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EDUCATION & RESEARCH

Case Study: Empowering a Research-based Learning Experience

RISE@Drexel builds bridges between Community College of Philadelphia & Drexel University

Summary

Minority students are historically underrepresented in STEM education programs. However, through a collaboration between Drexel University and the Community College of Philadelphia called RISE, minority students got a hands-on research experience alongside engineering experts in topics like environmental engineering and textile engineering, which facilitated knowledge growth in STEM topics and furthered career opportunities. With the help of Knovel and Engineering Village to support their projects, these students ultimately paved the path toward their research, education and career goals.

ELSEVIER

"I could research 'smartly' using Engineering Village, Knovel and ScienceDirect. It would not have been possible to be successful in this extensive research experience without the valuable tools and mentorship that Drexel Libraries provides."

—Kerrianne Parrish, RISE Scholar

Community colleges are a critical component of the American post-secondary education landscape, serving nearly half of all undergraduate students *(https://nces.ed.gov/)*. In the past two decades, community colleges have grown faster in enrollment than any other sector of higher education. Furthermore, the proximity, flexibility and affordability of community colleges makes them accessible to broad segments of the population, engendering a diverse mix of learners who are needed among the ranks of STEM professionals to ensure the nation's capacity for innovation.

Raising Interest in STEM Education

Raising Interest in STEM Education, or RISE (Director: Dr. Antonios Kontsos, Associate Professor of Mechanical Engineering & Mechanics at Drexel University), was a three-year collaborative effort between Drexel University and the Community College of Philadelphia to pair underrepresented minority students with Drexel labs of their choosing to embark on mentored research experiences in a fast-paced 10-week timeframe.† RISE was structured to produce a collaborative ecosystem within the university, based on the premise that STEM teaching and learning can be most effective if paired with an actual research experience (e.g. research-based learning).

In this context, students were free to affiliate with any STEM research group on campus, based on their personal interests. Students' research interests included clean energy systems, infrastructure monitoring, advanced manufacturing, environmental science and engineering, robotics and space exploration.

In just 10 weeks from start to finish, having no more than an introductory background in science, engineering and math subjects, the students had to work alongside faculty, graduate students and a librarian to produce a final oral presentation, a poster and the equivalent of a conference article.

Program Timeline

Week 1: Lab Selection	Week 2-3: Critical Review of Literature	Week 4: Proposal	Week 5-9: Independent Research	Week 10: Final Colloquium
Students find and select research groups from across the university	Students select a research topic and review literature to establish the state-of-the-art	Proposal before an independent committee and open audiece	 Guest Speakers	
			 Industry R&D Tour	 Written report Presentation Poster

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Engineering Village provides a searchable index of the most comprehensive engineering literature and patent information available. It gives access to peer-reviewed, deeply indexed, relevant and accurate engineering research content.

The students' challenge from day one was to engage with source literature to familiarize with their topics and pinpoint the current state of knowledge in their chosen topics. This required the students to harness Knovel and Engineering Village to formulate research proposals, to be presented in front of a faculty panel and public audience, by week 4 of the program.

Both solutions are widely used in academia as well as government and corporate settings, and can be personalized to the preferences of individual users. Over the 10-week program, the students became power users of both platforms for agile information search to quickly learn new fields and accomplish their research goals.

"Sage-on-stage" is out, "guide alongside" is in.

Jay Bhatt, Liaison Librarian for Engineering at Drexel University Libraries, has been an integral mentoring partner in the RISE program. Librarians can adopt new mentoring roles to guide learners through the transition from student to professional. Internationally renowned for his spin on embedded librarianship, Jay was recently named Special Librarian Association's 2017 Engineering Librarian of the Year. Jay embedded in the RISE@Drexel program from its outset, kicking off the program each year with a hands-on workshop in which students experienced Knovel and Engineering Village for the first time, in addition to other digital and physical resources from the university library.

The students provided their own comments on the value of the university library as a portal to knowledge streams. RISE Scholar Kerrianne Parrish (RISE@Drexel 2016) worked with Dr. Charles Haas in Drexel's Civil, Architectural and Environmental Engineering (CAEE) department to assess potential public health risks stemming from the use of harvested rainwater in Philadelphia communities.

"Since I was completely new to this kind of research, it was fundamental for me to build a foundation in recent studies concerning roof-harvested rainwater systems, the uses of rainwater and the possibility of contaminants," Parrish said.

"Harnessing Drexel's resources, I could research 'smartly' using Engineering Village, Knovel and ScienceDirect. It would not have been possible to be successful in this extensive research experience without the valuable tools and mentorship that Drexel Libraries provides."

“Knovel has an excellent material property search tool, which I was able to use to incorporate in my finite element simulations.”

—Marcus Spruill, a RISE scholar

RISE scholar Caroline Houlihan worked alongside Dr. Franco Montalto to understand tree performance and infrastructure damage during Hurricane Sandy. On the value of the library, she commented, “Drexel University Libraries grants its students access to an intense array of databases abundant with peer-reviewed articles. Gone are the days [when] I ponder the legitimacy of a blog article claiming some new finding, as I now understand that it is possible to find and read the actual study it comes from. This is my new favorite type of reading.”

Marcus Spruill, a RISE scholar whose work focused on simulating thermal performance of functional fabrics, stated, “Knovel and Engineering Village helped my research through their robust search features. Engineering Village made it easier to find source literature I needed for my project. It also supplied metadata that’s useful to find related research material, such as comparing relevant ASTM and ISO standards. Knovel has an excellent material property search tool, which I was able to use to incorporate in my finite element simulations.”

RISE scholar Joseph Kennedy, who focused on improving healthcare informatics in rural Uganda, agreed. “The importance of scientific publishing cannot be overstated. Accessing the published material to conduct that research is tantamount in being successful in understanding why we are doing this and how significant it is.”

“The mentorship I received from Drexel RISE and library staff was the first step in that process. Engineering Village and Knovel are some of the most valuable tools I had at my disposal. Scientific research wasn’t something any of us were familiar with. But we had to first do just that, research. RISE pushed us to identify the state-of-the-art in our fields and go beyond.”

Success Beyond the Program

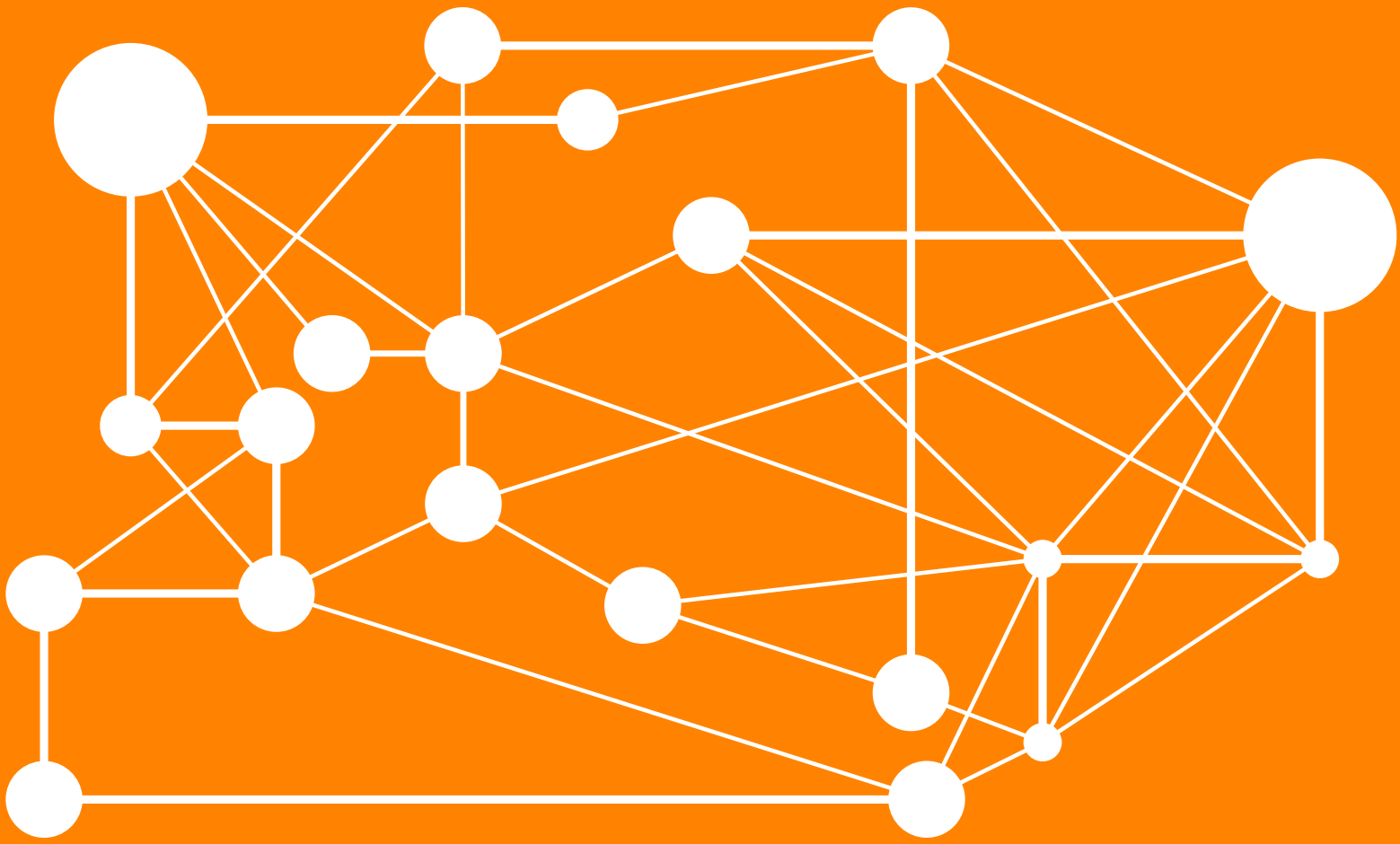
In parallel to their research, the students integrated within the ecosystem of the university through participation in seminars, visiting classes and networking with graduate students, faculty, staff and industry professionals in Fortune 500 innovation-driven companies. After completing the program, the students proceeded to earn prestigious Department of Energy Community College Internships, NSF Research Experiences for Undergraduates (NSF-REUs) experiences, and enroll in four-year engineering degree programs. Several former RISE students are now employed in engineering firms.

†Raising Interest in STEM Education:
A Community College-University Partnership to Impart STEM Research Skills. Daniel Christe, Brian Wisner, Jay Bhatt, and Antonios Kontsos. American Society for Engineering Education Mid-Atlantic Section Conference, October 21-22, Hofstra University, Hofstra, NY.

†Raising Interest in STEM Education:
A Research-based Community College-University Partnership for Improving Minority Participation. Daniel Christe, Brian Wisner, Jay Bhatt, and Antonios Kontsos. Minorities in Engineering Division, American Society for Engineering Education (ASEE) Annual Meeting & Exposition, New Orleans, LA. June 26-29, 2016.

†Raising Interest in STEM Education:
A Partnership for Underrepresented Minority Improvement in STEM. Daniel Christe, Arpit Shah, Jay Bhatt, Marisol Rodriguez-Mergenthal, Linda Powell and Antonios Kontsos. Minorities in Engineering Division, American Society for Engineering Education (ASEE) Annual Meeting & Exposition, Seattle, WA. June 14-17, 2015.

†Funding statement:
RISE@Drexel was a United States Department of Education-funded program (June 2014-September 2016), in the framework of the Minority Science & Engineering Improvement Program (MSEIP). Drexel was a sub-contractor to Community College of Philadelphia tasked with providing the summer research experience and organizing an annual career panel discussion and faculty-staff roundtable discussion.



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