. In this study, all three of the unique elements of imagination-driven engineering

engagement described previously, along with the playful and age-appropriate activity materials and narrative elements, appeared to support rich usercentered design for families and children.



