Narratives Expressing Emotion Support STEM Learning in Library and Children's Museum Programs

Graciela Solis, & Catherine A. Haden

Loyola University Chicago

INTRODUCTION

- Young children have been described as immersed in a diverse world of personal stories, with different structures and functions, through family narrative practices (Miller, Chen & Olivera, 2014).
- Drawing on story schema theory (Mandler, 1978) and linguistic approaches to the analysis of narrative form (Labov, 1982), personal narratives that support learning and remembering must include evaluation of actions, and emotions, to convey what is meaningful and memorable.
- Our goal is to explore how engineering experts' personal stories support children's science learning beyond what is available from direct experience with objects (Bruner, 1990) during family visits to children's museums.

PARTICIPANTS

- Across a total of five expert led programs, a total of 64 children *(M* child age = 7.72*)* and their families were observed.
- 44 participants (69%) of participants were recruited at Chicago Children's Museum, while the remaining participants (*n* = 20) were recruited at Evanston Library.
- Our sample was 38% European American/White, 16% Hispanic/Latino, 19% African American/Black, 11% Asian, 10% Mixed, and 6% no report.

METHODS

Part 1: Expert Narratives
Families heard an expert narrative before engaging in an inquiry based activity.
- *Inquiry Based Activities:*
  - <u>Chicago Children's Museum</u>: Making a swing set for puppets, making fan powered cars, and making wings.
  - <u>Evanston Public Library:</u> Making balloon-powered cars, and making index card towers.

Part 2: Short Narratives About Projects (SNAPs)
Children take a picture of their creation using a tablet computer and we ask them to tell us what they did and what they learned
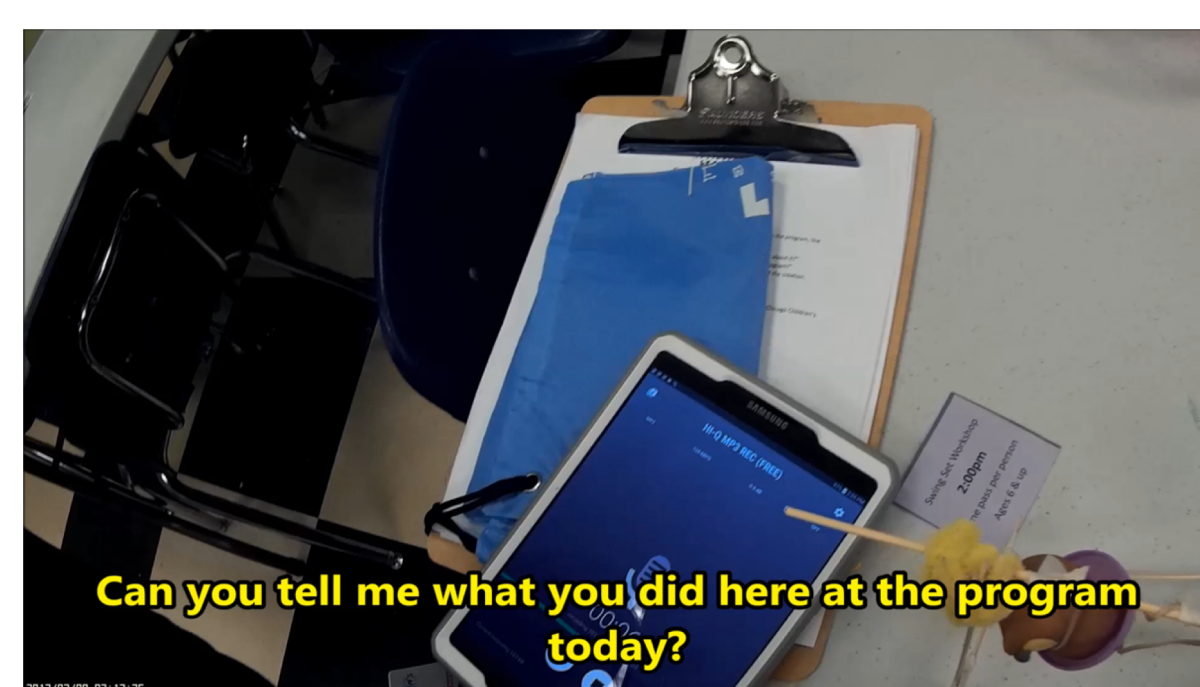
CODING

- Expert narratives were parsed into 10 second segments and coded into the following categories.
- Using transcripts and video, two coders established inter-rater reliability on twenty percent of the videos: percent agreement was 85%, Cohen's kappa=.83.
- The mean length of 23 expert narratives was 6.12 minutes (*SD* = 1:50, Min =1:26, Max =11:00).

EXPERT NARRATIVE CODING

Narrative	Contextual Information, Explanations, and Evaluations of Emotions • "When I was young we would fix cars….So it's my love of cars and tinkering at a young age that inspired this project."
Engineering	Connections to engineering in the present tense, vocabulary, and explanations of the engineering design process • "Engineering is a iterative design process you're always looking to continuously make improvements on your design."
Facilitation	Asking questions, Explaining handouts, introduction to materials, and instructions about how to work together. • "To make our cars we're going to be using K'nek has anyone used those before?"

So the thing about engineering is, right so it's-you never really have your best design on your first try.

- Children's answers during SNAPS were coded into different types of STEM talk and later collapsed into a general STEM talk category.
- Using transcripts and video, two coders established inter-rater reliability on twenty percent of the audio.
- The mean frequency of children's STEM talk was 6.38 (*SD* = 1.64, Min =2.67, Max =9.10).

CODING

CHILDREN'S SNAPs Coding

STEM Talk	Children's talk about planning, engineering design, size/ length/ height/ weight /distance, quantity, shape, measurement, location, iterative design and failure • "we put the um axel and the wheel on the axel then we put some some cardboard and put it down there and then we used tape and rolled it up so the wheel couldn't escape We realized that it takes a lots of tries to work."

RESULTS

Variable	B	SE	β
Child Age	-.58	.38	-.18
Narrative	.29	.13	.28 *
Engineering	.11	.17	.09
Facilitation	.12	.06	.25
R^2	.25		
F	3.80**		

**$p \leq .01$, $p < .05$

- Multiple Regression was used to test whether types of expert narrative talk during personal narratives predicted the STEM content of the children's reports
- Accounting for child age, the experts' personal narrative talk explained 25% of the variance in the STEM content in the children's reports after the program.
- Engineering and Facilitation did not account for changes in the STEM content of children's reports after the program

DISCUSSION

- Children who heard expert narratives that included emotional expression reported more STEM related content after participating in inquiry based programs.
- This study provides some evidence that personal narratives that include emotional expression may relate to forms of science related talk, raising questions for future study about specific links between story-telling and science understanding.
- We are currently exploring how parent-child interactions *during* these programs relate to children's reports after the program.
- Understanding these links is important for the design of informal and formal science environments and fostering children's engagement in science.

Can you tell me what you did here at the program today?

Please cite as Solis, G., & Haden, C. A. (2019, April). *Narratives expressing emotion support STEM learning in library and children's museum programs.* Poster presented at the American Educational Research Association Annual Meeting, Toronto, Ontario, CA.