

# REVEAL

## Researching the Value of Educator Actions on Learning

DRL #1321666

### Phase 2: Experimental Study

#### Experimental Study Research questions

- How well does the theoretical model developed during phase 1 describe the staff-facilitated family interactions at interactive math exhibits in the REVEAL project?
- What is the impact of staff facilitation on family learning at interactive exhibits, compared to the “greeting only” condition?
- Is facilitator-family match associated with the impact of staff facilitation on family learning at interactive exhibits?

#### Experimental Design

The design of the phase 2 study was quasi-experimental, with two experimental conditions (facilitation, greeting) rotated systematically across morning and afternoon shifts, three exhibits, and four educators. In the facilitation condition, the museum educators facilitated all visitor groups at the exhibits as they felt appropriate, based on the REVEAL training they had received. In the greeting condition, the museum educators verbally greeted visitor groups within 30 seconds but provided no additional facilitation. In total, 263 family groups across both experimental conditions were included in the final analysis.

### Data Collection Methods

- Videotaping
- Post-interaction family survey

## Studying Staff-Facilitated Museum Experiences

### REVEAL Goals

- 1) Iteratively develop and refine a theoretical model of how staff facilitation can deepen and extend family mathematical discourse at interactive exhibits.
- 2) Rigorously test key components of this model, including the relationship between staff facilitation and the nature of family mathematical discourse.
- 3) Provide evidence and research-based tools to support professional development efforts for informal STEM educators.

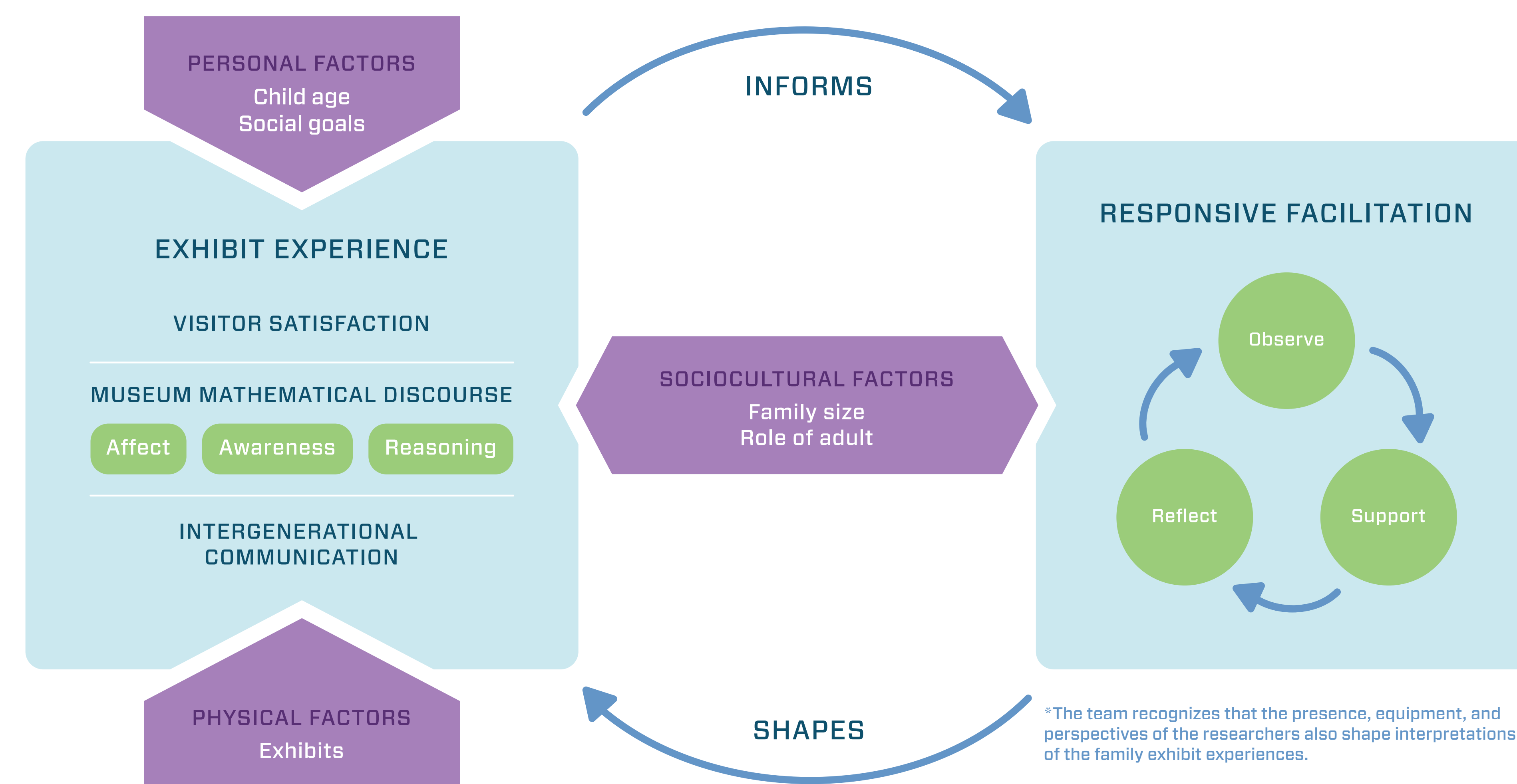
REVEAL is using a two-phase research design, including a phase 1 design-based research study followed by a phase 2 experimental study, to investigate and measure the impact of staff facilitation on family mathematical discourse at exhibits and identify factors that influence the outcomes of these interactions. The project has an emphasis on culturally responsive research and education approaches.

### Project Challenges

Based on prior research and the phase 1 study, the project team hypothesized that a critical aspect of effective facilitation in museums is the degree to which museum educators respond to and match the needs and goals of families. However, this aspect of staff-facilitated family learning proved to be extremely difficult to operationalize, and data analysis revealed significant validity and reliability issues with both the observed and self-reported facilitator-family match measures.



### REVEAL Facilitation Model



### Experimental Study Findings

Facilitation by trained museum educators had a small but positive impact on family mathematical reasoning, engagement time, and general satisfaction.

- Facilitation was significantly associated with mathematical reasoning and general satisfaction even after accounting for engagement time.
- There was some evidence that the styles of specific educators had an additional, independent impact on engagement time, intergenerational communication, general satisfaction, and math enjoyment.

Facilitation by trained museum educators had a small negative impact on family intergenerational communication.

- This relationship was significant even after accounting for differences across exhibits and visitor groups.

The experimental study findings generally aligned with the theoretical model of facilitation developed during phase 1.

- Most of the physical, social, and personal factors hypothesized in the REVEAL facilitation model, including educator facilitation, exhibit design, child age, and group size, significantly predicted family outcomes.
- Family social goals and adult visitor roles were measured indirectly through the observed and self-reported facilitator-family match measures. However, there were significant validity and reliability issues with these scales (see “project challenges”).

### Culturally Responsive Research Approach

The project team is dedicated to ensuring that the research findings and the facilitation model developed through the REVEAL project are culturally responsive and inclusive for the diversity of OMSI visitors and families. A variety of strategies have supported this goal, including: (a) integrating a culturally responsive research professional development process for the team throughout the project; (b) developing a cultural validity framework to guide both the phase 1 and phase 2 studies; (c) explicitly recognizing the role of the researchers in the project’s theoretical model; (d) partnering with a local community-based organization, Adelante Mujeres, to gather additional insights on staff facilitation for Spanish-speaking families; and (e) using a culturally responsive research lens to reflect on the team’s research findings and interpretations.

REVEAL is made possible with funding from the National Science Foundation under Grant No. DRL-1321666.

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