IUPUI CI-STEP
Central Indiana – STEM Talent Expansion Program

• National Science Foundation, awarded September 2010, $1.99 M

• “STEP seeks to increase the number of students receiving associate or baccalaureate degrees in established or emerging fields within STEM.”

• CI-STEP at IUPUI is creating a central Indiana pipeline to increase the number of students obtaining STEM degrees of all demographic groups who:
  (1) pursue STEM academic and career pathways;
  (2) participate in STEM research, internships, and honors activities;
  (3) graduate with an undergraduate degree in STEM fields; and
  (4) transition into industry, graduate and professional programs.
“... STEP Type 1 activities should be aimed at adapting and implementing best practices that will lead to an increase in the number of students (U.S. citizens or permanent residents) obtaining STEM degrees.”

**Overall Goal:** The program has set a target of increasing the number of STEM graduates at IUPUI by 10% per year -- an additional 782 STEM graduates by 2015, for a total of 3,067 STEM graduates by 2015.
INITIATIVES

**Student-centered Pedagogy**

Genetics K322 is the next required course after the first year introductory courses for all Biology majors. Peer mentoring is utilized in the intro courses but not thereafter, therefore CI-STEP funded a peer mentoring formatted recitation for this course (pictured to the right). Participation among students is high and support from the professors is encouraging.

**Career Services**

The School of Science Career Development Services Center (CDS) was created in 2010 with funding from CI-STEP. The number of students utilizing career services increased over 3 fold since its inception to 2012 and continues to grow. One-on-one advising has increased substantially. In Spring 2012, a survey was administered to students who attended the CDS and revealed the following:

- 17% accepted a position
- 24% attending graduate school
- 19% attending professional school
- 43% of graduates completed an internship

**Articulation w/ 2yr College**

The School of Science has an articulation agreement with Ivy Tech. Accomplishments:

- Increased dialogue among faculty;
- New course and program articulation agreements;
- New transfer student recruitment/support services;
- Increased number of transfer students;
- Increased retention of transfer students in STEM majors

**Student Success**

Recent data indicates that STEM Bridge participants have higher GPAs compared to non-participants and students participating in Summer Residential STEM Bridge have lower DFW rates compared to non-participants.

**Physics Learning Space (PhyLS)** opened in Fall 2012 and is designed to advance student success in introductory physics by providing mentoring to all students taking these courses.

**INITIATIVE**

- Faculty Development workshops
- E-Mentoring in Computer Graphics Technology
- Genetics K322 Peer Recitation*
- CHEM C341 Organic Chemistry Workshop series*
- Calculus Recitation for MATH Courses
- Peer Mentoring in Technology and in Engineering*
- Using Inductive Learning Methodology in MET Course*
- Building Support and Increasing Recruitment of Transfer Students into E&T*
- Development of Career Centers for School of Science
- Summer Industrial Projects Program*
- Residential and Non-Residential STEM Bridge Program
- 2+3 Dual Degree Program with Butler University
- Physics Learning Space*
- Post Enrollment Requirement Checking (PERC)
- Promotion of Math Minor
- Increase retention of Multicultural Students in E&T*
- MATH Course Transfer Agreement
- E&T Program and Course Transfer Agreements
Peer Mentoring

Peer mentoring has been shown to increase student performance, decrease DFW rates, and improve retention.

- Genetics K322 Peer Recitation
  - Required course for all Biology majors
  - Reduction in DFW rate after first 2 semesters
  - Promotes content retention and understanding as well as student satisfaction and confidence

- Calculus Course with Recitation
  - Sections of calculus with recitation sections had 20% lower DFW rates
  - Students with recitation performed 10% points better on departmental final exam

Peer Mentoring in Technology Gateway Courses
Peer Mentoring in Engineering
Assessment
Progress Metrics and Indicators of Success

- Course Enrollment Data
- Retention and Completion Data
- Student Satisfaction
- Performance on Course Final Exams
- Success or Failure (%DFW) Rates
- Student Evaluations
- Student Focus Group Comments
CAREER SERVICES

School of Science Career Development Office

GRADUATION SURVEY OF SCIENCE MAJORS

- Accepted a position: 17%
- Currently searching for a job: 27%
- Attending Graduate School: 24%
- Attending a Professional School: 19%
- Other: 13%

The number of students utilizing career services increased from 95 students in the first year to 327 in 2012

Educational programs include:
- Resume Development
- Class Presentations
- Workshop Series
- Social Media Networking
- Etiquette Lunches

INITIATIVE

- Development of Career Centers for School of Science
- Summer Industrial Projects Program*
CAREER SERVICES

Assessment
Progress Metrics and Indicators of Success:

• Number of Students Utilizing Career Services
• Graduating Student Survey (of Science Majors)
• Number of Students Completing Internships
• Number of Job Postings
• Career Placements or Employment Data
• Number of career-related Student Presentations

INITIATIVE

| Development of Career Centers for School of Science |
| Summer Industrial Projects Program* |
ARTICULATION WITH 2 yr COLLEGE

IUPUI – IVYTech transfer pathway featured in Association of American Colleges and Universities (AACU) article

Response to recent 120 hour legislative mandate and 30-hour common core, faculty from both institutions are revising the articulation agreements to reflect these changes.

To create articulation agreements:
• Faculty from both institutions have met extensively
• Aligned course descriptions, syllabi, exams, and lab projects
• IUPUI faculty sit on IVYTech’s Industrial Advisory Board
• IVYTech faculty sit on IUPUI’s School of Engineering and Technology Assessment Committee

http://www.aacu.org/aacu_news/AACUNews13/September13/feature.cfm
Articulation with 2 yr College

E&T Program and Course Transfer Agreements

Re-aligned program content and learning outcomes for pre-technology/engineering AS degrees

- Increase in enrollment, student retention and credit hours/student/year
- Academic quality of transfer students continues to improve
- IVYTech transfer students make up 24% of IUPUI’s ethnic diversity
Assessment

Progress Metrics and Indicators of Success:

• # of new Course Transfer Agreements signed
• # of Transfers per Year (transfer enrollment trends)
• # of Credit Hours transferred per Year
• # of Transfers (& Minorities) Enrolled in STEM fields
• # of Transfers who complete the first year
• Articulation of transfer credits to degree requirements
• Student Retention (one-year retention rates)
• Track Success of Transfers (from one year to next)
• Track # of Associates Degrees Granted per Year
Physics Learning Space (PhyLS)

Designed to advance student success in introductory physics by providing mentoring to all students taking these courses.

- Physics 218/219 (required by technology majors)
- Physics P201/P202 (biology, chemistry, and pre-professionals)
- Physics 152/251 (engineering, mathematics, CS, and physics majors)
- Physics 100 (survey of physics for general education)
- Physics 200 (elementary education majors)

Total enrollment ~ 1600 students annually
Open 42 hours/week
STUDENT SUCCESS

Assessment

• Progress Metrics and Indicators of Success:
  • Track Usage of PhyLS
    – > 900 visits per semester
    – Average visit length: 1 hour 10 minutes
    – 80% of visitors return multiple times
  • PhyLS Tutor Survey Evaluation Form
    – “The mentor provided me with appropriate, relevant information: 4.5/5
    – “My overall experience with the Tutor-on Duty was positive: 4.3/5
  • Student Focus Groups
  • Physics Courses Enrollment (trend data)
  • Physics Course % DFW rates (trend data)
OVERALL PROJECT ASSESSMENT
(SUMMATIVE EVALUATION)

- Process and Outcomes (Impact) Assessment:
  - Assure that project objectives have been / are being achieved
  - Document detailed impact on student learning and degree completion
  - Provide evidence of program achievements in increasing degree completions in STEM disciplines (at IUPUI)

- Developed a **Logic Model** to facilitate Project Evaluation

- Utilized a **Mixed Methods** Evaluation Approach …
  - Multiple data sources and multiple evaluation measures
  - Employ Process Metrics and **Outcomes** Metrics (for documenting or assessing progress and success of strategic initiatives)
  - Attain balance between **Direct** Measures and **Indirect** Measures

- Project Impact Analysis:
  - Continue data collection and analysis to assess **efficacy** and **impact** of each strategy and overall impact of CI-STEP project (on retention & graduation)
  - Acknowledge challenges / limitations in data collection and analysis
## Overall Project Assessment

### Two-Phase Project Assessment Framework

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<th>Assessing Outcomes (Impact)</th>
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<td>• Qualitative Data Sources</td>
<td>• STEM-related Retention &amp; Persistence Rates</td>
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<td>• Questionnaires</td>
<td>• STEM Degree Completion Rates; Bachelor’s Degree Awarded per Year (by disciplines)</td>
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<td>• Career Placements in STEM disciplines</td>
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OVERALL PROJECT ASSESSMENT

Types of Evaluation Measures

Direct Measures:
- Course-embedded assessments
  - Exams/Tests, Papers, Assignments, Oral Presentations, Group Work, etc.
- Standardized Achievement Tests
- Exit Exams/Common Final Exam
- Project Documents (e.g., mini-grant project proposals, progress/annual reports, etc.)
- Student ePortfolio Assessments

Indirect Measures:
- Pre-Post Knowledge Surveys (Questionnaires)
- Participant Satisfaction Surveys
- Interviews / Focus Groups with project participants
- Faculty/Mentor/Protégé Surveys
- Event Tracking/Usage Data Records
- Course/Event/Session Evaluations
- Extant Data (e.g., enrollment, participation, completion, retention, demographic data, grades, GPAs, %DFW rates, and related data)
- Participant Testimonials/Reflections
OVERALL PROJECT ASSESSMENT

Number of IUPUI STEM Majors Graduating

- Total STEM Grant Goal
- Technology
- Science Engineering
- Mathematics

* Baseline year

(Note: Graduation data for Year 2012 are not official; graph represents the unofficial count for May 2013.)
QUESTIONS

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