

# Engineering Definitions of Latine Families in a Co-Designed After-School Engineering Program

## INTRODUCTION

- Latine families' STEM engagement is understudied, particularly in engineering.
- Culturally responsive approaches are needed to capture family STEM practices.
- Existing measures often fail to reflect the sociocultural dimensions of STEM learning; researchers argue for frameworks that treat math and engineering engagement as embedded in cultural and family practices (Swirbul & Melzi, 2024).
- The present study explores how Latine families define engineering across a co-design program. Drawing on the perspectives of parents and children, this project examines engineering definitions that surfaced throughout 2 series of 6-week after-school co-design engineering programs.

## PARTICIPANTS

- 19 Spanish and English-speaking Latine parents (18 mothers, 2 fathers) with children aged 5-8, were interviewed.

## PROCEDURE

- A co-design method was used with museum educators and families working together to create an engineering program that would be featured at a children's museum.
- Each series of 6 co-design sessions involved a combination of hands-on activities and conversations and interviews
- This project focused on one interview question, which was asked each session to every family present: **Did you feel like you were doing engineering and why?**

## RESULTS & DISCUSSION

- Caregivers from series 1 codesigned puppets at the end of their program while series 2 codesigned piñatas.
- We used a thematic analysis approach (Braun & Clarke, 2012) where the data is first coded then themed to identify overarching commonalities in parents' responses.
- We present the frequency with which each of the three themes were present in family's response to the question, as well as the frequency with which different themes co-occurred in their responses.
- The findings highlight the varied ways of defining and seeing oneself as engineering, underscoring the need for culturally responsive approaches to studying family STEM engagement.
- Future directions include coding full interviews for direct or implied engineering definitions to further capture family meaning-making across program contexts.

Theme	Definition	Frequency:	
		Series 1	Series 2
<b>Theme 1:</b> "La ingenieria se trata de eso, de hacer cosas, crear": making and exploring physical things.	Focuses on participants beliefs that engineering is an activity where something is physically created. It involves exploring material, making, refining, and adding movement in their creation.	16	8
<b>Theme 2:</b> "Nessecitamos pensar para crear": using mental processes.	Outlines the way participants described mental processes, such as planning, learning, problem solving, and goal orientation, as being engineering.	17	2
<b>Theme 3:</b> "Como volvimos a retroceder el tiempo": personal and social endeavor.	Outlines participants beliefs that engineering is personal, involving emotion, identity, and past experience, as well as a collaborative activity.	10	11

"Si porque pues, este, usamos como el espacio, la altura, el modelo de los diseños."  
*"Yes, because well, we used the space, the height, the model of the designs."*

"Claro que sí. Porque salen muchas ideas y a veces no sale una y tienes que probar otra cosa."  
*"Of course. Because we get many ideas, and sometimes one doesn't work out, and you have to try something else"*

Co-occurring Themes	Frequency: Series 1	Frequency: Series 2
1, 2	4	8
1, 2, 3	2	2
1, 3	7	4
2, 3	6	2

"Claro. Si porque te pones a pensar, que puede, que puedes hacer y si fallas, tienes volver a tratar, es parte de la vida también."  
*"Of course. Yes, because you start to think, what can, what can you do if you mess up, you have to try again, it's part of life too."*

"It made me feel like engineering cause it was building stuff, creating stuff, and it made me excited, and we're making something that makes us happy."



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