Studio STEM: Engaging Middle School Students in Networked Science and Engineering Projects

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Studio STEM

PROJECT PRINCIPLES

The principal goal of Studio STEM is to:

- engage high needs middle school rural youth in designbased projects related to the science of energy
- that allow them to acquire critical knowledge, skills, and dispositions in STEM,
- while enhancing and extending the learning setting via social media and digital technologies.

Theory of Action

DESIGN PRINCIPLES

- Curriculum: Interesting problems in energy sustainability
- Teaching Approach: Designbased inquiry integrated wtih ICT platforms
- Learning Environment: Informal design studios with support from facilitators
- Audience: Youth from rural, low socio-economic communities, site leaders, facilitators, and teachers

SHORT-TERM OUTCOMES

Knowledge and Skills: Students, site leaders, and facilitators will gain knowledge and skills in STEM/ICT

Expectancies: Students will have higher levels of efficacy in STEM/ICT-related activities

Value: Students will be more likely to believe that STEM/ICT-related activities are interesting, important, and useful

Career Opportunities: Students will understand how STEM/ICT knowledge and skills relate to STEM/ICT careers

LONG-TERM OUTCOMES

Achievement: Students will be more likely to earn higher grades in future STEM/ICT courses

Retention: Students will be less likely to drop out of school

Course Selection: Students will be more likely to enroll in STEM/ICT courses in the future

College Major: Students will be more likely to select a STEM/ ICT major in college

Basics of the Program

- After school program + summer camp
- Teams w/STEM undergrad facilitator + technology
- Six weeks of selfdirected inquiry + collaboration
- Culmination w/community night + showcase



Working with youth from Roanoke and New River Valleys

Studio STEM

STRATEGIES FOR INCREASING DIVERSITY

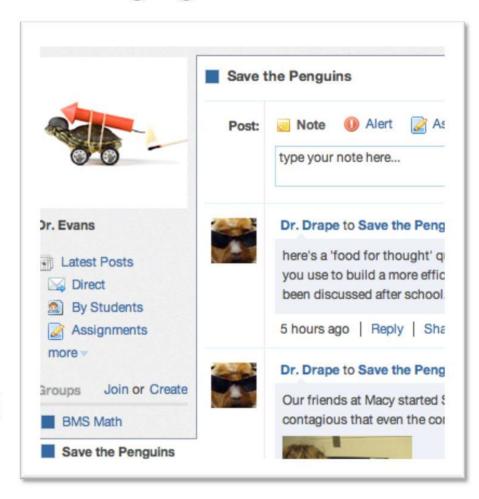
Recruitment Strategies for Rural Settings

- Work closely with school boards, principals, community orgs (4H), teachers & parents
- Understand local needs as well as hindrances (e.g., transportation, household norms, education expectations)
- Sculpt programming to increase likelihood that participants identify with goals & activities
- Leverage existing programs w/mutual goals, e.g., Center to Enhance Engineering Diversity (VT)



Technologies for Engagement

- Webquests that allow freedom to explore beyond school grounds
- Social networking forum, Edmodo, that allows for exchanges within and across sites
- Social media to keep stakeholders connected



Lessons Learned

- Facilitation by site leaders & mentors is critical to retainment
- Norms & values of rural communities must be expected at all times
- Resource constraints can never be overestimated

| Types of Questioning | Pedagogical Features | Example |
|-------------------------|---|--|
| Socratic | To prompt and guide one's thinking | "What should we do to improve your next design?" |
| Challenge | To elicit a defense or line of argument | "Why are you putting it together like that?" |
| Semantic Tapestry | To help "weave" together different ideas; questions from many angles that promote multimodal thinking | "What's in your storyboard that tells me about your design?" "Why do you think it worked?" |

Studio STEM

Michael A. Evans, Tiffany Drape, Megan Lopez, Donna Maddox

Web: http://studiostem.org/

Facebook: Studio STEM Twitter: @StudioSTEM

Saving Animals

Through STEM

Social Media

The main goal of Studio STEM is to engage middle school students in interesting projects related to environmental issues through STEM with the use of social media.

Save the Seabirds



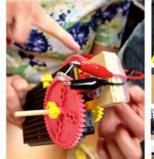


Save the Penguins



STEM Processes



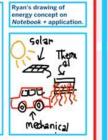






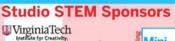
iPads & Edmodo













Studio STEM Team

- Dr. Brett Jones, Educational Psychology, Virginia Tech
- Dr. Carol Brandt, Science Education, Temple University
- Dr. Christine Schnittka, STEM Education, Auburn University
- Dr. Tiffany Drape, Project Director, Virginia Tech