Integration of Project-Based Learning into a Summer Bridge Program

Jay Well, Oregon State University
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)

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)

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.
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

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<th>Ethnicity</th>
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<th>Home Town</th>
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<table>
<thead>
<tr>
<th>Gender</th>
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<tr>
<td>Male</td>
<td>Range 2.75-4.00</td>
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<table>
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<th>Incoming Major</th>
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<td>Physics</td>
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<tr>
<td>Environmental Sciences</td>
<td>Political Science, Env. Policy</td>
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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.
Bioenergy Education Initiative

Thank you! Questions?

Learn more at: agsci.oregonstate.edu/bioenergy-education