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Opinion

Inclusion of Underrepresented Entrepreneurial-minded Postdocs in High-tech Startups Increases U.S. Competitiveness

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Abstract

Studies have shown that in the U.S., Black, Hispanic, and women entrepreneurs are given a tiny fraction of venture capital funding, which is vastly disproportionate to their representation in the population. This investment discrepancy is not only socially unjust, but it also deprives the U.S. of the advantages in innovation and global competitiveness that could stem from increasing the participation of these groups in innovative sectors. This is particularly true within transdisciplinary startups, including those focused on smart energy, biomedical, and nanomedical technologies, all of which require cross-disciplinary experts. Every new enterprise in these fields experiences challenges in finding adequate support. These challenges exist at a time in the 21st century when U.S. innovation is facing unprecedented pressures in competition for primacy. In 1960, U.S. R&D expenditure for defense and private industries was approximately 69 percent of global spending on R&D [1]; whereas in 2016, the U.S. share of global R&D expenditure had decreased to just 28 percent [2], due to China's substantial advances in R&D. If this trend continues, both China's GDP and R&D expenditure measured by GDP will outperform those of the U.S. by 2030 [3].

To ensure that the U.S. remains a world leader in R&D, the National Science Foundation (NSF) launched the Innovative Postdoctoral Entrepreneurial Research Fellowship (I-PERF) program. I-PERF facilitates the professional development of Black, Hispanic and female research fellows, who are typically underrepresented within STEM fields, by offering them invaluable experience within research and technology companies. The program's goal is to enhance diversity in the startup and entrepreneurial landscapes, improve opportunities for researchers from underserved groups, and increase the number of highly competent entrepreneurs within the U.S. STEM community. The startup companies involved in the program, which are also supported by the NSF, comprise a variety of new, mixed STEM fields that were unknown just a few decades ago.

Business Funding Inequities

Women and people from underserved minority groups often face many hurdles when they attempt to secure business funding in comparison to white men. The U.S. Small Business Administration (SBA) awards over 5,000 grants to entrepreneurs every year, amounting to a total investment of more than $3.5 billion [4]. The SBA's 2013 Annual Report – the latest known report – revealed that only 15 percent of this funding was awarded to businesses owned by people from underserved minority groups [5], even though these groups comprise approximately one-third of the U.S. population. Similar observations have also been made in the venture capital market. For example, the nonprofit collaboration Diversity VC released a report [6] in 2019 outlining the findings of a study that had surveyed 10,000 founders of startup companies. The study found that only 1 percent of venture fund recipients were African American and 9 percent were women of all ethnicities. Meanwhile, 77 percent were White. Therefore, initiatives that support the professional development and business endeavors of individuals from underserved groups are critically important. Such initiatives would ensure that the talents of bright individuals are recognized, and not wasted.

Solving the Problem on the Horizon

Over the past decade, the NSF has introduced and funded several initiatives to support startups and businesses founded by

underserved minorities, such as the Small Business Postdoctoral Research Diversity Fellowship (SBPRDF) program [7], which was launched in 2010.

To support the professional development of postdoctoral fellows in STEM fields, the SBPRDF program allowed these researchers to acquire experience and apply their skills in entrepreneurial environments within technology companies. The American Society for Engineering Education (ASEE) managed the program [8] and had so far placed 79 postdoctoral fellows in companies for two-year placements, 40 percent of whom were women and/or individuals from underserved minority groups. A large majority of the participants reported that the program had been greatly beneficial for their career development. This positive feedback inspired the NSF to introduce a replacement of the SBPRDF program called I-PERF [9]. Created in 2019 and also managed by ASEE, I-PERF's primary mission is to support research fellows from underrepresented minority groups in their professional development.

Valuable Opportunities for Underserved Minorities

As an extension of the SBPRDF project, the I-PERF program offers placements to postdoctoral fellows within startup companies, specifically focusing on women and individuals from underserved minority groups. These groups include Hispanic Americans, African Americans, American Indians, and Hawaiian/Pacific Islanders. Among many other things, I-PERF aims to improve the mentoring and on-the-job training that research fellows receive. Additionally, it attempts to overcome some of the barriers that often prevent underserved minorities from accessing business funding for their own startups. Through I-PERF, ASEE recruits, mentors and trains talented research fellows from underserved groups and offers them placements within a promising research and technology companies. The goals are to enhance diversity in the U.S. entrepreneurial landscape, improve opportunities for researchers from underserved groups, and increase the number of highly competent entrepreneurs within the U.S. STEM community. The companies participating in the program need to be approved by the NSF and must have been awarded SBIR Phase-II/IIB/TECP grants, which are aimed at supporting small businesses. Furthermore, when recruiting postdoctoral fellows to the I-PERF program, ASEE considers several different factors. Eligible applicants must have earned a doctorate in a STEM field from a recognized institution less than 7 years prior to submitting their application. They must also be a U.S. citizen or a permanent resident.

When pre-selecting candidates, ASEE specifically targets researchers who are socioeconomically disadvantaged, are from an underserved minority group, or have a disability. They also give preference to first-generation college graduates and U.S. Army veterans. In addition, they prioritize startup companies or projects that are located in socioeconomically disadvantaged areas, as defined by the Established Program to Stimulate Competitive Research (EPSCoR) [10]. During their placement within a host company, all postdoctoral fellows earn a competitive salary, in addition to other benefits, including a relocation allowance and health insurance. They also avail of valuable business and entrepreneurship training to kickstart their careers. In many cases, assigning a postdoctoral fellow to a company can be challenging, due to the often-multidisciplinary nature of the host company's research. This is especially true in bioscience startups that focus on medical materials connected with marketing, as there are not many university courses that offer such diverse content. Out of approximately 300 SBIR/STTR-supported companies, nearly 25 percent are from biomedical, bioscience, or nanotechnology areas. In addition to the company's research field, ASEE attempts to identify the most suitable research fellow for a given placement based on the individual's academic background, skills, and career goals. Each placement allows the postdoctoral researcher, who may have little or no professional experience, to apply their skills and theoretical knowledge in an entrepreneurial setting. The aim is to provide the postdoctoral researcher with invaluable experience that will aid their career development. Upon completing the placement, some participants may be offered a permanent position within the host company. Alternatively, they might be inspired to establish their own business, by leveraging their experience and skills they developed during their placement.

I-PERF's intake process consists of four stages: registration, matching, adjudication, and the award stage. Both postdoctoral fellows and companies register for the program during the registration stage. Then, the ASEE team debates about potential matches between applicants and companies during the matching stage. During adjudication, ASEE reviews all applications and conducts any necessary background checks on the applicants. Lastly, in the award stage, companies and applicants are notified about whether they were chosen to partake in the I-PERF program.

Aside from recruiting, mentoring and training postdoctoral researchers, I-PERF also takes several measures towards addressing common hurdles that individuals from underserved groups encounter when attempting to attain venture capital funding. For example, I-PERF offers training modules to help participants avail of funding opportunities. One relevant opportunity comes from U.S. government agencies that reserve 3 percent of venture capital funds for small businesses [11] founded and owned by people from underrepresented minority groups. The program also invites investors and other experts to give presentations on venture capital funding. These presentations also provide valuable networking

opportunities for the postdoctoral researchers, potentially allowing them to present their business ideas to investors.

Initial Outcomes

The vast majority of postdoctoral fellows and companies that have taken part in the program have been very satisfied with the outcomes. Specifically, about 95 percent of the participating fellows and host companies reported that they found the program to be mutually beneficial. Tim Boire, CEO of VenoStent Inc., a company that develops a perivascular wrap that aims to reduce collapse of the vein at critical places by providing durable, flexible, custom-fit mechanical support, says that the fellow who was assigned to their company had been an immensely valuable asset. "She has been proactive in modifying relevant materials for perivascular wrap-models and has quickly become a very thoughtful and reliable member of the VenoStent team," he says. "We are extremely grateful that we have found such a fantastic match." Postdoctoral fellow Sana Syed was also highly praised by her host company, Haima Therapeutics LLC, which develops bio-inspired therapies that reduce bleeding in traumatic injury, surgery and other situations. "She was easily able to start contributing to the physical and functional characterization of our nanoparticle-based synthetic hemostatic technology, developing critical assays for regulatory approval," says Michael Bruckman, CEO of Haima Therapeutics. "Her energy, character, and work ethic have improved the culture of Haima beyond expectations."

During the COVID-19 pandemic, researchers participating in the program attended online webinars focusing on various themes associated with entrepreneurship. Some of these webinars focused specifically on the I-PERF program, while others discussed various important aspects of becoming an entrepreneur and starting a business.

I-PERF is a valuable model demonstrating how researchers from underserved groups can be supported in their career development. In the near future, the success of this program could inspire other organizations and institutions to develop their own initiatives that support the professional development of researchers of all ethnicities, genders, and cultural backgrounds. The resulting increase in entrepreneurial-minded researchers from diverse backgrounds will fuel innovation in STEM fields, leading to new therapies and technologies that improve the wellbeing of people worldwide.

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