Central Indiana STEM Talent Expansion Program (CI-STEP)

Internal Advisory Board Meeting
July 25th, 2012

Kathleen A. Marrs, Associate Dean[†]
Jeffrey X. Watt, Associate Dean[†]
Andy Gavrin, Chair, Department of of Physics [†]
Charlie Feldhaus, Associate Professor*
Stephen Hundley, Associate Dean *
Mariah Judd, Postdoctoral Fellow [†]
Howard Mzumara, Planning and Institutional Improvement
Lisa Ncube, External Evaluator

[†]Purdue School of Science, IUPUI
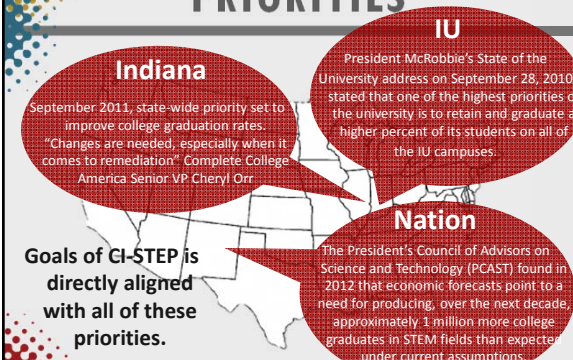*Purdue School of Engineering & Technology, IUPUI

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, Gavrin, 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)

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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."

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PRIORITIES

Indiana
September 2011, state-wide priority set to improve college graduation rates. "Changes are needed, especially when it comes to remediation" Complete College America Senior VP Cheryl Orr

IU
President McRobbie's State of the University address on September 28, 2010 stated that one of the highest priorities of the university is to retain and graduate a higher percent of its students on all of the IU campuses.

Nation
The President's Council of Advisors on Science and Technology (PCAST) found in 2012 that economic forecasts point to a need for producing, over the next decade, approximately 1 million more college graduates in STEM fields than expected under current assumptions.

Goals of CI-STEP is directly aligned with all of these priorities.

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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**."

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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:

- 10% ↑ in the number of new and transfer students admitted to STEM majors,
- 10% ↑ in the number of minority students admitted to STEM majors
- 10% ↓ 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

17 departments in the **School of Science** and **School of Engineering & Technology**

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 **3,067 STEM graduates by 2015**.

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THE TARGETED STEM DEPARTMENTS

STEM Program	F08 Direct Admits	F08 Transfers	F08 Total Majors	F08 Minorities	08-09 Graduates
Sci – Biol, Chem, Geol, Phys	386	46	885	223, 25%*	123
Tech – EE, CM, CP, ME, CI, BM	55	108	967	230, 28%^	184
Engr – EE, ME, CPE, BME, MS	102	91	808	285, 38%^	110
Math – MA, CS	48	15	223	42, 19%*	40
Total	591	260	2,883	780, 29%	457

* Includes AA, Hisp/Latino, and Native American students, excludes Asians and females.
^ Includes AA, Hisp/Latino, Native American and female students, excludes Asians.

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

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

	IUPUI SoS	IUPUI SoET	IUPUI Total	IUBL
Hours employed	23.8 hr/wk	30.3 hr/wk	25.8 hr/wk	7.2 hr/wk
% of new students that are FT	83%	53%	69%	96%
% in top 10% of HS class	43.6%	28.8%	17.9%	31.2%
1-yr retention rate of FT/FT	79%	75%	68%	90%
6-yr graduation rate	45.9%	29%	32%	73%
Undergraduate degrees awarded to total number of undergrads in unit	163 / 1,108 (14.7%)	294 / 1,775 (16.6%)	3,356 / 21,423 (15.7%)	6,352 / 31,626 (20.0%)

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.

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New CI-STEP Website

http://step.iupui.edu

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Higher Education Services: CI-STEP second year review

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CI-STEP INITIATIVES

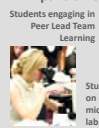4 major categories of initiatives:
- Student Centered Pedagogies
- Career Services
- Student Success
- Articulation with Ivy Tech

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

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- STEM Faculty Courses
- Transformation grants
- Expansion of PLTL, JiTT, Peer Mentoring

Students engaging in Peer Lead Team Learning

Student working on new microscopy lab

Proud student presenters at the 2011 STEM Showcase

Student-Centered Pedagogies

Career Services

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

- Honors Seminars
- STEM Mentoring Programs
- STEM Summer Bridge

2011-2012 Women in Science House (WISH) cohort
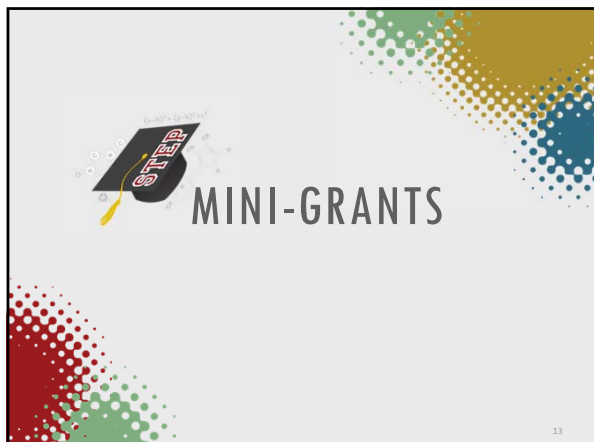
STEM Summer Bridge 2011. IUPUI student mentors with their mentees

Student Success

Articulation with 2 yr. Colleges

Math Professor Jeffrey Watt giving math students one on one attention

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

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MINI-GRANTS

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LIST OF MINI-GRANTS

Title	Investigators	Goal
Student Video STEM Projects	Andres Tovar and Randy Newbrough	Begin to develop video repository for students learning process to improve performance, retention and persistence to degree.
Summer Industrial Projects Program	Robert Durkin	Rekindle Soph/Jr. MET students' desire to become engineers, promote retention and persistence.
Develop a Rigorous Two-Year Mathematics Degree	Janet Dalzell	Have 5 students complete their degree by 2013.
Engineering and Technology Alliance for Retention for Multicultural Students	Patrick Gee	Raise GPAs. Increase minority retention and accelerate time to graduation.
Transfer Student Recruitment and Support	Terri Talbert-Hatch	Teach a learning community at IVYTech. 20 students in June for 1.5 day orientation to increase retention.
Using the Inductive Learning Methodology to Reduce Student Failure Rates in MET	Paul Yearling	Reduce DFW rates in the course Intro to Thermodynamics and Heat Transfer.
From Studio to Student: e-Mentoring in Computer Graphics Technology	Jan Cowan and Dan Baldwin	Attract, retain new and existing students.
Improving the Retention of Freshman Engineering Students through Proactive Peer Mentoring.	Stanley Chien	Increase freshman engineering retention at least 12%
Promoting STEM Course via Introductory Videos	Sohel Anwar	Recruit students.
Enhancing Student Comprehension and Success in Genetics through Recitation	Mariah Judd and Brittiney Reese	Retain students.
Organic Chemistry Workshop Series	Rob Minto, Ryan Denton and Sarah Wilson	
Creating a Physics Learning Space	Andy Gavrin	

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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 grant's 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

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SITE VISIT RECOMMENDATIONS AND RESPONSE

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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 (JiTT, 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).

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RESPONSES TO RECOMMENDATIONS

- Partner with CTL to host workshops for JiTT 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?

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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

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ASSESSMENT PROGRESS

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PROJECT EVALUATION

CI STEP Project: Two-Phase Assessment Framework

Assessing Processes	Assessing Outcomes
❖ Qualitative Data Sources	❖ Student Retention & Persistence Rates
[x] Questionnaires	❖ STEM Graduation Rates (by disciplines)
[x] Interviews	❖ Academic Performance (Scores, Grades, GPAs)
[x] Focus Groups	❖ Self-reported Learning Outcomes
❖ Program Participation/Completion Rates	❖ Student Satisfaction
❖ Student Surveys	❖ Faculty/Mentor Satisfaction
❖ Faculty/Mentor Surveys	❖ Student Engagement
❖ Course Evaluations	❖ Student Internships / Research Experiences
❖ Event Tracking	❖ Advanced Studies Pursued in STEM fields
❖ Attendance / User Sign-up Sheets	❖ Career or Job Placements in STEM fields

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Selected Highlights on Project Assessment/Evaluation Activities

Project assessment/evaluation activities completed or in progress include:

- 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 Re-design and use of recitations 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.

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Student Demographics

CI-STEP

Table 1. Student demographics: Academic major by gender*

STEP Reporting Period	Academic Majors	Male	Female	Gender Not Reported	Total
July 1, 2009 - June 30, 2010	Agricultural Science	0	0	0	0
	Biological Science	188	349	0	537
	Chemistry	116	93	0	209
	Computer Science	560	132	0	692
	Engineering	1181	161	0	1342
	Environmental Science	9	7	0	16
	Geosciences	8	6	0	14
	Mathematics	74	40	0	114
	Physics/Astronomy	24	4	0	28
July 1, 2010 - June 30, 2011	Agricultural Science	1	0	0	1
	Biological Science	221	366	0	587
	Chemistry	120	106	0	226
	Computer Science	555	142	0	697
	Engineering	1247	172	0	1419
	Environmental Science	11	9	0	20
	Geosciences	12	12	0	24
	Mathematics	78	49	0	127
	Physics/Astronomy	30	5	0	35

*Note: IUPUI student demographic and degree completion data include both the Indianapolis and Columbus campuses.

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Student Demographics: Bachelor's Degrees Granted

CI-STEP

Table 2. Student demographics: Bachelor's degrees granted in the respective disciplines*

STEP Reporting Period	Academic Discipline	Male	Female	Gender Not Reported	Total
July 1, 2009 - June 30, 2010	Biological Science	24	64	0	88
	Chemistry	21	16	0	37
	Computer Science	70	21	0	91
	Engineering	190	14	0	204
	Environmental Science	2	2	0	4
	Geosciences	1	3	0	4
	Mathematics	14	8	0	22
	Physics/Astronomy	1	1	0	2
July 1, 2010 - June 30, 2011	Biological Science	45	58	0	103
	Chemistry	20	19	39	78
	Computer Science	91	14	0	105
	Engineering	185	29	0	214
	Environmental Science	1	0	0	1
	Geosciences	2	1	0	3
	Mathematics	12	12	0	24
	Physics/Astronomy	6	1	0	7

*Note: IUPUI student demographic and degree completion data include both the Indianapolis and Columbus campuses.
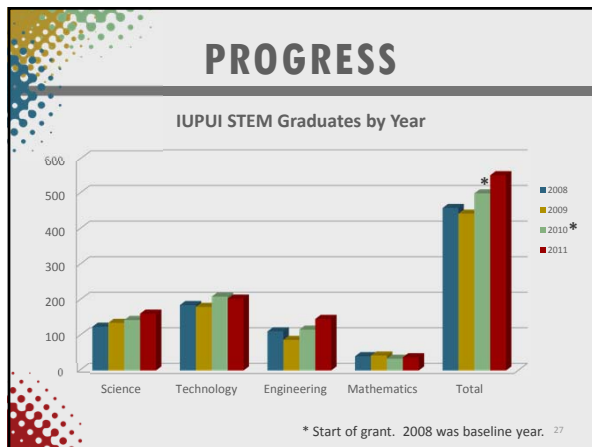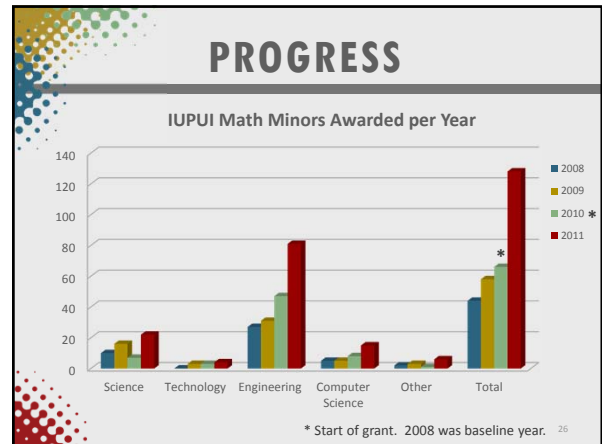
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Ongoing Assessment/Evaluation

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)

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PROGRESS

IUPUI Math Minors Awarded per Year

* Start of grant. 2008 was baseline year. 26

PROGRESS

IUPUI STEM Graduates by Year

* Start of grant. 2008 was baseline year. 27

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.

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OUTREACH, CONFERENCE PRESENTATIONS, ASSESSMENT CONFERENCE

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DISCUSSION and QUESTIONS

step.iupui.edu

Contact:
Jeff Watt jwatt@iupui.edu,
Kathy Marrs kmarrs@iupui.edu,
Mariah Judd juddm@iupui.edu,
Charlie Feldhaus cfeldhau@iupui.edu,
Stephen Hundley shundley@iupui.edu,
Andy Gavrin agavrin@iupui.edu,
Howard Mzumara hmzumara@iupui.edu

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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?

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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?

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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?

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