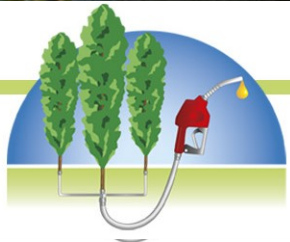


Bioenergy Education Initiative

Integration of Project-Based Learning into a Summer Bridge Program

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United States
Department of
Agriculture

National Institute
of Food and
Agriculture



The AHB Bioenergy Education Pipeline

Family and community programming

Pre-college programs

Community and technical college workforce development

Bioenergy summer bridge (BSB) to college program

Undergraduate bioenergy education

Masters-level programs



Importance of Bridge Programs



- Supports student retention and graduation rates by:
 - Connecting students to campus resources
 - Building college readiness skills
 - Developing strong social networks

Residential Bioenergy Summer Bridge (BSB)



We propose that bridge programs serving URS, STEM and Non-STEM majors, can use a STEM research project to support academic skills and interest in STEM.

GOALS: Increase retention and success of all students; promote interest in bioenergy and STEM

- Use bioenergy as access point to STEM
- Assist URS transition to college using authentic experiences to simulate college classes, promote connection to resources, and facilitate supportive peer groups
- Connects students directly to bioenergy research, Bioenergy Minor, other campus bridge programs
- Address needs of STEM and non-STEM majors using Project-Based Learning (PBL)

Designing PBL for the BSB

Create a STEM research project that requires meaningful interaction with campus resources

- Presents STEM in technical and socioeconomic context
- Couples direct instruction with skill development
- Creates smaller assignments that build on each other throughout the program
- Have multiple levels of support available for students
- Establishes clear student expectations
- Parents play the role of the audience during commencement



Resulting Student Products

Bioenergy Research Project

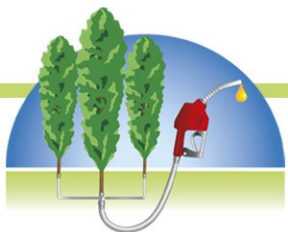
- Positions students as experts of a defensible solution
- Presentation of research results to their families
- Navigate campus resources to complete a rigorous academic project

Goal: Refine academic skills and utilize campus resources in a supportive community

Academic Self Poster

- Builds on personal and academic reflections throughout the program
- Students display their personal transition story
- Gallery walk with parents, guests, and peers

Goal: Self awareness of college transition, as well as to facilitate a conversation with students and their families



Assessment of Programing

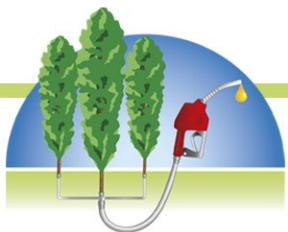
Research Design & Methods

What is the impact of the BSB research project on college student self-efficacy, academic skills, STEM and Bioenergy interest, and connection to OSU?

- Mixed Methods
- Pre-, post-, and delayed-surveys
- Scales: 5pt (SD to SA) and 10pt (not confident to extremely confident)

Survey Elements

- Social cognitive theory views BSB as a mastery experience for incoming students
- Used broad and targeted scales
- STEM interest & career interest
 - Success in a STEM major at OSU
 - Bioenergy Interest
- College self-efficacy
 - Success at OSU
 - Related project skills
 - Specific OSU resources



Students who participated



40% were 1st generation college students

2015 Bioenergy Summer Bridge Cohort			
Ethnicity	%	Home Town	%
Asian/Asian American	20	Rural	30
Hispanic	40	Urban	60
White	30	Unsure	10
More than one	10		
Gender		High School GPA	
Female	60	Average	3.54
Male	40	Range	2.75-4.00

Incoming Major	
Animal Sciences	General Engineering
Business	Mechanical Engineering
Chemistry	Microbiology
Computer Science	Nuclear Engineering
Electrical Engineering	Physics
Environmental Sciences	Political Science, Env. Policy

Key Findings:

STEM interest, College Student Self Efficacy (CSSE), OSU success in STEM field, and OSU resources



- Supports STEM interest and CSSE during the program; both increased and positively correlated with each other at the conclusion of the program.
- Students reported a 42% increase in bioenergy interest when comparing pre-post results
- Increase in bioenergy interest positively correlated with confidence using OSU resources on post survey.
- Student perceived success at OSU in a STEM major positively correlated to an increase in bioenergy interest on post survey
- Negative correlation between CSSE and confidence using OSU resources on the post test

Key Findings:

Connection to OSU Resources and People



“The Bridge taught me about the resources around campus and showed me how helpful and friendly people around here are. Because of that, OSU is starting to feel more like home. Now I know that I can go to many places to seek help should I need it.”

“I was able to learn about all different kinds of resources on campus and meet new people that I knew I will remain in contact with for many years to come.”

“The most useful part was the resources the program introduced me to. The challenging part to the program was the workload while maintaining a social aspect to college.”

Key Findings:

BSB Project & Academic Skills

Challenging students,
refining academic skills



“It helped me gain better research and studying skills along with skills that allow me to write effective presentations.”

“The Summer Bridge Program was helpful in teaching me good notetaking and presentation skills.”

“It helped me develop time management, intelligence, discipline, and organization.”

“The challenging aspect of the Summer Bridge was actually doing the research project, and finding ways so that everyone can work and work to the best of their abilities.”

Relevance to Educators



PBL STEM research projects to support URS' STEM interest, CSSE, connection to resources, help form peer groups and refine academic skills.

PBL STEM research projects can expose students to resources and social groups they will find during their college careers

PBL STEM research projects can support academic skills across diverse groups of STEM majors.

Students identify resources that will be most helpful to them.

Post bridge experiences to support gains in skills they learned during that bridge and increase in CSSE.

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Thank you! Questions?

Learn more at:
[agsci.oregonstate.edu/bioenergy-
education](https://agsci.oregonstate.edu/bioenergy-education)