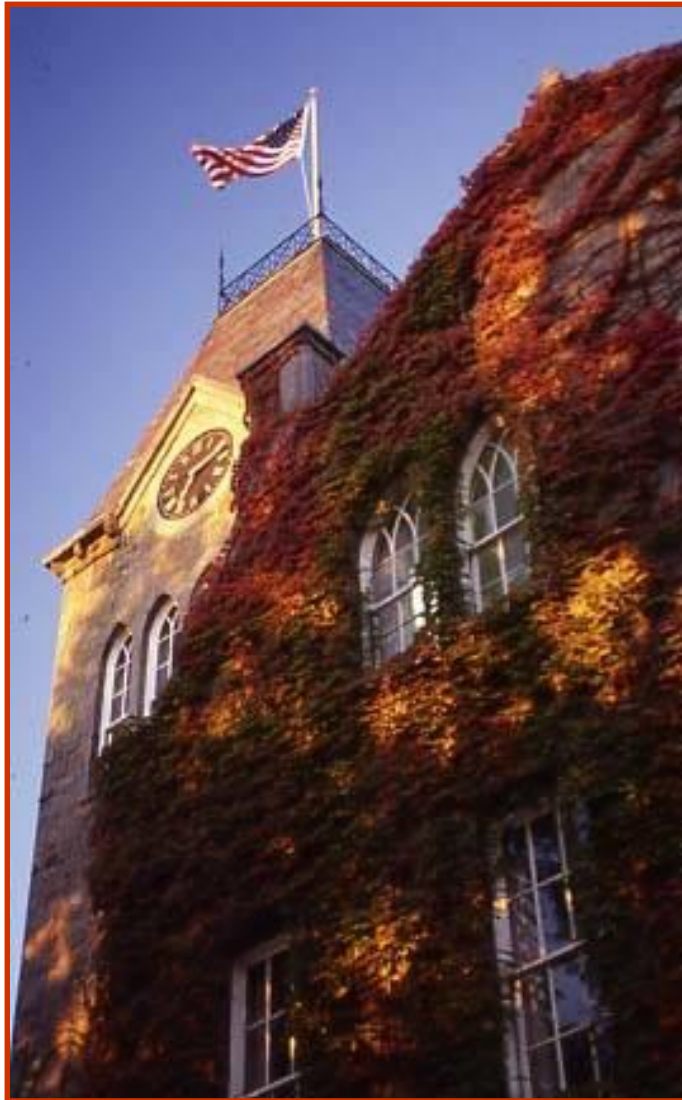# WPI

# Designing Project-Based Experiences for Integrative Global Learning

*Scott Jiusto*
*Steve McCauley*
*Anne Ogilvie*
*Rick Vaz*

*Interdisciplinary and Global Studies*
*Worcester Polytechnic Institute*

# Goals for Today



- Present a project-based model for global learning

- Connect student learning outcomes to program design

- Discuss implications for faculty roles and responsibilities

- Describe support strategies

- Explore evidence of impact on students

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# Introductions

- Who you are

- What you do

- Why you're here

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# What Do We Mean by Project Work?

- Authentic, open-ended, *situated* problems

- Messy, interdisciplinary

- Goal, methods, criteria chosen by students

- Requires integration, analysis, synthesis, and *contextual understanding*

- Emphasis on generating and communicating useful results

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# Objectives for Project-Based Learning



- Understanding problems in social and cultural contexts

- Applying knowledge in authentic settings

- Learning new topics quickly

- Communicating effectively in written, oral, and visual forms

- Interacting productively with teammates, faculty advisors, sponsors, communities

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# How Are Project Students Evaluated?

- **Quality of *results***
  - Careful research
  - Valid analysis
  - Contextual understanding
  - Persuasive writing
  - Effective solutions

- **Quality of *process***
  - Steadiness of effort
  - Interactions with others
  - Written and verbal communication
  - Flexibility, adaptability, sensitivity

# Projects Across the Curriculum at WPI

- 1st year: Great Problems Seminar
  - 6 credit hours, interdisciplinary
  - Global themes (water, food, energy, …)

- 2nd year: Humanities and Arts Capstone
  - Seminar or practicum in chosen area
  - Can be completed off campus

- 3rd year: Interactive Qualifying Project (IQP)
  - 9 credit hours, interdisciplinary gen ed
  - Can be completed off campus

- 4th year: Major Qualifying Project (MQP)
  - 9 credit hours, capstone in major field
  - Can be completed off campus

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  - 9 credit hours, interdisciplinary gen ed
  - 70% off campus; 50% overseas

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  - Can be completed off campus
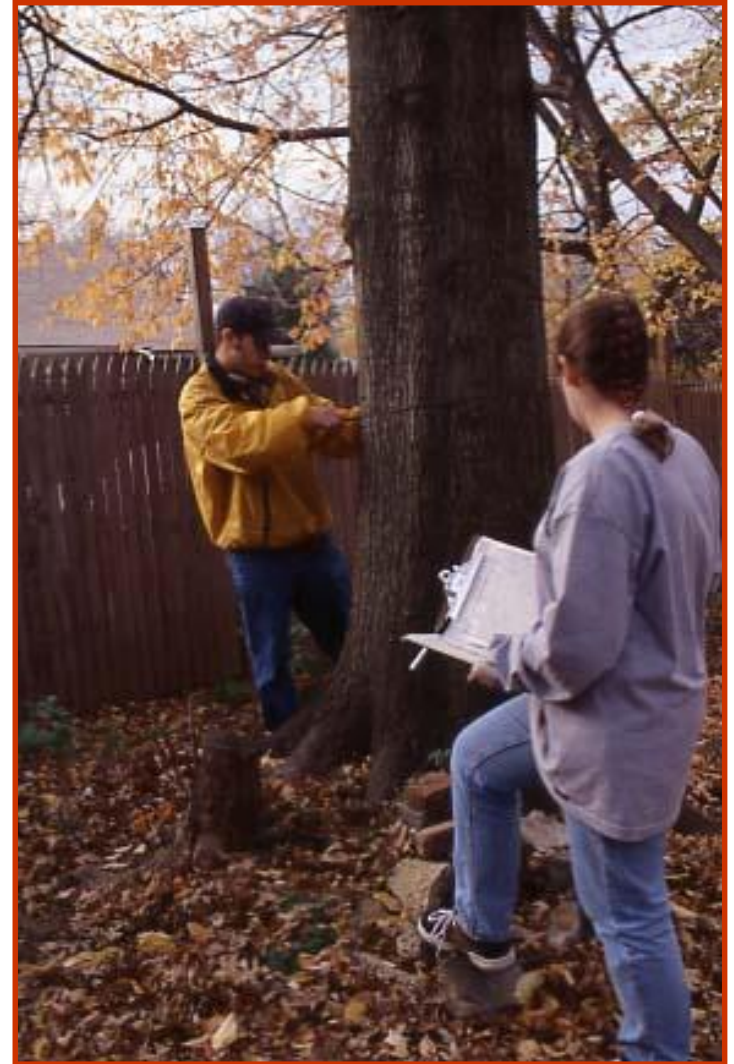
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# Interactive Qualifying Project (IQP)

- Junior year, 9 CH, gen ed requirement

- *Not a course* – students conduct inquiry under faculty direction

- Teams of 3-4 from all fields

- Faculty from all fields

- Problem at society/technology interface

- Most sponsored by NGOs, gov't, nonprofits

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# Educational Objectives of the IQP



- Research skills
- Problem solving
- Critical thinking
- Communication
- Teamwork & leadership
- Ethical awareness
- Contextual understanding

# Examples of IQPs

- Improving community nutrition
  - AIDS Project Worcester
- Public art cataloguing and preservation
  - City of Venice, Italy
- Alerting systems and egress for the deaf
  - VicDeaf, Melbourne, Australia
- Erosion and flood control in informal settlements
  - Namibia Housing Action Group
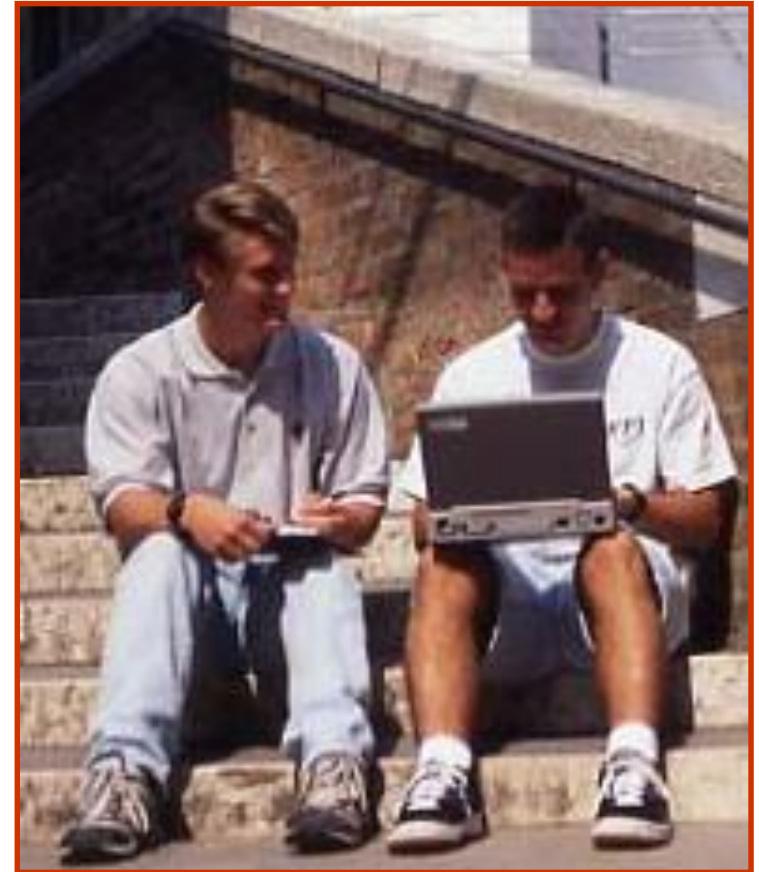
# Blending Experiential Learning Models

- ## Project-based learning
  - – Application of knowledge in authentic settings
  - – Promotes problem solving, critical thinking

- ## Study abroad
  - – Preparation for global engagement
  - – Promotes cognition, personal development

- ## Service learning
  - – Reflective interaction with communities
  - – Promotes interpersonal skills, identity development

Project Based Learning

Study Abroad

Service Learning

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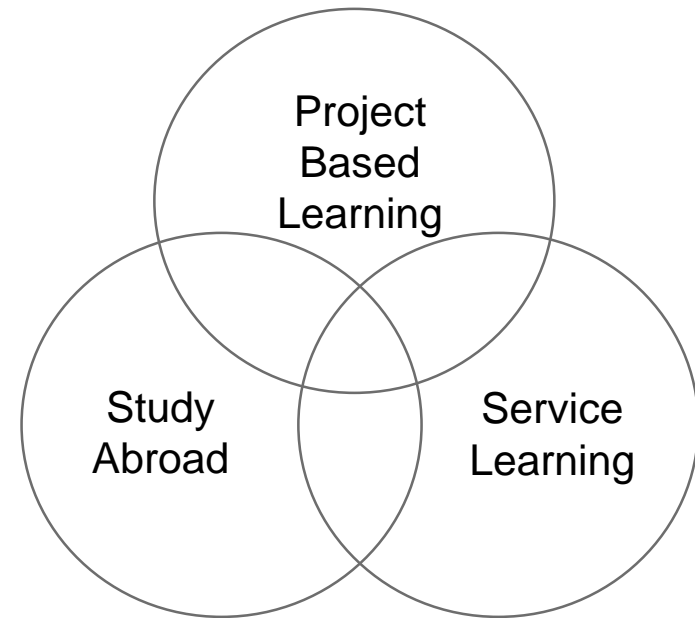
# WPI Global Projects Program

- 70% of students complete at least one project in a fulltime immersion off campus

- About 50% do at least one project overseas

- WPI operates 40 off-campus Project Centers around the globe

- The typical cohort at a center is 24 students (6 teams of 4) and 2 resident faculty advisors

# On-Campus Project Scheduling

| 1 Term = 7 weeks<br>1 Semester = 2 Terms | 3 Courses/Term<br>6 Courses/Semester |
|---|---|

| **A Term** | **B Term** | **C Term** | **D Term** |
|---|---|---|---|
| Signal Analysis | Asian Studies | Probability | Networks |
| Psychology | IC Design | History | Materials |
| *IQP* | *IQP* | *IQP* | VLSI Design |

# Off-Campus Project Scheduling

| 1 Term = 7 weeks<br>1 Semester = 2 Terms | 3 Courses/Term<br>6 Courses/Semester |
|---|---|

| **A Term** | **B Term** | **C Term** | **D Term** |
|---|---|---|---|
| Signal Analysis | Asian Studies | *IQP In Hong Kong* | Networks |
| Psychology | IC Design | | History |
| Probability | *Project Preparation* | | VLSI Design |

# Interdisciplinary (IQP) Centers

- Tirana, Albania
- Melbourne, Australia
- Hangzhou, China
- Hong Kong, China
- San Jose, Costa Rica
- Copenhagen, Denmark
- Thessaloniki, Greece
- Mandi, India
- Venice, Italy
- Rabat, Morocco
- Windhoek, Namibia
- Wellington, New Zealand
- Asuncion, Paraguay
- Panama City, Panama

- Moscow, Russia
- Cape Town, South Africa
- Zurich, Switzerland
- Bangkok, Thailand
- London, UK
- Washington, DC
- Boston, MA*
- Nantucket, MA
- Springfield, MA*
- Worcester, MA*
- Bar Harbor, ME
- San Juan, PR

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# Off-Campus Operations



- **Faculty Center Directors**
  - Develop/maintain relationships
  - Identify projects
  - Recruit/select students

- **Academic Preparation**
  - Culture, language, context
  - Teamwork, writing, presentation
  - Goal, objectives, methods
  - Proposal to sponsor

- **On-Site Immersion (7 weeks)**
  - Faculty advisors on site
  - Fulltime project work
  - Close interaction with sponsors
  - Project report and presentation

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# Support and Scaffolding



- Nonacademic preparation
  - Mandatory orientations, policies
  - Health, safety, sexual assault
- On-site advisor training
  - Managing risk, dealing with crises
  - Handling teamwork & personal problems
  - Building relationships with sponsors
  - Representing WPI locally
- Range of support offices
  - Interdisciplinary and Global Studies
  - Gordon Library
  - Student Development & Counseling
  - Office of Student Life
  - Accounting, financial aid, etc.

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# Changing Faculty and Student Roles

- Faculty move away from
  - Dispensing information
  - Authority and expert

and toward
  - Monitoring inquiry
  - Coach and facilitator



- Students move away from
  - Listening/watching
  - Dependence
  - *Gaining* knowledge

and toward
  - Creating/discovering
  - Independence
  - *Making* knowledge

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# Faculty Roles in Project Advising



- Finding sponsors and projects
- Recruiting and preparing students
- Academic guidance
  - Discussing research plans
  - Meetings with team and sponsor
  - Responding to written drafts and presentations
  - Evaluating results and process
- Nonacademic roles
  - Logistical arrangements
  - Teamwork coaching
  - Maintaining relationships with sponsoring organizations

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# Faculty Involvement

- ## All TT faculty (and many NTTs) advise projects as part of their teaching
  - Considered in T&P, annual reviews
  - "Apprenticeship" training
- ## About 50% involved in IQPs
- ## Each year, >10% of faculty spend a term advising IQPs off-campus (from all depts.)

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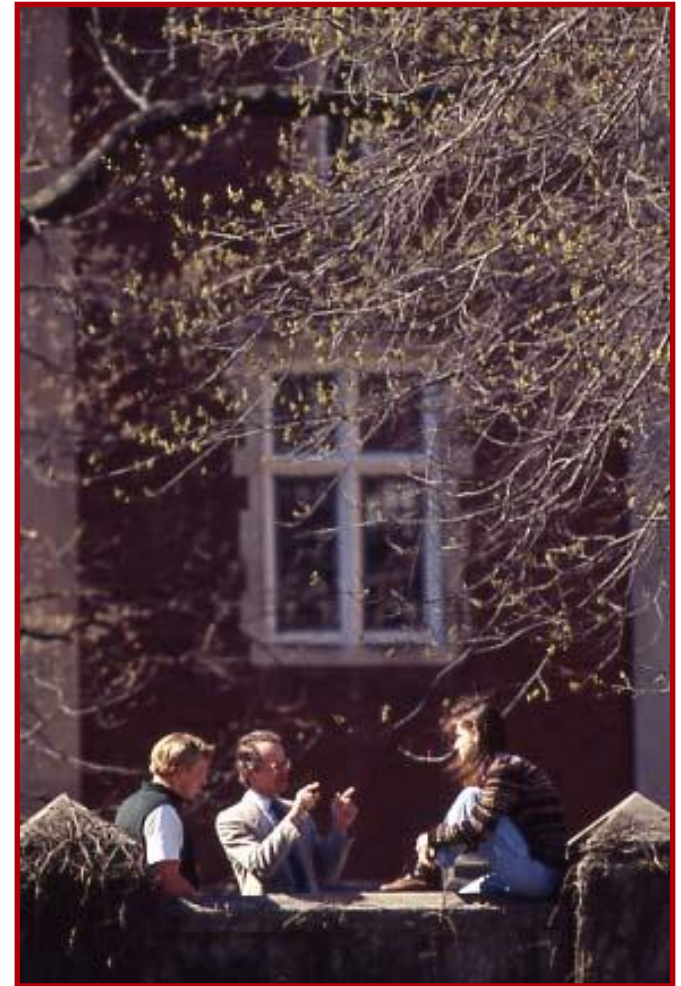
# Institutional Impacts of PBL

- Student learning and culture
  - transferrable skills
  - global preparedness
  - "making a difference"
- Institutional culture
  - broad involvement
  - pride in "signature program"
- Community and academic partners
  - mutual benefits
  - sustainable relationships
- Major focus for advancement
- Major focus for marketing
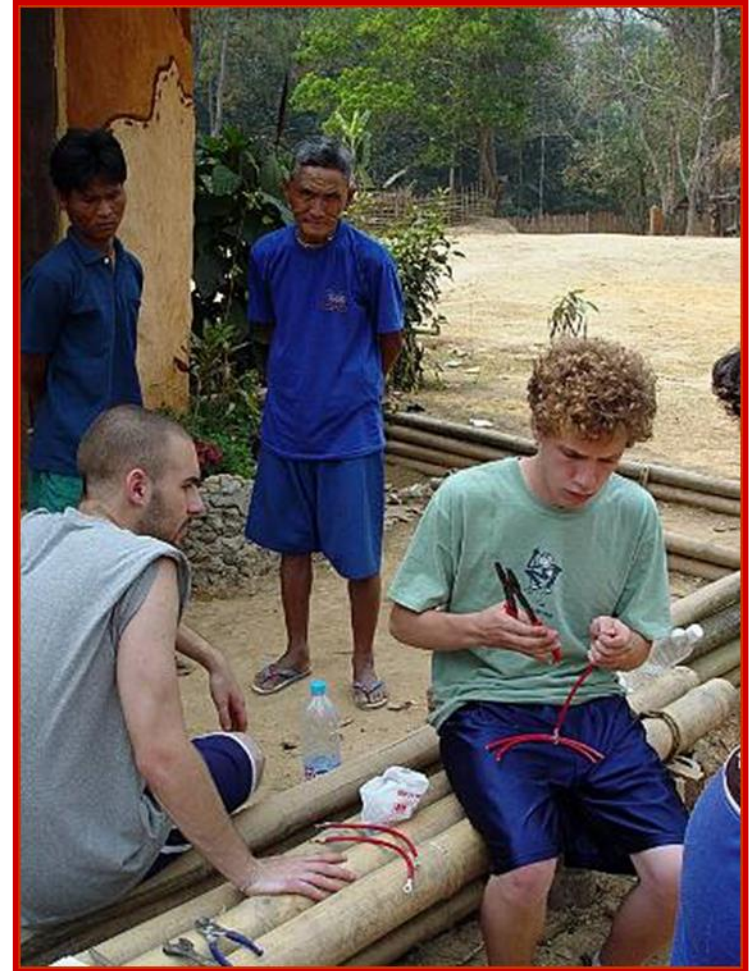
# Other Benefits



- Rich accreditation evidence
  - "understand engineering in global/social context"
- Faculty professional/personal development
  - Powerful experience, attractive opportunity
- Multidisciplinary collaboration
  - Team teaching leads to other partnerships
- Faculty research opportunities
  - International partnerships

# What Does It Cost, Who Pays?

- Tuition, financial aid continue; no program fee

- Students/families pay travel and living costs ($4k to $8k)

- Increasing number of global scholarships available

- Faculty advisors are the greatest resource implication for WPI: time, travel, housing

- *Program cost/credit is similar to the overall curriculum, about $4000 per 13.5 CH student experience*

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# Working with students in the field

*Scott Jiusto*
*Steve McCauley*
*Interdisciplinary and Global Studies*
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*Being a creative force*

*Being a student*

*Being a researcher*

*Being an independent traveler*

# *Being a field ethnographer*

*Being a consultant*

*Being a project developer*

*Being a collaborator and friend*

*Being a team member*

# What does this mean for our role as teachers, advisors, program leaders?

# Faculty/Program Leader Roles for Project-Based Learning

- Program leader, project developer & strategist

- Project Advisor

- Teacher & Learner

- Colleague

- Medic, mental health counselor and *in loco parentis*

- Team dynamics consultant

- Cultural/travel guide

- Safety officer

- Networker and intervener

- Reflector in chief…

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# Supporting Faculty-Led Study Abroad Experiences

# Recruitment and Selection of Students

- Information sessions
  - Advertise program
  - Disclose conditions and risks of sites/projects

- Application process
  - Recommendations
  - Interview
  - Essay and resume
  - Academic and judicial checks

# Education Abroad Standards and Practices

- [NAFSA Responsible Sudy Abroad: Good Practices for Health and Safety](#)
  - For sponsors, students and parents


- [Forum on Education Abroad Standards of Good Practice](#)
  - Standards focused on each component of program development and execution: defining mission and goals, academic framework, policies and procedures, health, safety, and security, ethics, etc.

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# Changes in Faculty Role for PBL and EA

- Academic changes: monitoring inquiry, coaching, facilitating

- Non-academic aspects of role also change

-Conduct welcome orientation at project site

-Observe behavior and monitor general participation and well being of all students

-Address safety concerns and/or behavioral issues and report all incidents according to IGSD incident reporting guidelines

-Collect local contact information at start of term and weekend travel information each week

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# Changes in Student Role

- Greater independence, in both learning and day-to-day living

- Greater interdependence: students must collaborate with peers, sponsors, advisors, community

- Must adapt individual learning and work styles to function well within team setting

- Focus on results of work and process of getting there

- High-stakes, team-based nature of work

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# Working with Campus Partners

- Student preparation, pre-departure orientations and academic prep., re-entry programming

- Ensuring that university policies are applied consistently and appropriately in off-campus settings

- Collaborate closely with:
  - Dean of Students Office
  - Health Services
  - Student Development and Counseling Center
  - Office of Disability Services
  - Office of Multicultural Affairs
  - Library
  - Academic Advising

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# Supporting Faculty and Students

- Pre-departure preparation includes work on learning and team work styles
  - Myers-Briggs
  - Tuckman's stages of group development model
- Faculty closely monitor progress of teams and must decide when to intervene
  - Discuss problems openly
  - Refer to SDCC for counseling
  - Address problematic individual behavior through the use of contracts for academic and behavioral issues
  - Request to involve parents and campus partners when necessary

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# Emergency Response Planning

- Same ERP process as study abroad

- Must also consider how remote support from SA office and campus partners can be provided

- New categories of incident, "student participation issue" and "team discord"

# When Things Go Wrong

# Good News

- Big picture: most of the time, things go right!

- Project-by-project: lots of things go wrong
  - Changes at sponsor organization
  - Challenges with data collection
  - Project changes completely
  - Sponsors and advisors have different visions

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# Scenarios

- Discuss scenarios at tables
- Report back to group

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# Evaluating Project Work

- **Grades reflecting results and process**

- **Student ratings of learning and advising**

- **Sponsor feedback solicited**

- **Regular program assessment**
  - Aligned with institutional LOs
  - Instrumental to accreditation
  - Used for improvement

- Alumni study to explore long-term impacts

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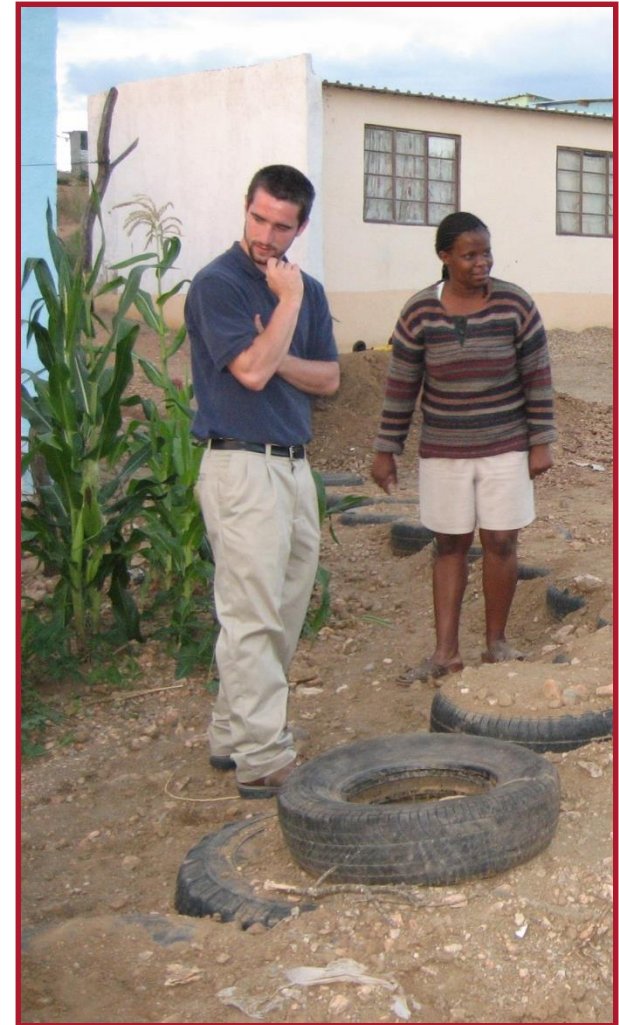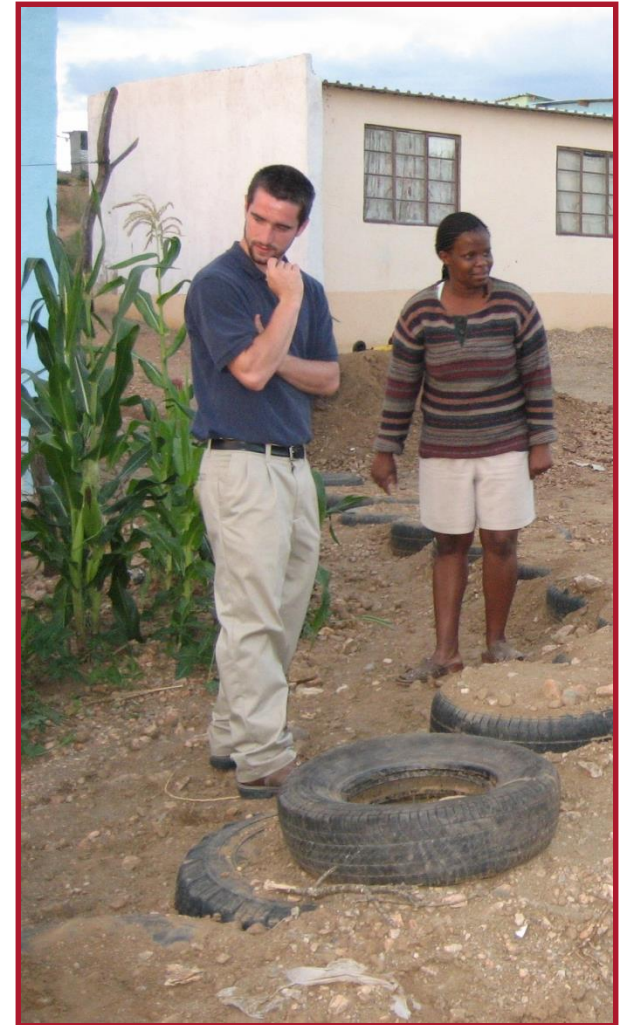
# WPI Alumni Study

- Project-based learning of increasing interest

- Evidence of impacts can drive reform, justify investment, persuade skeptics, and guide implementation

- Study group: 20,000 graduates of WPI's project-based curriculum from 1974 through 2011

- Research questions:
  - *What are the* **long-term impacts** *of the IQP and MQP on the careers and lives of our students?*
  - *What differences in impacts are reported by alumni who completed projects* **off-campus** *from those who did not?*

# Study Overview

- ## Alumni survey
  - Professional and personal impacts of IQP and MQP
  - 39 areas of long-term impact
  - Random sample of alumni (1974 – 2011)
  - 25% response rate (*n=2532*)

- ## Alumni interviews
  - 25 in-depth interviews to explore "how and why" behind long-term impacts

- ## Employer interviews
  - Do project experiences produce different graduates? How and why?

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# Overview of Findings

- Project work conveys *many* positive impacts
  - Wide range of professional abilities and skills
  - Broader world views and personal growth

- Alumni who completed projects off campus reported more positive impact in **33** of **39** areas

"My off-campus experience let me experience a culture and adapt to a different working environment, like not having the internet, and dealing with different people from different cultures. I had to work with students and people sometimes with very different backgrounds when I was in Namibia."

# Impact of Projects on World Views

| Area of Project Impact | %"Much" or "Very Much" | | |
|---|---|---|---|
| | On campus | Off campus | p |
| Ability to view issues from different perspectives | 52 | 60 | <.001 |
| Understanding people of other cultures | 19 | 48 | <.001 |
| Understanding global issues | 24 | 44 | <.001 |
| Respect for other cultures | 17 | 45 | <.001 |

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# Off-Campus Projects:  Personal Impacts

| Area of Impact | % "Much" or "Very Much" | | |
| --- | --- | --- | --- |
| | On campus | Off campus | *p* |
| Development of a stronger personal character | 64 | 72 | <.001 |
| Enriched life in non-academic or work-related ways | 28 | 70 | <.001 |
| Feeling able to "make a difference" | 38 | 47 | <.001 |
| Ability to achieve work/life balance | 27 | 39 | <.001 |
| Feeling connected to the WPI community | 17 | 32 | <.001 |

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# Impact of Projects on Professional Skills

| Area of Impact | *** % "Much" or "Very Much" *** | | |
| --- | --- | --- | --- |
| | On campus | Off campus | p |
| Ability to function effectively on a team | 65 | 75 | <.001 |
| Ability to effectively manage a project | 65 | 73 | <.001 |
| Interact in a professional capacity | 58 | 73 | <.001 |
| Ability to write clearly and effectively | 53 | 63 | <.001 |
| Ability to be an effective leader | 52 | 62 | <.001 |
| Understanding ethical responsibilities | 30 | 44 | <.001 |

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# Alumni Interviews: Gaining Perspective

"The [Cape Town] experience [I had] ... put me back in my place a little bit and taught me ... how big the world really was."

"After I'd lived in the US for four or some odd years, I had a bit of an attitude in terms of, 'I've seen it all myself and there's nothing new in the world for me to learn.' And setting foot in Hong Kong—a city that is so different from anything else I'd seen before—definitely cut me down to size. I think that it was definitely a big learning that I'm still carrying with me that, you know, things are very different somewhere else even if you've seen a lot."

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# Alumni Interviews:  World Views

"**The way it change[d] my view of the world … translates to multiple different areas of my life. You know, I look at … my community as a much smaller piece of a larger world than I used to. I see diversity in a different way. I take things for granted a lot less than I used to.**"

"**Cape Town was … hands-down the most interesting place I've been to… . [It] opened my world up for experiencing more of that. And, just the relationships I developed … we're still really good friends, and I think we really will be for a really long time.**"

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# The Motivational Factor of Authentic Work

"**If you're in school and a professor asks you a question, you'd better give them an answer, even if it's wrong. In the real world, the only answers that matter are the right ones. So that requires a different way of thinking, and you learn that from doing projects with people who actually depend on your answers being right.**"

# Benefits to Women

- Female alumni reported more positive impact in **36/39** areas

- Research shows women are more motivated than men by context, application, and collaboration

"**For the longest time, [I] didn't want to be an engineer because … I thought that … it was just sitting behind a desk doing calculations…These projects really allowed me to see the impacts on society that engineering can have, and it made it fun, it made it interesting and relatable, and it really stimulated my interest in staying with engineering.**

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# Some Other Findings

- "Real world" aspect highly motivational

- Adversity in projects viewed as an asset

- Unpredictability of projects promoted learning, growth, and confidence

- Projects viewed as a "safe environment" to develop professional skills

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# Employer Interviews

In-depth interviews with representatives from:
- Multinational conglomerate corporation
- U.S.-based pipeline and midstream company
- Global diversified technology company
- International technology and service company
- Not-for-profit R&D corporation
- International software company
- Large regional utility company in the U.S.
- One of world's largest insurance organizations
- Highly technical U.S. military program
- Marketing and advertising agency

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# Skills and Abilities Employers Value Most

- Solid base of technical knowledge
- Ability to apply technical knowledge
- Ability to solve problems
- Leadership capability
- Strong communication skills (presentations and interpersonal)
- Ability to be self-directed and self-motivated
- Ability to effectively collaborate with others and work on a team

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# Collaboration and Teamwork Are Especially Important

"It's very rare that you're doing things on your own."

"Everyone works on a team. ... It is crucial that you can work collaboratively."

"At this company, even when you're working independently, you're working in groups."

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# Employer Views on Project-Based Learning

- Project-based curriculum is why WPI graduates are well-prepared for the workplace

- Projects that are substantive, long-term, and authentic have more benefit to students

- Project work is used as a proxy for the skills and abilities they are seeking

- PjBL eases employers' needs for training

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# A New Goal for WPI

"Doing off-campus projects has a huge and positive impact on our students, so I believe we must commit ourselves to make it possible for all undergraduates to have the opportunity to pursue at least one of their projects off-campus."
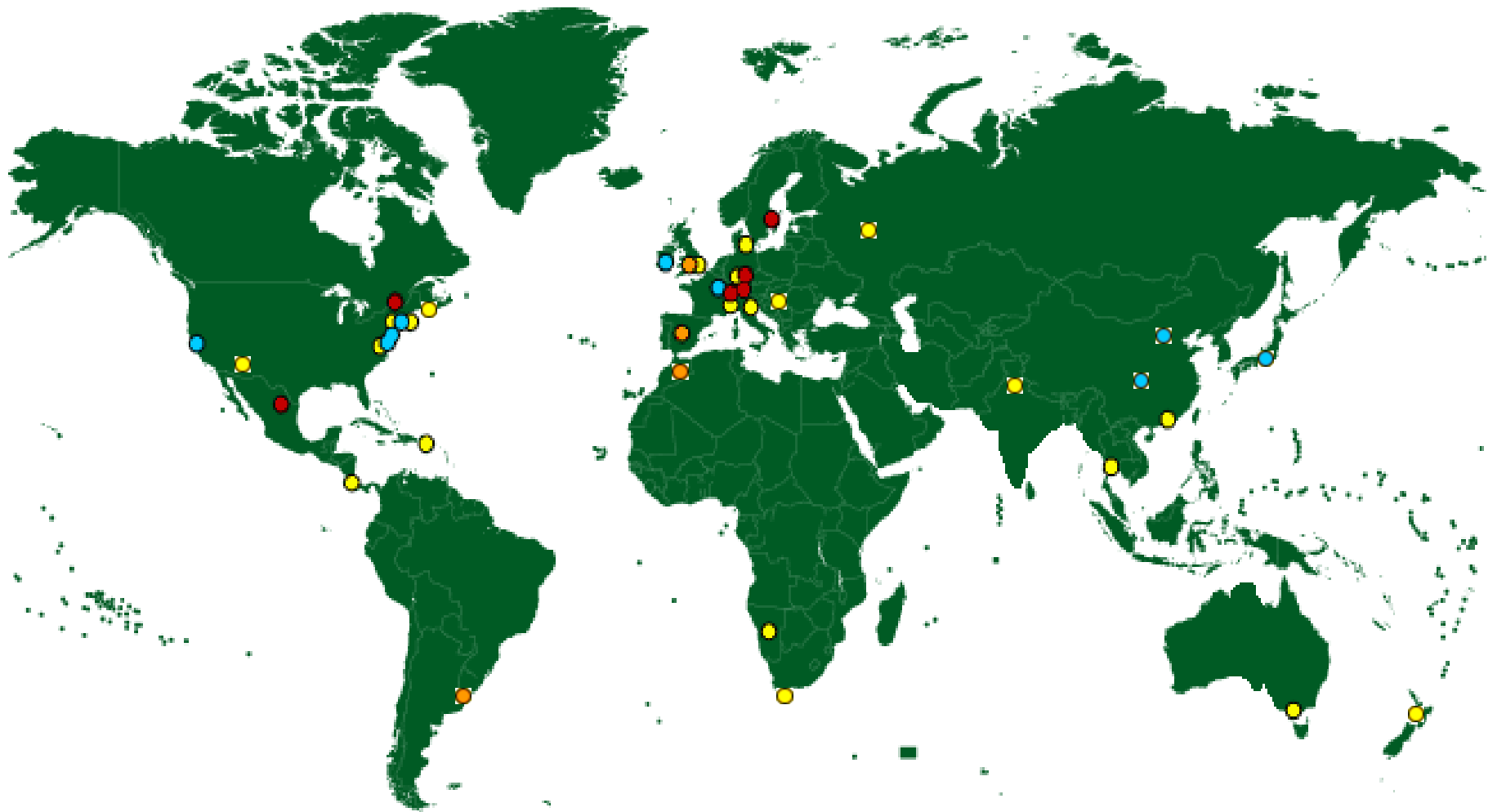
*President Laurie A. Leshin*

*Inaugural address, November 2014*

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# Thanks

# 2015 Institute on Project-Based Learning

- Inaugural offering:  June 25-27, 2015
- Co-sponsored by WPI and AAC&U
- Workshop topics
  - PBL as a first-year and general-education strategy
  - Partnering with external organizations for PBL
  - Team formation, development, and mentoring
  - Integrating PBL into STEM courses
  - Feedback, evaluation, and assessment strategies for PBL
  - Faculty development and institutional change
- For more info, see *wpi.edu/+2015Institute*

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