

Study of summer research quantifies what students see as most beneficial

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Leadership Alliance director Medeva Ghee presided at the national symposium of the organization that serves hundreds of students from backgrounds underrepresented in academic research. Credit: Hank Randall

It's not unusual for college students who do research over the summer to

say it was time well spent, but a new study provides something rarer: hard data on exactly what components and experiences in a national program oriented toward underrepresented students proved valuable and in what ways.

The study involved 450 participants in the Summer Research Early Identification Program of The Leadership Alliance. The alliance is a national partnership among universities and the private sector that provides training and mentorship in research across all academic disciplines for students from underrepresented backgrounds. The new study in the journal *CBE-Life Sciences Education* focused on science, technology, engineering and mathematics undergraduates who engaged in summer research through the program between 2013 and 2015.

"We receive wonderful emails from students who talk about the impact of their experiences," said study lead author Medeva Ghee, assistant professor of the practice in the Brown University School of Public Health and executive director of the Leadership Alliance, which is housed at Brown. "But I think what's critical is to understand exactly what are those key program components—what about the experience is beneficial in helping students to develop their scientific identity and to clarify their career path."

To do that, the Leadership Alliance required data, so they gave detailed surveys to the students both in their first week of the 8- to 10-week summer research program and again in their last week. The surveys asked not only how students' research skills and professional perspectives may have changed, but also how they spent their time in the program and about experiences they had with faculty, postdoctoral and graduate student mentors.

Specific program insights

Analysis of the data revealed several key insights about what moves the needle for students in their sense of self-efficacy in doing research, their understanding and interest in the research process and careers, and about the role that mentors play.

In the aggregate, for example, students left the program feeling at least somewhat more confident on every one of the 16 research skills the surveys covered. But some leaps were significantly greater than others. From relatively low initial rates, the proportion of students reporting confidence in skills such as mining data or using statistics software essentially doubled. But students reported relatively high initial confidence in understanding research overall and in ethical issues of research, so the increases in those areas were less dramatic.

Over their summers, students also made significant gains—to greater than 90 percent—in the proportion who professed understanding of the graduate school application process and graduate school life. They also, the results showed, expanded their horizons about career possibilities in their field. But their career intentions either inside or outside of academia, already fairly high, barely budged.

Through the data, students revealed clear distinctions about what kinds of interactions with mentors meant the most. Students who reported that mentors showed interest in their research and supported their ideas were significantly more likely to report satisfaction with their mentors than students for whom mentors demonstrated knowledge and expertise in their field, or provided constructive feedback on their academic career development.

Another set of key findings arose from correlating the amount of time spent in different summer research activities with changes in impact measures such as research skill confidence and understanding of graduate school and career pathways. For example, students that spent

more time preparing for their research—reading prior studies, engaging in lab group discussions, framing research questions and goals—gained significantly in every impact measure, while time spent doing laboratory work didn't show significant influence on any of them.

Mentor quality, meanwhile, proved to be highly powerful almost across the board.

Ghee said many of the results suggest that students most highly value the chance to engage in the big picture of research. They want to be involved in understanding and planning research, not merely carrying out its mechanics.

"It's that process of the mentor letting them know they do have great ideas to contribute," Ghee said. "They are not just a bystander in the research project. They are actively engaged in asking the research questions and thinking about the different problems they want to solve."

A surprising finding, Ghee said, was that the demographics and backgrounds of students and which kind of college they attend seemed to matter little to how well they responded to the program. The preparation received by students through the Leadership Alliance uniformly benefits their skill development and aspirations for continued training in STEM disciplines, she said.

From insight to impact

Standing beside her poster at Brown's Summer Research Symposium on Aug. 4, Xavier University student Micah Holness said she was glad overall to have spent the summer working at Brown in the lab of Joo-Hyun Song, assistant professor of cognitive, linguistic and psychological sciences. She studied how different visual distractions can make people deviate as they reach for targets.

Holness, who is interested in clinical psychology but also neuroscience, said she's not necessarily more sold on the idea of pursuing research but she does appreciate it more, and the experience helped her clarify what she enjoyed and what she didn't. She loved reading about and discussing relevant research and doing her own writing, too.

"I actually enjoyed writing my research proposal," she said.

Holness still has plenty of time to make her career decisions. She is one of the participants in a new program called First Year Research Experience that the Leadership Alliance implemented in part because of data in the new study, which found that the vast majority of participating students were entering their junior and senior years, when they may benefit less from the program than newer students.

Ghee said the data also figure integrally in how the alliance now engages faculty mentors.

"What the students are telling us is helping us to share effective mentoring approaches with faculty," she said. "We are going to use this data to inform these conversations."

It's all in the name of optimizing the effect that summer research can have in giving students exposure to and guidance in the world of academic research so that they can consider graduate school and research careers.

"It's exciting to see that process," Ghee said. "It's rewarding to see that transformation of [students](#) from the budding scholars when they come here in their first week to the confident researchers who present and discuss their [research](#) as experts."

In addition to Ghee, the paper's other authors are Micere Keels, Deborah

Collins, Cynthia Neal-Spence and Earnestine Baker.

Provided by Brown University

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