Chemistry in Afterschool - Partnership with CaSTL and the Boys and Girls Club

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CaSTL CENTER Chemistry at the Space-Time Limit
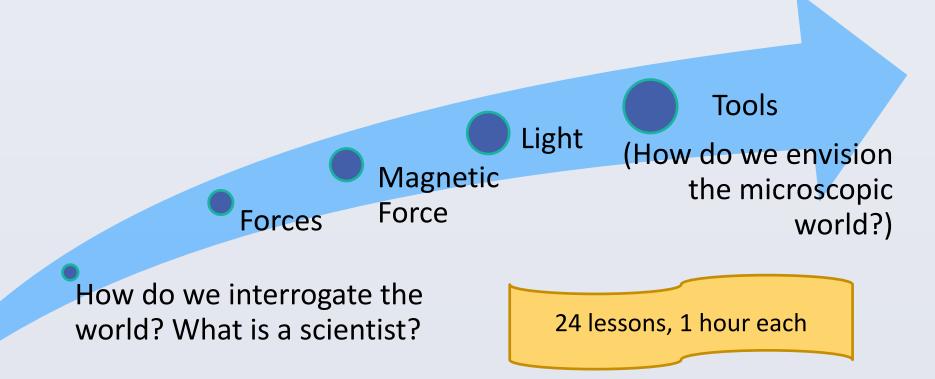
BOYS & GIRLS CLUB OF SANTA ANA

OBJECTIVES

- To develop and implement an after-school curriculum that engages children in scientific concepts that relate to the research being done at the CCI Chemistry at the Space-Time Limit
- To increase participants' interest, enthusiasm, and learning outcomes in Science Technology Engineering and Math (STEM) fields, through the development of science and chemistry hands-on lessons
- To evaluate the program and attempt to use results to sustain the program after the life of the Center's involvement

CURRICULUM TRAJECTORY

Forces

Magnetic Force

Light

Tools (How do we envision the microscopic world?)

How do we interrogate the world? What is a scientist?

24 lessons, 1 hour each

WHO ARE THE AUDIENCES ADDRESSED?

After-school Elementary School Students at the Boys and Girls Club (BGC) of Santa Ana.
- Over 90% of the participants self-identify as Latino
- 93% on free and reduced lunch

WHO HAS BEEN INVOLVED?

- Chemistry at the Space-Time Limit (CaSTL)
- A Science Specialist and Evaluator from the California Science Project of Irvine(CSPI) at the University of California, Irvine
- The Boys and Girls Club of Santa Ana
- UC Irvine Undergraduate Science Majors
- UC Irvine Graduate Students

PROJECT QUESTIONS

To what extent does the CaSTL science program:
1. Engage students in STEM lessons?
2. Allow students to experience hands-on, quality inquiry-science lessons (as defined by CaSTL, CSPI, and the California State Standards)?
3. Increase participating students' interest, knowledge, and excitement in STEM disciplines?
4. Engage students to consider STEM careers?

EVALUATION RESULTS
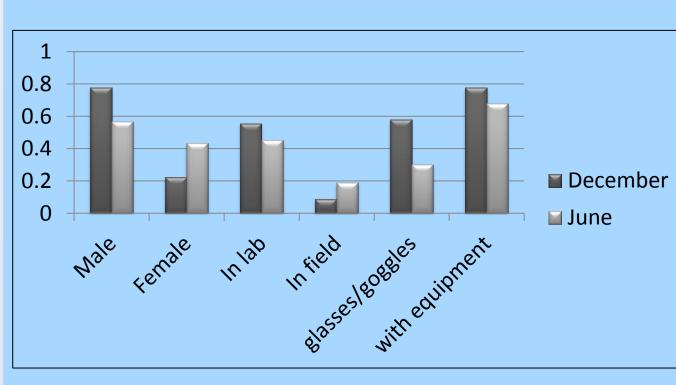
Quality Science Lessons

- Hands-on
- Inquiry-based, exploration
- Focused on student talk and language development
- Teachers talked to students like they are scientists
  - *"As a scientist, you're going to use your senses. Which senses will you use?"*
  - *"Scientists report their information, but they are also good listeners. So we need to listen to the others in the room."*
- Each lesson scored "adequate" or "exemplary" on STERS rating scale in each component
  - Components of Science Teaching
  - Create a Physical Environment for Inquiry and Learning
  - Facilitate Direct Experiences to Promote Conceptual Learning
  - Promote Use of Scientific Inquiry
  - Create a Collaborative Climate that Promotes Exploration and Understanding
  - Opportunities for Extended Conversation
  - Build Children's Vocabulary
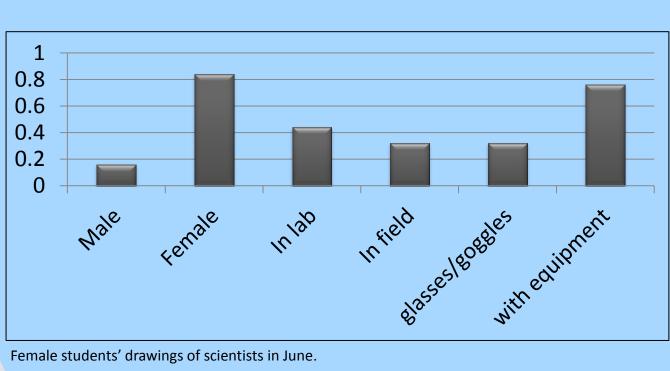 - Plan In-depth Investigations
  - Assess Children's Learning

Changes in Views of Scientists

- *"Scientists are people who study many different things. Like for example, they study the world, the galaxy, history of animals, and the history of the earth too."*
- *"Scientists are people who study about brains, study about animals, study about people. They study about the earth science, and they study about the weather."*
- *"A scientist is someone who finds out information for something that probably other people don't know."*
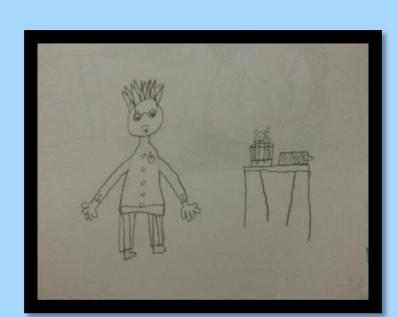
Comparison of students' drawings of scientists from December to June.

Female students' drawings of scientists in June.

"I Can Be a Scientist"

- *"I can be a scientist. If I study and go to college."*
- *"Us. When we grow up, we can be one."*
- *"Because I want to be a chemist when I grow up"*
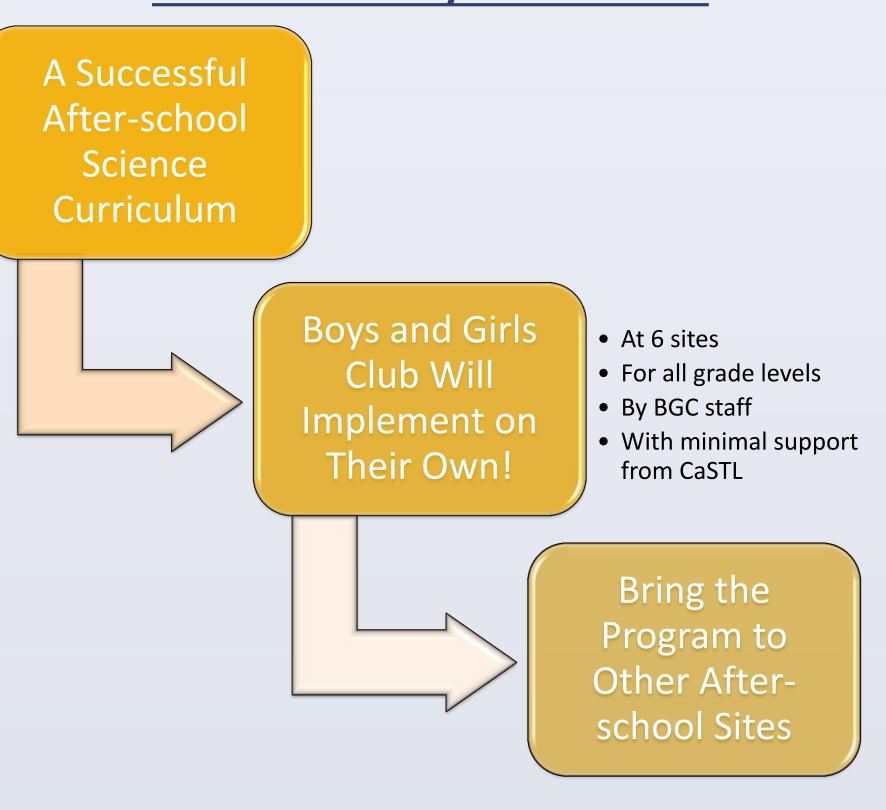
December Example

June Example

RESEARCH METHODS

- Observations of lessons
  - Field notes
  - Peer Classroom Observation Protocol
  - Science Teacher and Environment Rating Scale
- Interviews with after-school students
- Collection of student work
- Mixed Methods Analysis

CONCLUSIONS/NEXT STEPS

A Successful After-school Science Curriculum

Boys and Girls Club Will Implement on Their Own!
- At 6 sites
- For all grade levels
- By BGC staff
- With minimal support from CaSTL

Bring the Program to Other After-school Sites

CHALLENGES

- Inconsistent student attendance rates
- Conflicting programs at the BGC site
- Time
- Staff turnover
- Having designated space for the program

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NSF Proposal Number: 0802913

"You are a scientist!"