

inforMath

The Informal Mathematics Collaborative

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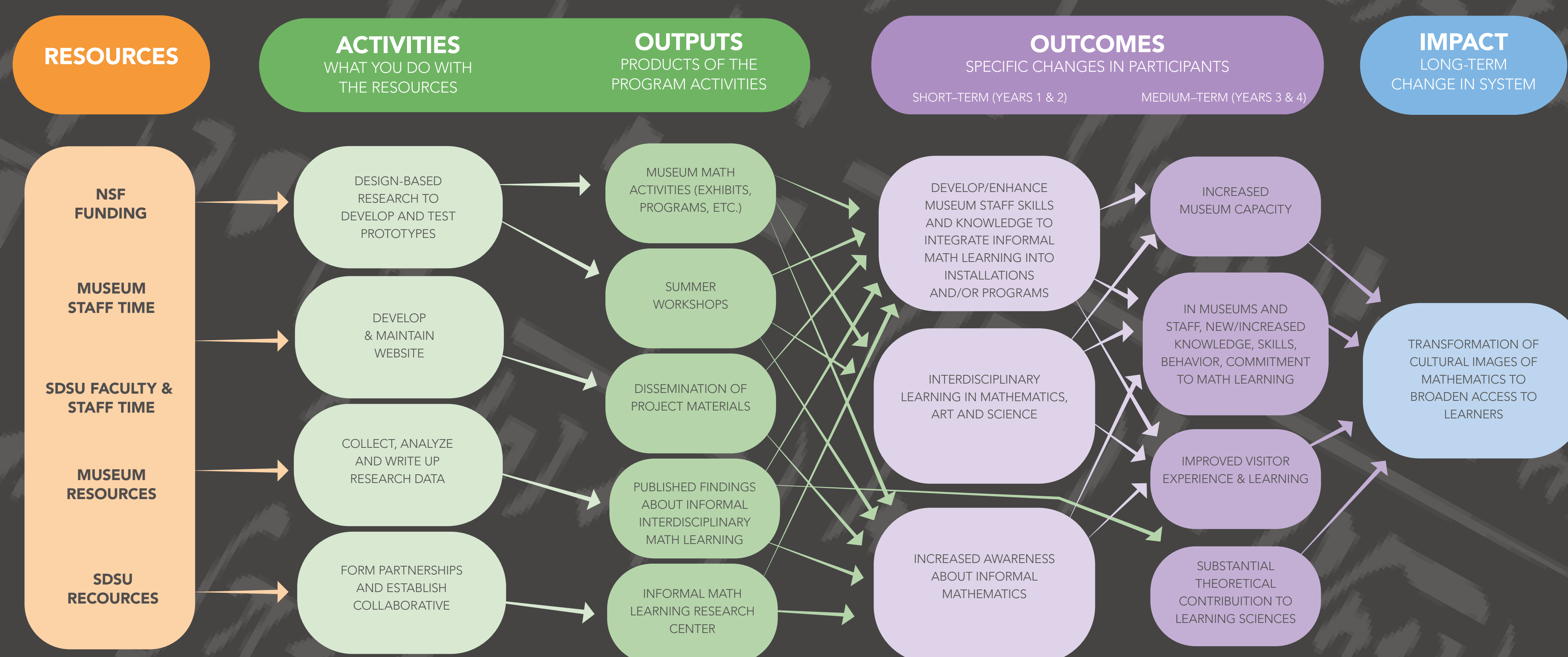


Project Overview:

This research project seeks avenues for transforming cultural perceptions of mathematics in ways that broaden learners' access to the discipline. The project addresses an issue of central importance to the field of STEM education: widespread cultural images of mathematics as an inscrutable domain available only to a small number of people of exceptional intelligence or innate capacity. Widely circulating cultural notions of mathematics as difficult and esoteric deflect many learners' experiences with this discipline and ultimately have the unfortunate potential to discourage participation in or identification with mathematics. To address this issue, this project explores two conjectures:

1. Educational interventions that (a) merge mathematics and the arts and (b) engage learners' bodies, through movement, interaction, and multimodal perception, can productively broaden cultural views for what is regarded as mathematics.
2. The diverse array of institutions in the informal education sector has a unique potential to engage learners with specific mathematical content in novel ways.

The proposed project investigates each of these conjectures in the context of the establishment of a new research center, the InforMath Collaborative, that brings together university educational researchers with art and science museum professionals. This collaborative, through design-based research on exhibits and programs, integrates existing content from participating art and science museums with mathematics.



YEAR ONE

Activities

During year 1 the InforMath project undertook two pilot design-based research projects, one with Mingei International Museum and one with the Museum of Photographic Arts (MOPA). For each pilot project members from SDSU and the Balboa Park Learning Institute (BPLI) partners collaborated with staff members from each institution to create an activity for the public that integrated the mathematics of perspective with relevant art concepts and practices from each of the museums. The collaborations spanned several months, allowing time for SDSU researchers and museum staff to jointly imagine, develop, refine, and implement each pilot activity. During each pilot, video and audio data were collected about the public participants' engagement with the activity, including a brief exit interview.

Throughout year 1 senior members of the InforMath Collaborative met to discuss the planning of the pilot studies and then later to plan for year 2.

Resources and Deliverables

Anamorphic Projection Stand: The anamorphic projection stand is a device used to create anamorphic projections of three dimensional objects. The device literally connects a pre-image of the 3d object to its image in the projection using a string. By choosing strategic points on the 3d object, the object's anamorphic image can be constructed. When viewed from the origin of the string (i.e. the point of central projection), the drawn image appears to be three dimensional.

Treasure Map: During the pilot at Mingei the Treasure Map was an activity that had visitors exploring the museum with an eye toward mathematics.

Family Interview Protocol: This protocol was used in our semi-structured interviews at both pilot activities. It contains both open ended questions about visitors' general experiences and more detailed questions about specific activities they may have engaged in.

InforMath Basecamp:
basecamp.com/2493800/projects/4602905

Project website under development.

Impacts

This year the InforMath Collaborative engaged diverse audiences in a wide variety of public programs and events, including:

- Public programs at Mingei and MOPA provided opportunities for visitors of all ages and backgrounds to experience hands-on learning at the intersection of mathematics and the arts.
- A public presentation by co-PI Molly Kelton at San Diego's STEAM Ascend conference, which drew 500 regional and national educators, nonprofit professionals, students, parents, business leaders, and policymakers.
- Facilitated programs and demonstrations at Play Day for Educators, an event in Balboa Park organized by the NSF-funded Art of Science Learning project that brought together hundreds of regional STEAM educators from a variety of formal and informal settings.

Challenges Encountered

We have encountered the challenge of overcoming the image of mathematics stemming from traditional school experiences, which tend to exclude personal expression and open wonder about space, time and shape as genuine mathematical undertakings.



PARTNERS

