Engaging Experts in the Use of Oral Narratives During Informal Science Programs for Families

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INTRODUCTION

- Our goal is to identify and document effective processes for engaging engineering experts to lead inquiry based programs in ways that advance STEM learning opportunities for children and families.
- We draw on sociocultural theory (e.g., Vygotsky, 1978) to examine how experts' stories relate to families' STEM learning.
- There is evidence that communicating scientific ideas through stories may better engage non-experts with science by making the ideas more meaningful and relatable (Avraamidou & Osborne, 2009; Dahlstrom, 2014).

PARTICIPANTS

- Across a total of seven expert-led programs, 112 children and their families were observed
- Children 6-8 years old (M = 7.5)
- 64% of parents have a college degree
- Our sample was 33% European American/White, 17% Hispanic/Latino, 15% African American/Black, 13% Asian, 12% Mixed, and 10% no report.

CYCLE ONE: METHODS

- Experts worked with practitioners and researchers to help them develop the story they would tell.
- 5 expert stories.
- Focused on identifying a narrative to share with families.

CYCLE 1: HOLISTIC CODING

- Experts fell into two broad categories.
- No significant difference in overall story time.
- Using transcripts and video, percent agreement was 80%,

EXPERT NARRATIVE CODING

Narrative Focus	• What it is like to be an engineer and how they think • Integrated the engineering design process
Task Focus	• What an engineer is and listing what they do • Definitions of concepts

## CYCLE 1: CODING EXAMPLE

Narrative Focus Example:

"When I was your age and a little bit older my friends and I in the neighborhood would do a lot of crazy things. We would build ramps for cars we made. We used to design and build like remote control cars as well so we'd build these remote control cars and modify them. Changing the tires, changing the rims, changing the parts from like, uhm plastic to aluminum to make them stronger. And then changing the engines out to make them go a lot faster."

CYCLE ONE: RESULTS:
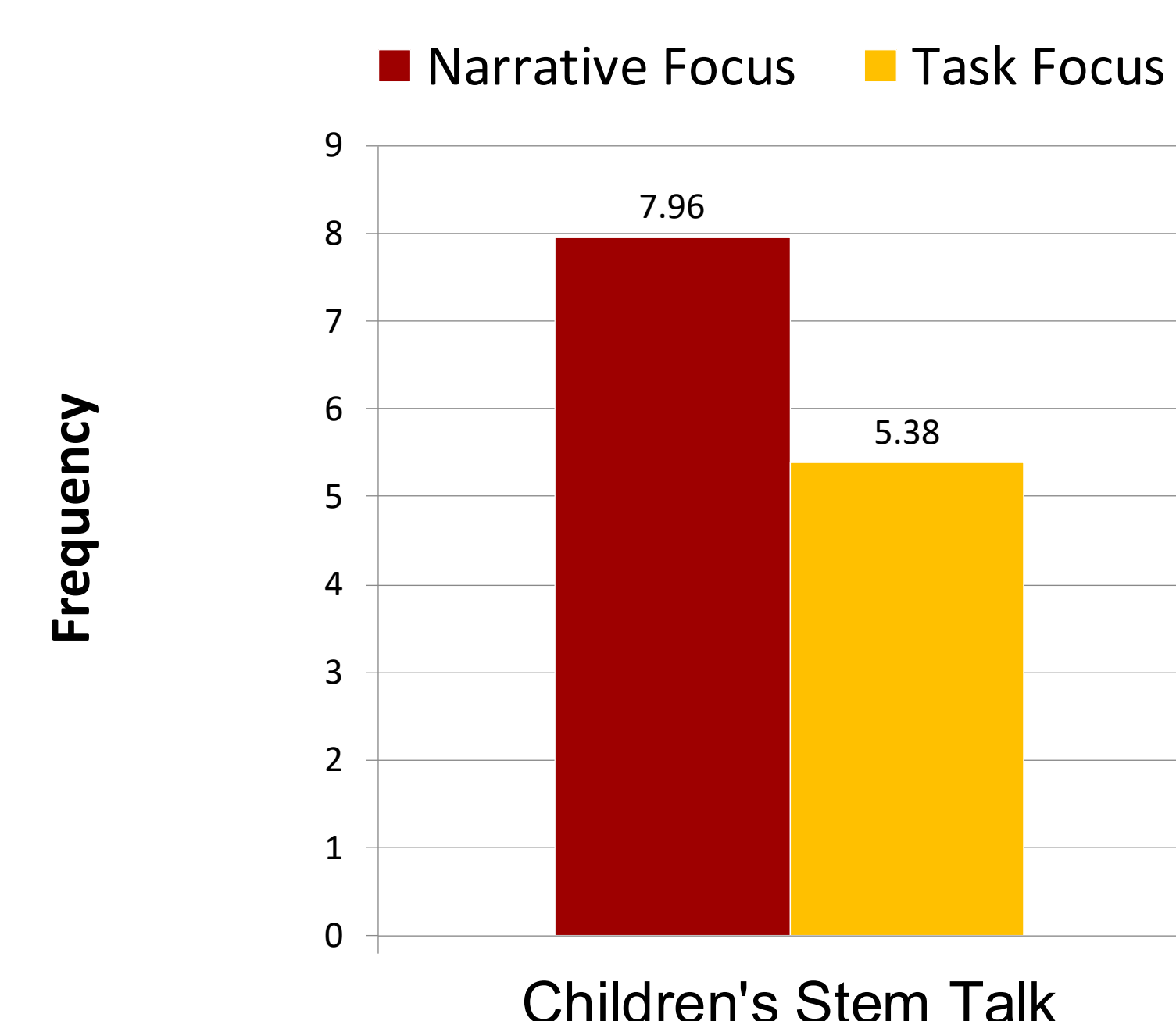
What are children learning from these narratives?

Children who heard an expert story with a narrative focus reported more STEM related information than children who heard a task focused narrative, t = 5.44, p <.001
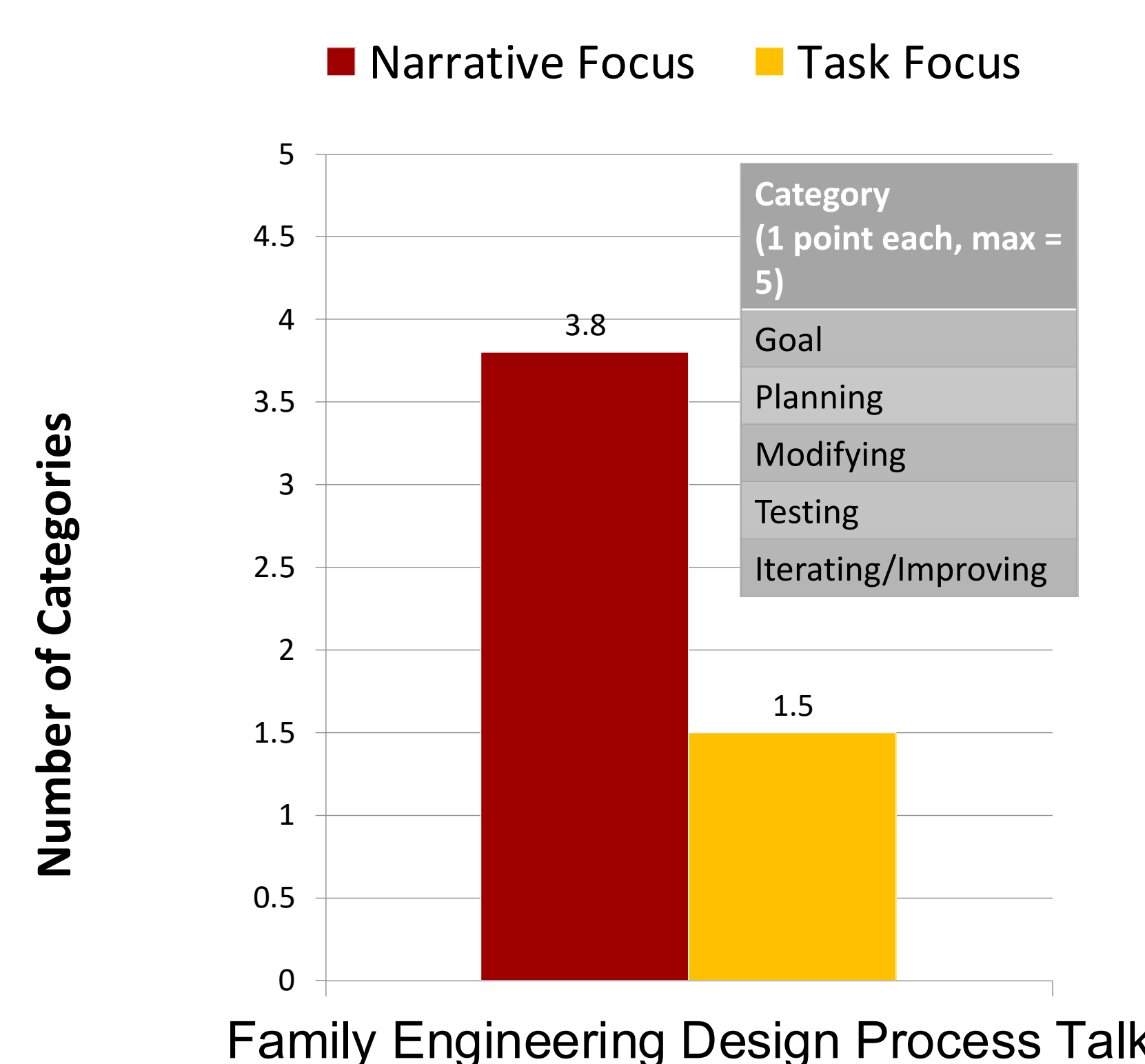
Are there differences in family conversations by narrative type?
Families who heard an expert story with a narrative focus talked about a greater variety of elements of the engineering design process than families who heard a task focus story, t = 2.31, p < .05

CYCLE TWO: METHODS

- Cycle Two: 2 expert narratives.
- Included a demonstration video encouraging experts to use the narrative focus:
  - More Narrative Talk: Contextual Information
  - Integrate the Engineering Design Process
 - Connect Narrative to Activity

CYCLE 2: TIME SEGMENT CODING

- All 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.

EXPERT NARRATIVE CODING

Narrative	Contextual Information, Explanations, and Evaluations of Emotions (example: "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 (example: Yes the axel is responsible for holding the rim and the tires together.") .
Facilitation	Asking questions, Explaining handouts, introduction to materials, and instructions about how to work together.
Associations	Explicitly pointing out connection between narrative and activity.

CYCLE TWO PRELIMINARY OBSERVATIONS
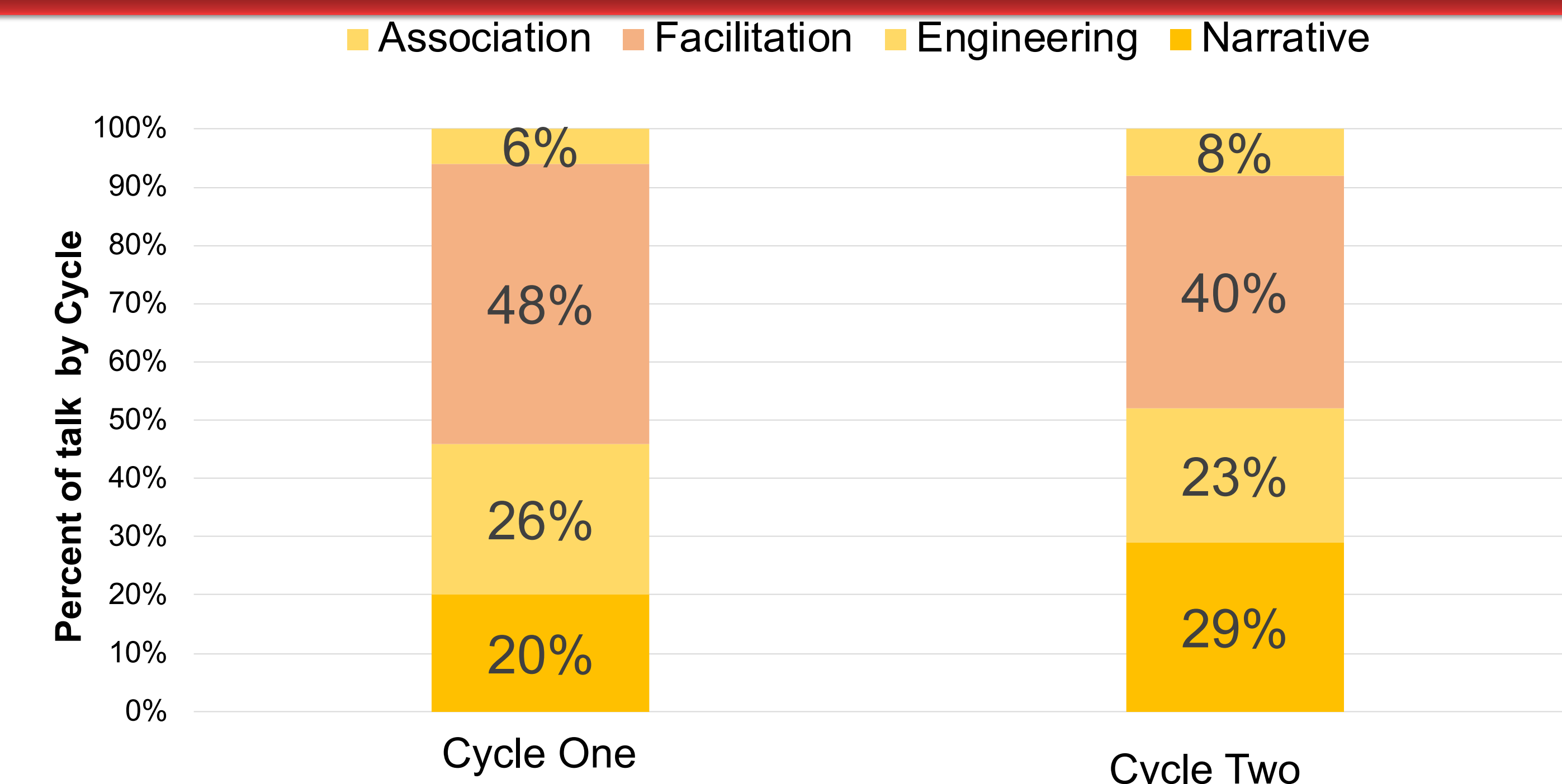
Are there differences between Cycles in Expert Narratives?
We are seeing a slight increase in the percent of narrative talk and association to the activity.

IMPLICATIONS

- Our demonstration video is encouraging experts to provide stories with a narrative focus during our inquiry-based activities.
- Encouraging experts to use a more narrative focus to leading programs can advance opportunities for children's engineering learning in museums and libraries.

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