Supporting Rural STEM Middle School Teachers and Career Counselors in the Development of Effective STEM Content and Career Development Experiences

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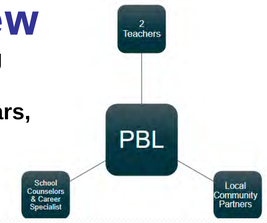
Project Goals

This Late-Stage Design and Development DRK-12 Project aims to refine and iteratively develop an innovative educational and professional development model for STEM collaboration and teaching in high poverty rural middle schools, the Advancement of the Workforce and Knowledge Economy for STEM (AWAKE-STEM). USC's AWAKE STEM program has four major goals: 1) Increase collaboration between teachers and school counselors and community partners 2) Design and deliver authentic gold-standard PBL that integrates PBE and STEM Careers 3) Obtain evidence for the AWAKE-STEM PD model and 4) Examine student outcomes (creativity, critical thinking, rural attachment, STEM motivation).

Project Overview

To meet project goals, we recruited teams consisting of two teachers (at least one STEM) and one school counselor from rural middle schools. Across two years, we have 19 rural educator teams from different districts.



The collaboration between teachers and school counselors is a main driving factor of the AWAKE-STEM model, some of the aims of this collaboration are to:

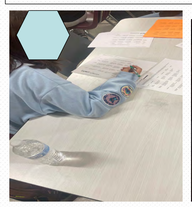
- Engage rural teachers, counselors, and the local workforce to work collaboratively to design an integrated set of STEM content and career development activities
- Ease sense of isolation among rural educators
- Support teams in designing and delivering 2 high-quality authentic interdisciplinary gold standard PBL units that integrate place-based education (PBE) and STEM career activities that are aligned to state standards.

To successfully integrate PBE and STEM careers with standards, teachers and counselors combine their expertise and learn from one another while working together.

Teacher-Counselor Collaboration

"This collaboration has deepened my understanding of effective teaching and career counseling practices. Working closely with our counselor opened my eyes to the different ways we can support students' long-term success beyond academic content." (Teacher)

"I've worked with the teachers on my team for years and already had deep respect for them. But collaborating on PBL connected me to them in a new and meaningful way. I enjoyed being in their classrooms and helping plan powerful, relevant learning experiences." (Counselor)



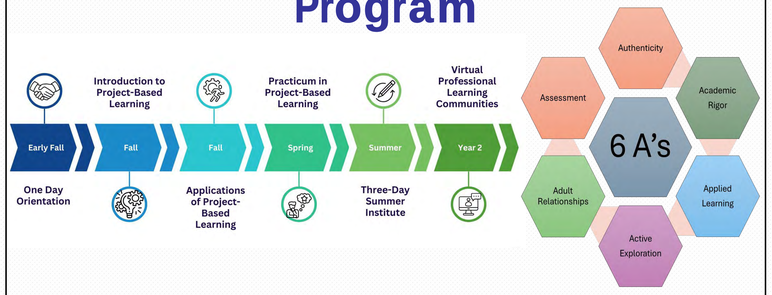
Stream MS students completing peer feedback rubrics on solar light milestone

Stream MS students' solar lights milestone products

Glendale MS students working with Master Gardener

Glendale MS community garden ribbon cutting presentation

AWAKE Professional Development Program



(Larmer et al,, 2015, Steinberg, 1998)

PBL Case Studies

Glendale Middle School: Rural Distant (42); 353 students, 58% FRL (NCES, 20224)

Unit 1 DQ: In what ways did early civilizations overcome the challenge of limited access to water for their survival and how can we use their discoveries to maintain and sustain a community/school garden?

Unit 2 DQ: What would happen if we couldn't get food from the grocery store? How can we change that for our community?

Stream Middle School: Rural Distant (42), 688 students, 66% FRL (NCES, 20224)

Unit 1 DQ: How can students address and propose solutions to the problem of food deserts in their local schools and community?

Unit 2 DQ: How can we address the issue of energy conservation at the local and global level?

PBL Design Element (Steinberg, 1998) 6A's +C Implementation Rubric Scores (1-4)	Glendale MS PBL Unit 1	Glendale MS PBL Unit 2	Stream MS PBL Unit 1	Stream MS PBL Unit 2
Authenticity	2	3	3	3
Academic Rigor	3	3	3	4
Applied Learning	3	3	3	4
Active Exploration	3	3	2	4
Adult Connections	2	3	2	3
Assessment Practices	3	3	3	3
STEM Career Connections	2	3	2	3

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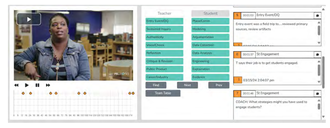
References

AWAKE Data Collection

Key Components of Program Evaluation:



- Team PBL Unit Plans
- Video Recordings and SeeMeTeach (Berg, 2023) Coach Feedback
- 6A's + C PBL Observation Rubric
- PBL Implementation Journals
- Beginning and End of Year Educator Interviews
- PBL Team Created School-Level Professional Development
- Student, Educator, and Community Partner Surveys
- Student Creativity, Critical Thinking and Collaboration Rubrics (adapted from PBLWorks)

Educator Comments:

"The field study for our PB [unit] 2 was extremely helpful and relatable. Our students were able to see the water treatment process and wastewater treatment process thoroughly…In our last career session, during the gallery walk assignment, students were able to explain how important a water treatment plant operator's job is and how valuable it is. The student stated without the plant operators, we may not have clean water and how their job affects us all." (Counselor)

"We believe this is something our students will remember, not just because of content, but because they saw firsthand that learning can be about more than themselves. It can be about making a difference and serving others!" (Teacher)

Conclusions

PBL Implementation:

Successful implementation of community- and career-focused PBL into rural middle school STEM classrooms through a yearlong PD emphasizing teacher and school counselor collaboration

Teams showed varied degrees of integration of PBL design elements (scores of 2-4 on rubric) with improvements from Unit 1 to Unit 2 within the first year for Cohort 2 cases

STEM Career and Community Integration

Benefits: Units integrated STEM careers through direct involvement of local professionals and real-world applications
Barriers: Limited industry presence, long travel distance, extended partnerships need time to develop

Implications: Through community and career-focused STEM PBL units, rural educators have the potential to increase middle school students' interest in STEM content and future STEM careers while improving their rural communities through solving local community issues (Sobel, 2004).