

Understanding Undergraduate Interventions in STEM: Insights from a National Study



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Quick Overview of the Study



- Following entering cohort of students in 2004
 - Baseline sample: 63,000 aspiring STEM majors across 350 institutions
 - Multiple surveys
 - 2004 Freshman Survey
 - 2005 Your First College Year Survey
 - 2008 College Senior Survey
 - 2011 Post-Baccalaureate Survey
 - Merged with IPEDS, National Student Clearinghouse, Registrar, MCAT, College Board, and Faculty Survey data
 - Qualitative data collection
- Introductory STEM classroom mixed methods study
- Focus groups with STEM graduate students

Undergraduate Interventions and STEM Persistence across Disciplines



	All	Biology	Physical Science & Math	Engineering and CS	Health Professions
Undergraduate research	14.2%***	18.6%***	19.0%***	10.9%*	19.8%**
Internship	NS	NS	NS	11.5%*	-9.5%*
Supplemental instruction	NS	NS	NS	NS	NS
Faculty mentorship	4.7%*	7.6%*	NS	NS	NS

Undergraduate Research and STEM Graduate Enrollment across Disciplines



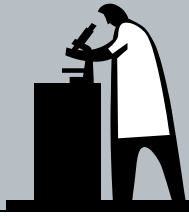
	All	Life Sciences	Physical Sciences and Math	Engineering and Computer Science	Health	Math/ Stat
Structured UG research	7.8%*	6.1%*	14.90%	9.6%*	NS	19.0%*
Faculty research	14.6%* **	9.4%**	13.0%***	21.0%***	15.2%***	8.5%*

Most Effective Components of Undergraduate Research Programs



- Data collected in 2006-2007
- Five site visits
 - 1 HBCU
 - 2 HSIs
 - 2 PWIs
- Interviews with faculty research program directors and student participants

Programmatic Function: Provide Research Experience and Exposure



Introduces students to:

- what science is
- where it can take them
- what the possibilities are for both graduate studies and scientific careers

“You know, it’s providing us with this other way of looking at the sciences...I mean, I think for me, that’s one of the biggest things, the biggest way this research...or this program is supporting my career goals, just like teaching me how to be a scientist and showing me the research to give me an active interest in biology.”

(Male student, HSI)

Programmatic Function: Provide Research Experience and Exposure



Hands on experience

- Building real life, daily experience in labs
- Exposure to practical aspects of research

“We’ve got our hands-on and we get to do it. It’s one thing to read a book, but when you actually get to see how the colors change and how...to form a solid and then you can use something to evaporate and then it was liquid and now it’s solid or a residue, blah, blah, blah, all that stuff, we actually get a chance to do that and **it’s great I get to do that instead of just read about it.**”

(Male student, HBCU)

Programmatic Function: Access to Supplemental Services



Access to Supplemental Services

- GRE workshops
- Seminar speakers
- Funding for conferences
- Summer programs
- Financial support

“A program like this where you get paid and you get to do research is great because it’s like you really need the experience to go to grad school or you need experience to get a job after college, but if you don’t get paid, then you struggle and you have to choose between waiting tables, which will do nothing for you after college, or getting some real experience. So programs like these are really good because I’ve known people who work in labs and don’t get paid and are volunteering, it’s like I could have never done that.”

(Female student, HSI)

Programmatic Function: Access to Social Networks/Support



- Professional and academic networks
- Relationships with:
 - program directors
 - faculty mentors
 - Smaller scale interactions
 - Personal attention

“Another professor that I worked with, she was also very helpful and helped me with my CV and she called one of the schools that I was applying to because she was friends with some of the other professors there.”

(Male student, PWI)

Programmatic Function: Access to Social Networks/Support



- Personal and emotional support
- Sense of community

“I think it’s successful because of the community aspect, a place where those that are in the program feel that they belong to something special and that there’s somebody out there that cares... Students feel that they have some sort of accountability that’s more than just to themselves, that somebody’s out there thinking, ‘Hey, I’m here caring about your success, so you should care about your success as well’.”

(Female Administrator, PWI)

Programmatic Function: Access to Social Networks/Support



Peer networks

- Being surrounded by like-minded peers
- Students felt understood

“[The program] just really helped me to focus on actually doing research and just even get me interested in going to conferences, presenting the research that I’m doing, and also just really getting interested in other people’s research, and so for me, I guess having the opportunity to go out and see that there’s other people that are even my age doing the same is a real big encouragement to me.”

(Male Student, HBCU)

Summary



- Undergraduate research interventions are effective at promoting:
 - STEM retention/persistence
 - STEM graduate enrollment
- Internships may be a more effective intervention for engineering and computer science students
- Key attributes of undergraduate research facilitating student success:
 - Hands-on learning
 - Mentorship and sense of community
 - Financial support
 - Professional development

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