

NEW INVENTORS AND NEW IDEAS: DIVERSITY IN INVENTION AND PATENTING

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INTRODUCTION

At age 17, Alissa Chavez became the youngest known Latina patent holder in the United States. Her invention, Hot Seat, is an alarm system intended to prevent a parent from accidentally leaving a child in a hot car. Chavez introduced the idea for Hot Seat at her eighth-grade science fair. She advanced to the semi-finals and caught the attention of a patent attorney who encouraged her to file for a patent. Chavez has sold hundreds of Hot Seats and continues to invent new products to help families, including the EasyFlo baby bottle, which allows caregivers to transport and mix formula and water on the go, all in a single container.

At age 19, Jessica Matthews invented SOCKET — a soccer ball that can harness energy and power lamps — after experiencing a power outage during a family wedding in Nigeria. Today, Matthews has four U.S. patents for technology that can be installed in any device that can harness kinetic energy, and her company Uncharted is working to revolutionize energy infrastructure. Matthews's latest invention is a "smart city" sidewalk paver system that can transmit energy underfoot as a replacement for wire cables and detect infrastructure maintenance issues, such as a weakened water line.

Inventors from historically under-represented groups brought us the dishwasher, the Super Soaker, home security systems, GPS, and cruise control. These inventions and countless others would not have been created without the unique experiences and perspectives of the inventors who conceived them. Just imagine the possibilities if everyone had

the opportunity to invent and patent.

That's why we created Invent Together — an alliance of organizations, universities, companies, and other stakeholders dedicated to understanding the diversity gaps in invention and patenting and supporting public policy and private initiatives to close them. Invent Together has sponsored research on the inventor diversity gaps; promoted public awareness of the gaps and ways to close them; supported the development and implementation of best practices to promote inventor diversity at companies and universities; and advocated for public policies designed to increase the participation of groups under-represented in invention and patenting.

In 2022, Invent Together launched The Inventor's Patent Academy (TIPA) — a free online patent education tool. TIPA was created to help individuals understand intellectual property (IP) and prepare them to apply for their own patents. It explores challenges inventors might face along the way and provides practical advice for overcoming those challenges. The course is unique because it was designed specifically for historically under-represented inventors and features videos of inventors from historically under-represented groups sharing their invention and patenting stories. Invent Together is pleased to present this course in collaboration with our partner Qualcomm, one of America's most innovative research and development companies with more than 140,000 granted and pending patents across more than 100 countries and jurisdictions. You can learn more about Invent Together and TIPA by visiting <https://inventtogether.org/>.

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Like *Invent Together*, the authors featured in this special issue are invested in building a future complete with new inventors, new ideas, and new technologies. The authors and articles in this issue represent a wide variety of perspectives and disciplines, and each makes a distinct contribution to the literature. As the articles in this issue demonstrate, stakeholders across the innovation ecosystem have unique and important roles to play in ensuring we take full advantage of all the talent and ingenuity our nation has to offer.

OVERVIEW OF THE ARTICLES

The first two articles in this issue of *Technology & Innovation* offer insights on expanding participation in academic innovation. Academic innovation and subsequent technology transfer from universities to the commercial sector have added billions of dollars to the U.S. economy, supported hundreds of thousands of jobs, and resulted in new products and services that change lives. Expanding participation in academic innovation and technology transfer will only amplify these benefits to society. In “Engaging More Women in Academic Innovation: Findings and Recommendations,” a group of highly experienced technology transfer professionals — Jane Muir, Megan Aanstoos, Tamsen Barrett, Almesha Campbell, Forough Ghahramani, Jennifer Gottwald, Kirsten Leute, Nichole Mercier, and Jennifer Shockro — share findings from a first-of-its-kind survey of women involved in academic innovation. Their article provides new quantitative and qualitative evidence on the experiences of women in technology transfer to inform technology transfer offices and professionals how best to work with and support academic women. In their article “Applying a ‘Mentor-Protégé’ Approach to Broadening Participation of HBCUs in the National Innovation Network,” Thaddeus McEwen, Jessica Fields, Caesar R. Jackson, Jill Keith, Cira Cardaci, Nhi Tran, and John A. Blaho discuss an avenue for broadening participation in innovation at Historically Black Colleges and Universities (HBCUs). The authors describe a novel partnership between a National Science Foundation (NSF) Innovation Corps (better known as I-Corps) Hub and a coalition of three North Carolina HBCUs that uses a mentor-protégé model to support project leaders at individual HBCUs and thus expand HBCU

innovation capacity. Both of these articles represent important contributions to the literature on best practices for expanding participation in academic innovation.

The next four articles address the role of education in broadening participation in innovation. Narrowing in on the intersectional and compounding challenges faced by Latinas, Cristina Saenz and Audra Skukauskaitė argue that one of the most effective ways to engage Latina students in inventing is to embed invention education within the school day. Dustin Britton, Sara Thermer, James A. Perez, and Jin Kim Montclare examine the gendered impact of the COVID-19 pandemic and the shift to e-learning for the Pre-Capstone Innovation Experience course at New York University. April Burrage, Janell Ciemiecki, Stephanie Couch, and Ina Ganguli draw insights from eight years of information reported by more than 2,000 college and university students who applied to participate in a national prize competition — a type of informal education and a pathway to invention. And Christine Nunziata, Mahya Beheshti, Ryan Branski, Steven Kuyan, Kurt Becker, and John-Ross Rizzo make the case for transdisciplinary, bidirectional graduate programs in engineering and clinical medicine to foster clinicians’ innovation potential and advance commercially viable biomedical innovation. These articles add to the growing body of literature demonstrating that different levels of education — from elementary to graduate school — and different types of education — by subject or setting — can play an important role in broadening participation in innovation.

The next two articles offer perspectives on the potential of specific groups of under-represented inventors. Jonathan Duvall, Sivashankar Sivakanthan, Brandon Daveler, S. Andrea Sundaram, and Rory A. Cooper explore the contributions of inventors with disabilities in “Inventors with Disabilities — An Opportunity for Innovation, Inclusion, and Economic Development.” Their research demonstrates the untapped potential of under-represented inventors, such as those with disabilities, as well as the need for more data and research on the demographics of inventors. In “Whitey on the Moon: Racism’s Maintenance of Inequity in Invention & Innovation,” James Holly Jr. and Yolanda L. Comedy challenge

white conceptions of invention and innovation and provide insights on the Black experience of invention and innovation. In a critique of the recent attention on diversity in invention and innovation, Holly and Comedy also urge stakeholders in the innovation ecosystem to consider and address the role of racial inequities outside the ecosystem (e.g., health, housing, employment, and violence) on the racial inequities within the ecosystem.

The final three articles concern efforts by the U.S. government to promote inclusive innovation. In “Comparative Economic Outcomes from SBIR Funding: ‘Underserved’ versus High-award States,” Michael P. Wallner, Jeff Peterson, Will Swearingen, Michelle Zook, Cara Jorgensen, and Robin Gaster analyze whether firms in states with higher or lower rates of federal innovation funding — specifically recipients of federal Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards and participants in the NSF’s Established Program to Stimulate Competitive Research, or EPSCoR — are more effective at commercializing technology funded by SBIR/STTR awards and find that firms in underserved states outperform firms in high-award states on a host of measures. These results support the assertion that SBIR/STTR awards are an effective way to spur innovation and economic progress in historically underserved areas. In the next article, along with our colleague Eric Chung, we present public policy recommendations to increase equity, inclusion, and diversity in inventing and patenting. Our recommendations for the U.S. government include improving data collection and research to measure and advance equity in patenting; supporting historically under-represented inventors by providing education, legal, and technical assistance and promoting workplace equity; and spotlighting historically under-represented inventors and promoting diversity among patent counsel and patent examiners. The final article describes the U.S. Patent & Trademark Office’s (USPTO) Women’s Entrepreneurship (WE) initiative and includes the remarks of USPTO Director Kathi Vidal from the November 19, 2022, WE launch event. Vidal discusses the importance of lifting up women entrepreneurs and announces that the USPTO has launched a new online resource to help women

entrepreneurs access resources related to protecting IP, securing funding, and building networks.

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