Biotech Jumpstart: Building Competency and Career Awareness Through Scientific Inquiry

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Introduction

Background

- Colorado Paradox: Due to a lack of local skilled workers, most biotech jobs in Colorado are filled by out-of-state employees.
- This project will increase local participation in Colorado's biotech workforce by improving biotech education and awareness in high schools and in our community college.

Goals and Objectives of Project

Goal 1: Improve Biotech Education by Building Students' Skills and Capacity to Engage in Biotech-Focused STEM Careers

Objective 1.1: Develop two inquiry-based molecular biology labs to increase students' engagement and skills in biotechnology fundamentals and techniques in preparation for a biotechnical career.

Objective 1.2: Implement a program of near-peer, Supplemental Instruction Leaders (SILs) to engage students during the inquiry-based labs and to model career exploration.

Objective 1.3: Create workshops to train high school and community college teachers to adopt inquiry-based curricula.

Goal 2: Build Interest and Awareness in Biotech Career Opportunities.

Objective 2.1: Increase student awareness of and interest in biotech through career exploration activities.

Objective 2.2: Improve FRCC and high school teachers' effectiveness as biotech career mentors by expanding their knowledge of local private sector and government biotech career opportunities.

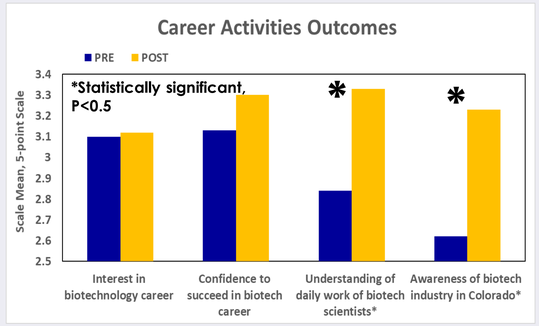
Products

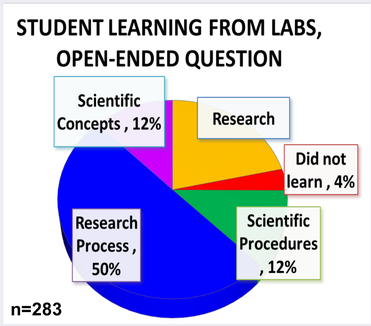
Activities	Students Participating
National Renewable Energy Lab Tour	8
Biotech Talk	22
Biotech Career Fair	35
Inquiry-Based Biology Labs	**Students Participating**
Biofuels Production	239
Rubisco Expression	78
Professional Development	**Numbers of Participants**
Summer 2018 workshop	11
Spring 2019 workshop	10

Outcomes

Career Exploration activities

- Student awareness of and interest in biotechnology increased after attending STEM-related seminars and/or a tour of a biotechnology research institute.

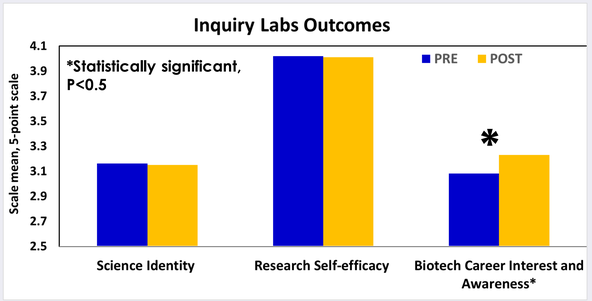


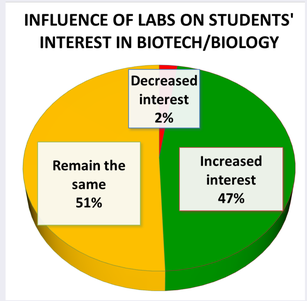


Students pre- and post- survey data are depicted above (n=21).

Inquiry-based Biotech labs

Student awareness of and interest in biotechnology increased after participating in inquiry-based labs.

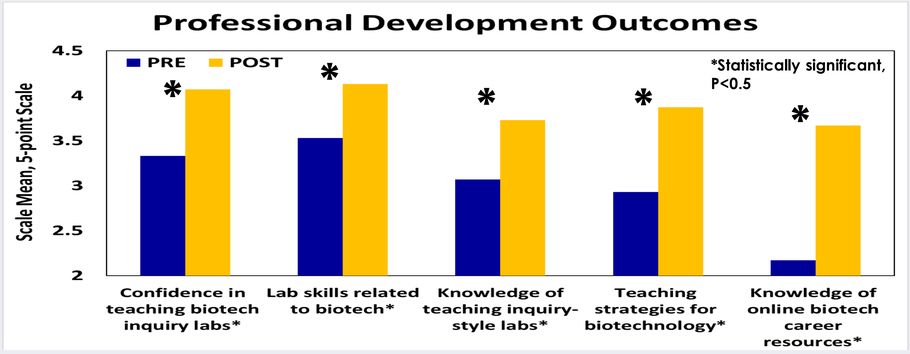




Survey data from implementation of biotech inquiry labs in fall 2018 and spring 2019 (n=317). Research self-efficacy measured confidence and capacity to conduct research, science identity measured feeling of belonging and aspirations.

Professional Development Workshops

Educators gained confidence and skills to implement inquiry-based labs.



Survey data from two workshops (n=21) in summer 2018 and spring 2019.

Conclusions

Career Exploration activities

- Students made statistically significant gains in understanding the work of biotech scientists and in their biotech career awareness.

Inquiry-based Biotech labs

- Students demonstrated the strongest growth in their awareness of and interest in biotechnology careers.
- Nearly half of students reported an increase in interest in biology or biotech from their participation in the biotechnology labs.
- 96% of students reported that they had learned about the scientific research process, including experimental design, generating a research question, research procedures and processes, and the characteristics of research.

Professional development workshops

- Workshop participants felt confident in being able to facilitate the labs and share them with colleagues.
- Workshop participants gained knowledge of online biotech teaching and career resources, increased their confidence and knowledge in pedagogical strategies for teaching inquiry-based biotech labs, and developed lab skills in the field of biotechnology.

Future Directions

1. We will continue to implement the labs in multiple classes at high schools and our community college.
2. Additional high school and community college teachers and SILs will be trained in the upcoming fall workshop.
3. Additional tours will be conducted to the biofuels facility at the National Renewal Energy Lab (NREL) in Golden, CO this fall.
4. FRCC will continue to host seminars on biotechnology research in the upcoming academic year.

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