Big Move- Purdue Polytechnic Institute Update

Opening our College to the Future

April 4, 2014
Board of Trustees Meeting
Gary R. Bertoline, Dean & Distinguished Professor
Fatma Mili, CIT Department Head
Jamie Mohler, Associate Dean
Ragu Athinarayanan, TLI Department Head
The Polytechnic Initiative

• A bold Big Move to reposition the College of Technology as a national leader in technology education and application-oriented research.

• The Polytechnic is a virtual unit parallel to the College of Technology used as an accelerator for transformational change.

• There are multiple initiatives currently underway all leading to the overall goal to change the face of technology education in the nation and bring distinction to Purdue University.
The world has changed
WHAT THE ECONOMY OF TODAY AND TOMORROW DEMANDS

- Ability to ask good questions,
- Thinking and analytical skills to seek answers
- Information
- Literacy
- Collaboration & Communication
- Civil duty and sense of community
- Lifelong
  - curiosity and learning
Top 5 Needs of Employers

- Critical Thinking and Problem Solving
- Information Technology Application
- Teamwork/Collaboration
- Creativity/Innovation
- Diversity

Education Technology Expert Alan November has included Empathy as Number One In His Surveys

Are They Really Ready To Work: (Employer’s Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st Century U.S. Workforce.)

21st century edtech
web site provides
total ranking
The students have changed
THEY COME WITH DIFFERENT MIND HABITS

- Connected, multi-taskers, digital natives
- Used to creating and sharing;
- Learning with and from others
- Informal interest-based exploration and learning
- Learning through exploration and discovery
New culture for students

• Students are mentored into discovering and creating a purposeful path rather than given a one size fit all plan of study.
• Students work in classroom with multi-disciplinary teams of faculty (mostly) rather than through fragmented monodisciplinary courses.
• Students learn just in time following their passion and purpose rather than just in case it comes up in the test.
• Students receive credit for demonstrating mastery rather than for seat-time served.
• Students receive credit for everything they learn however they learn it rather than only through our lectures.
• Students are trusted and respected in rather than tested and suspected.
New culture for faculty

• Working with students is our highest form of scholarship rather than a routine different from scholarship.
• Faculty trust the students, nurture their passion, and follow their lead rather than be the sage on the stage.
• Faculty model openness, growth mindset, risk-taking, and lifelong learning, the same values and skills we expect from students.
• Faculty are collaborative, cooperative and reflective in their working with students.
• Faculty expect the highest standards from themselves, from each others, and from the students.
New culture for classrooms

• Classrooms are open laboratories. Faculty collaborate with each other and with the rest of the community to practice the three R’s of the 21st century:
• Rigor: Students practice how to think (reason, analyze, weigh evidence, problem-solve) and communicate effectively.
• Relevance: problems addressed are relevant to the students’ world and interests.
• Relationships: students’ place in the world relative to their peers and to the global world are always central to what they do.
The T-shaped Professional

21st Century competencies

- Deeper learning
- Analytical reasoning
- Effective communication
- Critical thinking
- Managing complexity
- Collaborative work
- Self-directed learning
- Cultural awareness
- Innovation

Depth of knowledge

- Technical content
- Domain theory
- Domain fundamentals
- Problem-solving skills
- Research skills

Methods

- High TRL research
- Student-centered teaching
- Cross-functional learning
- Contextual learning
- Work-based learning
- Internships
- Co-curricular experiences
- Industry driven curriculum

Students First in All We Do
The Four Polytechnic Initiatives

• **Education R&D (Polytechnic Incubator)**
  ▫ Lead- Fatma Mili & Faculty Fellows

• **Curriculum Transformation (Polytechnic Accelerator)**
  ▫ Lead- Jamie Mohler & Faculty Fellows

• **Research & Innovation Acceleration Network**
  ▫ Lead- Ragu Athinarayanan & Richard Voyles

• **Comprehensive Workforce Education Strategy**
  ▫ Lead- Christy Bozic, Statewide Technology & Engagement Faculty
Education R&D

• Established a Polytechnic Incubator for curriculum transformation.
  ▫ The group of faculty working out of the DLRC are creating an integrated learning experience for the fall for ~50 newly admitted students from Technology and Liberal Arts

• Innovative curricula and ideas tested and validated in the incubator are transitioned to the home academic units of the faculty.
Curriculum Transformation

- Examples of new programs under consideration:
  - Computing & Informatics
    - Human Centered Design
    - Bioinformatics
    - Cyber Security & Forensics
    - Big Data & Analytics
    - High Performance & Cloud Computing
    - Computational Art (with Liberal Arts)
  - Integrated Manufacturing Systems
  - Robotics, Automation & Mechatronics
Curriculum Transformation

• Core curricula may include
  ▫ Common Core & First-year Experience
  ▫ Learn by Doing
  ▫ Real-world Immersive Capstone Experience
  ▫ Global Perspectives Program
  ▫ Polytechnic Field Experience
  ▫ Applied Innovation Certificate Program
  ▫ Humanities Integration
The Gap in Higher Education Research & Innovation Ecosystem

System Test, Launch & Operations
System & Subsystem Development
Technology Demonstration
Technology Development
Feasibility Research
Basic Technology Research

Time to Market
- Short term: 0-6 months
- Mid term: 6-18 months
- Long term: 18-48 months

Purdue Research System
Purdue TAP
Gap

Students First in All We Do
Innovation Acceleration Network

• To address a gap in higher education research and innovation ecosystem.
• Creation of iLabs around research themes for industry aligned with Technology Readiness Levels (TRL) 4 through 7.
• Value to industry = Speed to Market
  ▫ Provide Indiana companies with agile, low-cost pathways to innovation – new products, new markets
College of Technology & Partners

- College of Technology
  - SoET (5), CIT (2), CGT (1), BCM (1), AT (1),
- College of Liberal Arts
  - English(1), Comm(1), Theatre & Performing Arts (1)
- College of Education (1)
- DLRC
- CIE
- IMPACT
- Honors College
- Foundations of Excellence
- Discovery Park
- Research Park
COT in 3 YEARS (PPI/COT) Transformed

DIVISION OF INTERDISCIPLINARY STUDIES

COT

Student Experience
Applied Research
Educational Models

PPI

LEARN BY DOING
INTEGRATION WITH HUMANITIES

TRANSFORMATION STAGES “CATALYST”