Central Indiana STEM Talent Expansion Program (CI-STEP)

Internal Advisory Board Meeting
July 25th, 2012

Kathleen A. Marrs, Associate Dean
Jeffrey A. Watt, Associate Dean
Andy Gavin, Chair, Department of Physics
Charlie Feldman, Associate Professor
Stephen Hundley, Associate Dean
March Judd, Ph.D. student
Mesmer Moor, Planning and Institutional Improvement
Lisa Noller, External Evaluator

The STEM number of students (U.S. citizens or permanent residents) seeking to obtain STEM degrees... cannot be at the expense of degrees in other STEM fields.

NSF STEP

“STEP seeks to increase the number of students (U.S. citizens or permanent residents) receiving associate or baccalaureate degrees in established or emerging fields within STEM.”

“...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.”

“The goal of the project must be to increase the total graduation numbers of such students at the institution.”

“...specific numerical targets.”

“...cannot be at the expense of degrees in other STEM fields.

IUPUI CI-STEP

- 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.”

IUPUI CI-STEP GOALS

Our proposal aims to ‘set the stage’ for student success, removing barriers to learning and promoting a vision of a career in STEM. As a result, we are targeting for each year of the funding, a:

- 50% in the number of new and transfer students admitted to STEM majors,
- 60% in the number of minority students admitted to STEM majors,
- 50% in the DFW rates for MATH, CS, PHYS, TECH and other courses,
- 15 additional students participating in internship and research experiences,
- 50 graduating seniors participating in honors seminars.

Overall: 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 1,907 STEM graduates by 2015.

AGENDA

- Introductions and Agenda Overview (Feldhaus)
- Overview of NSF STEP Grant (Watt)
- New Website (Judd)
- Higher Education Services 2nd year Review of CI-STEP Grant (Marrs)
- CI-STEP Mini-Grants Awarded and Progress Made (Feldhaus, Watt, Hundley, Gavin, Marrs, 20 min)
- Assessment Progress and NSF Report (Mzumara and Ncube, 30 min)
- Outreach, Conference Presentations, Assessment Conference, etc. (Hundley and Marrs, 10 min)
- Questions (15 minutes)
THE TARGETED STEM DEPARTMENTS

<table>
<thead>
<tr>
<th>STEM Program</th>
<th>FIU Direct Admits</th>
<th>FLI Transfers</th>
<th>FIU Total Majors</th>
<th>FIU Minorities</th>
<th>08-09 Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sci – Biol, Chem, Geol, Phys</td>
<td>386</td>
<td>46</td>
<td>885</td>
<td>223</td>
<td>123</td>
</tr>
<tr>
<td>Tech – EE, EM, EE, ME, O, BM</td>
<td>55</td>
<td>108</td>
<td>967</td>
<td>230</td>
<td>184</td>
</tr>
<tr>
<td>Eng – EE, EM, ME, BM</td>
<td>102</td>
<td>93</td>
<td>808</td>
<td>285</td>
<td>110</td>
</tr>
<tr>
<td>Math – MA, CS</td>
<td>48</td>
<td>15</td>
<td>233</td>
<td>42</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>591</td>
<td>260</td>
<td>2,883</td>
<td>780</td>
<td>457</td>
</tr>
</tbody>
</table>

* Includes AA, Hispanic, and Native American students, excludes Asians and females.
* Includes AA, Hispanic, Native American and female students, excludes Asians.

Goal: 10% increase each year from 457 in baseline → 782 STEM graduates

PROFILE OF STUDENTS AND CHALLENGES FACING THE STEM TALENT GAP AT IUPUI

<table>
<thead>
<tr>
<th></th>
<th>IUPUI/SoS</th>
<th>IUPUI SoET</th>
<th>IUPUI Total</th>
<th>IU/BL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours employed</td>
<td>23.8 hr/wk</td>
<td>20.3 hr/wk</td>
<td>25.8 hr/wk</td>
<td>7.2 hr/wk</td>
</tr>
<tr>
<td>% of new students that are FT</td>
<td>83%</td>
<td>53%</td>
<td>69%</td>
<td>98%</td>
</tr>
<tr>
<td>% in top 10% of HS class</td>
<td>43.6%</td>
<td>28.0%</td>
<td>17.9%</td>
<td>31.2%</td>
</tr>
<tr>
<td>1-yr retention rate of FT/FT</td>
<td>79%</td>
<td>75%</td>
<td>68%</td>
<td>90%</td>
</tr>
<tr>
<td>5-yr graduation rate</td>
<td>45.5%</td>
<td>29%</td>
<td>32%</td>
<td>73%</td>
</tr>
<tr>
<td>Undergraduate degrees awarded to total number of undergrads in unit</td>
<td>163 / 1,108 (14.7%)</td>
<td>294 / 1,775 (16.6%)</td>
<td>3,356 / 21,423 (15.7%)</td>
<td>6,352 / 31,626 (20.0%)</td>
</tr>
</tbody>
</table>

In 2008, the IUPUI undergraduate student population was: 46% FT/FT, 23% transfer, 12% returning adults, 9% non-degree, 7% inter-campus transfer, 2% FT/FT international, and 1% all other.

CI-STEP INITIATIVES

4 major categories of initiatives:
- Student Centered Pedagogies
- Career Services
- Student Success
- Articulation with Ivy Tech

For each initiative:
- Major research and education activities.
- Major findings resulting from these activities.
- Opportunities for training, development and mentoring.
- Opportunities for outreach activities.

New CI-STEP Website
http://step.iupui.edu

Higher Education Services: CI-STEP second year review

STEM Faculty Courses
- Transformation grants
- Expansion of PSTL, JITT, Peer Mentoring

Student-Centered Pedagogies
- Student learning
- Peer-led teams
- Student-physician collaboration

Career Services
- New CI-STEP Internship Program
- New School of Science Career Development Services

Articulation with 2 yr. Colleges
- New Mathematics Courses
- Collaboration with Bridges to the Baccalaureate
- Revised Articulation with Department of Engineering and Technology

Student Success
- Honors Seminars
- STEM Mentoring Programs
- STEM Summer Bridge

Articulation
- 2011-2012 Majors in Science/Engineering
- 2011-2012 Transfer students with their majors

7/25/2012
MINI-GRANTS

PROGRESS REPORTING: MINI GRANTS AND OTHER ACTIVITIES

Each mini grant recipient and other STEP funded activities will receive a progress report form to complete at the beginning of the Fall semester.

1. Please list the top 3 objectives of your mini-grant:
2. Please describe in detail, the progress that has been made to date:
3. Please list any preliminary results/conclusions/outcomes to date:
4. Please detail future plans regarding the mini-grant:
5. Please provide any supplemental materials that have been generated as they relate to the mini grants efforts (i.e. pictures, handouts, fliers, website etc.). These can be attached to this document and listed here for accounting purposes.

Suggestions for additional information to gather?
Poster session at external board meeting in December to highlight each projects progress

NSF SITE VISIT RECOMMENDATIONS

- Focus on limited number of activities that will increase total number of BS/BA degrees by end of grant period.
- Focus on just a few pedagogical strategies that are best practices (JIT, PLTL, etc.) and invite faculty to adopt - training can be provided by CTL.
- Increase the number of students in STEM related bridge, increasing the number per section if necessary. Use NSF money to experiment with size of sections - using more student mentors and fewer faculty.
- Limit pipeline activities to IVYTech – this has potential of providing the most total students.
- Use internship money to target students at risk of not completing degree, and opportunity will retain student to graduation (could be difficult sell for employers).

LIST OF MINI-GRANTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Investigators</th>
<th>Goal</th>
</tr>
</thead>
</table>
| Student Video STEM Projects | Ashley Young and Kendra Windham | Goal to develop video library for students learning process to improve performance, retention and motivation |}
| Summer Industrial Projects Program | Robert Grosjean | Develop a rigorous two-year mathematics degree for students interested in technology |}
| Engineering and Technology Alliance for Retention: Metrics and Action | Terri Talley-Weatherman | Improve retention rates in STEM |}
| Transfer: Student Recruitment and Support | Paul Herling | Increase number of students completing STEM degrees |}
| Using the Inductive Learning Methodology to Reduce Student Failure Rates in STEM | Stanley Chinn | Reduce student failure rates in STEM |}
| Focus: Student in Transfer and Computer Engineering | Robert C. Warren | Increase student retention in transfer programs |}
| Improving the Retention of Freshmen Engineering Students through Process Peer Mentoring | Sarah Anwar | Improve retention of first-year engineering students |}
| Promoting STEM Course via Introductory Courses | Sarah Ladd and Brittney Beres | Increase student interest in STEM courses |}
| Enhancing Student Success in Computer Science | Sarah Ladd and Brittney Beres | Increase student success in computer science courses |}
| Concrete Through Pedagogies | Sarah Ladd and Brittney Beres | Increase student success in concrete courses |}
| Creating a Physics Learning Space | Sarah Ladd and Brittney Beres | Increase student interest in physics |}

SITE VISIT RECOMMENDATIONS AND RESPONSE

- Partner with CTL to host workshops for JIT and PLTL.
- Increase the number of students participating in Bridge by funding student mentors instead of faculty.
- Choose our activities with IVYTech wisely for biggest impact on STEM graduation.
- Target “at risk” students for Internship opportunities to increase their chances of achieving graduation.
- Other suggestions?
TARGETED EFFORT FOR NEXT ROUND OF MINI GRANTS

- Identify areas of need that meets the mission of the grant (and our newly focused agenda)
- Hold workshop for invited individuals
- Work with individual(s) to write proposal; including project/activity description, evaluation plan, budget and how the proposal helps meet the mission of the grant

ASSESSMENT PROGRESS

PROJECT EVALUATION

CI STEP Project: Two-Phase Assessment Framework

<table>
<thead>
<tr>
<th>Assessing Processes</th>
<th>Assessing Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative Data Sources</td>
<td>Student Retention &amp; Persistence Rates</td>
</tr>
<tr>
<td>Questionnaires</td>
<td>STEM Graduation Rates (by discipline)</td>
</tr>
<tr>
<td>Interviews</td>
<td>Academic Performance (Scores, Grades, GPA)</td>
</tr>
<tr>
<td>Focus Groups</td>
<td>Self-reported Learning Outcomes</td>
</tr>
<tr>
<td>Program Participation/Completion Rates</td>
<td>Student Satisfaction</td>
</tr>
<tr>
<td>Student Surveys</td>
<td>Faculty/Staff Satisfaction</td>
</tr>
<tr>
<td>Faculty/Staff Surveys</td>
<td>Student Engagement</td>
</tr>
<tr>
<td>Course Evaluation</td>
<td>Student Internships / Research Experience</td>
</tr>
<tr>
<td>Event Tracking</td>
<td>Advanced Studies Pursuit in STEM fields</td>
</tr>
<tr>
<td>Attendance / User Sign-up Sheets</td>
<td>Career or Job Placements in STEM fields</td>
</tr>
</tbody>
</table>

Selected Highlights on Project Assessment/Evaluation Activities

- Compilation of data for the annual STEP Online Survey (www.stepsurvey.com) [see summary data shown in slides #23-24]
- Extraction and compilation of extant data (for supplementary analysis, evaluation, and reporting purposes):
  - Progress metrics: enrollment, retention and completion data; success and failure (% DFW) rates per respective CI-STEP strategies or activities including:
    - CHEM-C341 Organic Chemistry Workshops
    - Calculus II design and use of notations in Analytic Geometry & Calculus classes
  - Outcome metrics: number of degrees awarded annually; graduation rates, etc.
- Demographic data (Covariates): students’ gender, race/ethnicity, academic major, GPA, year or term indicator, etc.

Student Demographics: Bachelor’s Degrees Granted

<table>
<thead>
<tr>
<th>CI-STEP</th>
<th>Table 1: Student demographics: Academic major by gender</th>
</tr>
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<tbody>
<tr>
<td>July 1, 2009 - June 30, 2010</td>
<td>Academic Major Male Female Gender Not Reported Total</td>
</tr>
<tr>
<td>Biological Science</td>
<td>54</td>
</tr>
<tr>
<td>Chemistry</td>
<td>130</td>
</tr>
<tr>
<td>Computer Science</td>
<td>100</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>8</td>
</tr>
<tr>
<td>Geosciences</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics</td>
<td>74</td>
</tr>
<tr>
<td>Physics/Astronomy</td>
<td>2</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>CI-STEP</th>
<th>Table 2: Student demographics: Bachelor’s degrees granted in the respective disciplines</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 1, 2009 - June 30, 2010</td>
<td>Academic Discipline Male Female Gender Not Reported Total</td>
</tr>
<tr>
<td>Biological Science</td>
<td>61</td>
</tr>
<tr>
<td>Chemistry</td>
<td>131</td>
</tr>
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<td>Computer Science</td>
<td>100</td>
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Notes: IUPUI student demographic and degree completion data include both the Indianapolis and Columbus campuses.
**Ongoing Assessment/Evaluation**

Examples of indirect measures to assess effectiveness and impact of respective strategies will be obtained from a variety of data sources including:

- Survey of STEM Living Learning Summer Bridge participants
- Attendance or Sign-in Sheet and Tutoring Evaluation Form for users of the Physics Learning Space (PhyLS)
- Interviews / Focus Groups with CI-STEP project participants
- Review of project documents including CI-STEP annual reports, mini-grant project reports, and other STEP-related materials posted in the STEPcentral.net site (www.stepcentral.net)

**PROGRESS**

**IUPUI Math Minors Awarded per Year**

*2008 was baseline year.*

**TRAJECTORY**

- By achieving a 10% increase per year, the increase in degrees, over 5 years, will result in almost 800 additional STEM degrees during the course of the grant.
- In 2011, the number of STEM graduates was on track to achieve the goal of 10% increase.
- 13 Mini-grants have been granted to date. The targeted awarding of mini grants will aid in the attainment of the grants mission.

**DISCUSSION and QUESTIONS**

Contact:
- Jeff Watt (jwatt@iupui.edu)
- Kathy Marrs (kmarrs@iupui.edu)
- Mariah Judd (juddm@iupui.edu)
- Charlie Feldhaus (feldhaus@iupui.edu)
- Stephen Hundley (hundley@iupui.edu)
- Andy Gavrin (gavrin@iupui.edu)
- Howard Mzumara (mzumara@iupui.edu)
DISCUSSION PROMPTS

• What is preventing us from graduating more STEM students?

• Are we doing enough to see the change that PCAST is calling for (1 million additional STEM graduates over 10 years)?

• What are the benefits of timely graduation?

DISCUSSION PROMPTS

• Are we helping our students reach graduation?

• Are you (and your colleagues) doing all you can to help IUPUI meet their mission of increasing graduation rates and reducing attrition?

• What efforts can you make to help contribute to the call for 1 million additional graduates? Do you have an idea that CI-STEP could help with?

DISCUSSION PROMPTS

• What initiatives can be sustained after grant?

• Creation of a STEM Center, what should it look like?

• Is STEM a priority on campus?

• Can project take some credit for this at IUPUI?

• Are students/faculty/staff aware of funding source?

• Other ways to become even more student centered?

• What do you see as working best, and not working, thus far?