Problem-Based Learning in Sustainable Technologies: Increasing the STEM Pipeline

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PROBLEM BASED LEARNING

Crisis in STEM Education in the U.S.

The Problem

- The U.S. Bureau of Labor Statistics predicts that from 2004 to 2014, the number of jobs in STEM occupations will grow by 22 percent, twice the rate of all other occupations.
- According to a recent NSF report, the United States is experiencing a chronic decline in homegrown STEM talent.

Addressing the Need Through Sustainable Technologies

The "Hook"

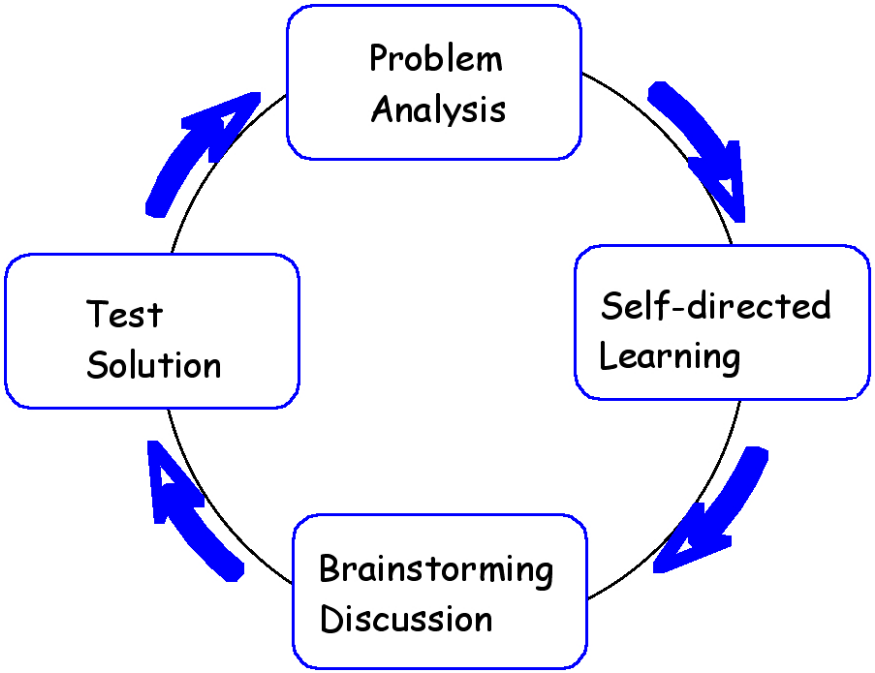
A new generation of American students are passionate about saving the environment through sustainable technologies and all things "green."

Problem Based Learning

The Approach

What is PBL?

- Originally developed for medical school education in the 1970s.
- PBL teaches students both content and problem solving skills through engagement with authentic real-world problems.



Problem Based Learning

Benefits of PBL

- Improves students' understanding and retention of content
- Promotes a "deep approach" to learning
- Improves critical thinking and problem solving skills
- Improves motivation for learning
- Improves students' ability to transfer skills and knowledge to new situations

Problem Based Learning

Characteristics of PBL

- Learning occurs collaboratively in small groups
- Problems are presented *before* any formal preparation has occurred - the problem itself drives the learning
- New information is acquired via self-directed learning
- Instructor acts as a facilitator providing focused instruction and guidance on an "as needed" basis

Problem Based Learning

Criteria for good PBL problems

- Open-ended with more than one possible solution
- Ill-structured with insufficient information to facilitate inquiry
- Based on real-world issues that engage students' interests
- Require cooperation and teamwork
- Build on prior knowledge
- *Problems have been solved by partner organization to allow students to compare and contrast their own solutions*

STEM PBL Project

3-Year NSF-ATE Project Goals:

1. Develop six multimedia STEM PBL "Challenges" focused on sustainable technologies in collaboration with industry and university partners
2. Provide professional development and ongoing support for in-service STEM educators in PBL methodology
3. Develop a model classroom course in PBL methodology for pre-service Technology and Engineering Education (TEE) programs.
4. Conduct research on the efficacy of PBL in STEM education

STEM PBL Project

Demonstration

STEM PBL Project

For more information…

www.pblprojects.org

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