IUCEE-EPICS

Engineering Projects in Community Service

Prof. William (Bill) Oakes
Director, EPICS Program
Professor Engineering Education

Maeve Drummond
EPICS University Coordinator
Purdue University

epics.university@purdue.edu
www.purdue.edu/epics
Think, pair, share

• What skills are important for engineering graduates to develop to be successful in their careers in today’s global economy?
Background

• Design Engineer with GE Aviation
  – Must be better ways to prepare students to be leaders in industry
  – Bring industry projects into the university
  – Lots of jet engines...

• Assigned to EPICS in 1998...
Pop Quiz

• At GE, we did a study of undergraduate grades (marks) and success in the company. We found

A. Positive correlation – higher grades (marks) were correlated with success in the company

B. No correlation – undergraduate grades (marks) were not related to success in the company

C. Negative correlation – lower grades (marks) were correlated with success in the company
Research Result: Outcome Space
Human-Centered Design

- New ideas from higher level stakeholders
- Designers need experiences to learn, especially with REAL USERS

Diagram:
- Learning Design
- Understanding Users
- Student Development
- Traditional Education

Legend:
- Broader context, relationship
- Involves users
- Context
- Needs, info from higher level stakeholders
- User is seen as information source
- Lacks appreciation of users
- Technology-Centered Learning Design
- Integrated and Iterative Design Process
- Very Integrated Design Process, Iterative
- Empathic Design
Ways Of Experiencing Uncertainty In Aerospace Design Decisions

- Problem Complexity
- Teamwork Skills
- Traditional Education

Projects Need to Involve Teams, Complex Problems Involve Teams of Team
Motivation: Education & Society

• Education
  – Prepare future leaders in the global economy with quality experiences
  – Sustain projects affordably
  – Connect societal needs with engineering

• Society
  – Opportunities for impact with REAL projects that are used by real people
  – Long-term partnerships to address needs of the underserved
In the beginning...

- EPICS started in 1995 with 40 ECE students on 5 projects
  - Leah Jamieson and Ed Coyle
- Question if engineering could work with communities
- 22 years later....
  - YES!!
  - EPICS at Purdue is an academic program
  - 35 universities have EPICS courses
    - Doubling to 70+ in next two years
  - ASEE’s Community Engagement Division
  - Top awards from NAE, Campus Compact, IEEE, ASEE (2X), ....
Design Education

Community Engaged Learning

Professional Preparation

EPICS®
Impact on Alumni in Industry

Sample Size
- n=524
- n=27

Data Collection
- Administer Survey
- Conduct Interviews

Data Analysis
- 5-pt Items: Multiple Regression Analysis, ANOVA, Exploratory Factor Analysis
- Open-Ended Responses: Coding, Purposive Sampling
- Thematic Analysis

Impact on Alumni in Industry
EPICS Alumni Study: Percentage of Alums that Attribute EPICS to Improving...

- Professional Competency
- Perspectives about Engineering
- Community Engagement

- Some Extent
- Large Extent
- Very Large Extent
Connection
Experience

Scenario

Practice

EPICS PURDUE
I’ve seen this before!
Working with Others

- Valuable skills for professionals
- Learn to work with those who are different

Frustrating

EPICS PURDUE
Professional Preparation

- EPICS provides technical and professional skills needed in today’s global economy
  - Recognized for providing real experience by U.S. National Academy of Engineering
  - Employers for Purdue University students recognize EPICS as work experience
- Opportunity for IUCEE-EPICS student certificates
  - Criteria and process to be defined at July Workshop
Partnerships and Opportunities

Industry
Professional Practices
Assessment Tools (Design)

Communities

Colleges and Universities

Real Users
Real Projects
EPICS in India

- Engaging Indian faculty (and students) to integrate EPICS into the curriculum
- Workshops since 2008
  - Partners with IUCEE, IEEE and EWB-India
- Community projects being done at several institutions
- How do we work with more institutions effectively?
- IUCEE-EPICS
Unnat Bharat Abhiyan

- National Initiative to Link Gov’t Institutions with Rural Communities
- Opportunity for Undergraduate Engagement

"If we have to build a nation, we should start from the villages."
– Sri Narendra Modi
Honorable Prime Minister of India

Unnat Bharat Abhiyan: vision
- Transformational change in rural development processes
- Connect institutes of higher education with local rural communities
- Participatory processes
- Appropriate technologies,
- Sustainable growth
- Virtuous cycle between the society and an inclusive university
- Upgrade capabilities of both public and the private sectors
IUCCEE-EPICS: Creating Capacity

Curriculum and assessment materials

Faculty workshops in India

Webinars, online reviews and coaching

Campus visits and mentoring

Pilot Cohort:
MIT Academy of Engineering
MLR Institute of Technology
Vardhaman College of Engineering
SR Engineering College
Hyderabad Institute of Technology and Management
BH Gardi College of Engineering and Technology
Conclusions

- EPICS is a model that has been recognized within engineering education globally
- Opportunities for IUCEE members to be leaders in preparing graduates for industry
  - Thriving in today’s global economy
- Opportunities to make an impact in the country
  - Long-term commitments to communities
  - Move past projects and into partnerships that make an impact on people and communities
- EPICS and IUCEE leveraging assets to support institutions
- Leadership in India and Globally
Thank you!

Information on IUCEE-EPICS can be downloaded from the IUCEE website

https://iucee.com/iucee-epics/.