Museum Practices that Support Children's Engineering Learning

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INTRODUCTION

- Tinkering is a creative form of hands-on problem solving that can advance engineering learning opportunities for children (Acosta et al., 2021; Bevan, 2017; Pagano et al., 2021).
- In this project, we asked how facilitation strategies used by museum staff - specifically an orientation about key engineering principles prior to tinkering - could foster families' talk about and hands-on engagement in engineering.

PARTICIPANTS

- 51 children (25 girls) between 6-9 years old (*M* = 7.02 years) and their families.
- 54% Caucasian, 15% Hispanic, 8% African American, 6% Asian, 17% Mixed.
- Parental Education *M* = 17.1 SD = 3.2.

METHODS

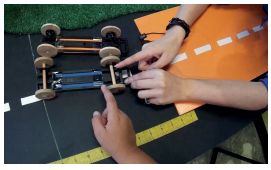
- Families recruited at the tinkering exhibit of a children's museum.
- Families participated in the challenge to make something that rolls.
- Orientations conveyed 3 key engineering principles:
  - Function of axle.
  - Wheels of same size on each side.
  - Wheels must touch the ground.
- Video observations were coded.


CODING

Quality of Orientation	
Low	• States challenge and/or provides engineering principles
High	• Challenge + engineering principles + engaging • Invites children to test, pose questions, and provide explanations

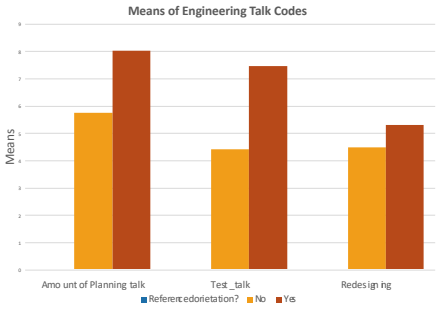
Engineering Talk	
Setting goals	Planning
Brainstorming materials	Other's creations
Testing	Redesigning

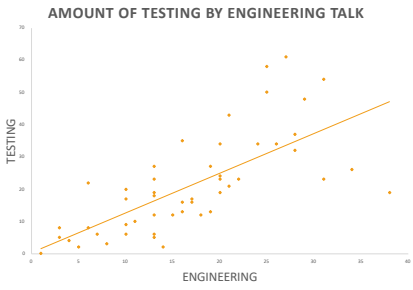
EXHIBIT DESIGN AND ORIENTATION AREA


RESULTS

- Orientations varied in quality: 56% of the families received low quality orientation, and 44% of families received high quality orientation.
- High quality orientations were referred to most during tinkering, $X^2(1, 49) = 5.6$, $p = .018$, $n^2 = 0.99$.
- Families who referred to the orientation talked more about engineering practices (i.e., making, testing, redesigning) $F(1,49) = 4.67$, $p = .037$, $n^2 = 0.86$; and in turn engaged in more physical testing, $F(1,49) = 47.2$, $p < .001$, $R^2 = 0.5$.





CONCLUSION

- Our research is identifying museum practices that can support engineering-rich family interactions.

ACKNOWLEDGMENTS

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