

A magazine for mathematics
and science educators

TERC

SPRING 2023



8 WE ARE TERC:
advancing
STEM education
while creating
equitable
opportunities
for all learners

CONTENTS



01

TERC Staff Feature
Brian Drayton

04

Exploring STEM Education and Professional Growth Through Mentorship

Reflections from Three TERC Scholars



08

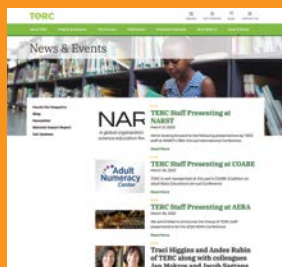
We Are TERC

Advancing STEM education while creating equitable opportunities for all learners



12

What's New at TERC.edu?



Letter from the President

Welcome to the Spring 2023 issue of *Hands On!* The first two articles accentuate the importance of mentorship, early in one's career and throughout. For the fledgling interns in the TERC Scholars Program (TSP), their experience could be, as was true for long-time senior researcher at TERC Brian Drayton, the beginning of a long career in a STEM- and education-related field.

In a new series we are launching, *TERC Staff Feature*, Dr. Brian Drayton is profiled. Readers will enjoy learning of Brian's journey during his 30+ years at TERC, what continues to fuel his long-term commitment to TERC, and what he hopes to inspire in others in this field. Brian's contributions to the field of science education and – most importantly to him – directly to teachers are too numerous to mention. Of similar value is Brian's impact on important internal discussions, decisions, and considerations given his reasoned approach, calm manner and innate ability to lend his voice at just the right moment to aid in moving critical conversation forward in a productive and impactful manner.

In *Exploring STEM Education and Professional Growth Through Mentorship*, you will hear from three interns in the TERC Scholars Program (TSP), an internship program that began in 2017 and is open to college and graduate students. In the case of each intern, mentorship was a major factor in their positive experiences at TERC and will hopefully provide an important foundation from which they build rich, satisfying, and impactful careers.

We then share some highlights from TERC's 2020-21 Biennial Impact Report which shares data on where we are working, the learners we support and a summary of a few bodies of work. We wrap up the issue with *What's New* – including the new *Reimagining Equity and Values in Informal STEM Education Center* (REVISE) which will serve as a critical voice for advancing equity in the Informal STEM Education (ISE) field and a letter from TERC's new Board Chairperson, Dr. Nadine Bonda.

Laurie

Laurie Brennan, President

Editor: Valerie Martin

Copyeditor: Jennifer Rose

Administrative Support: Katie Stokinger

Design: Jason Fairchild, Truesdale Group

Director of Brand Strategy & Communication: Jaclyn Parks

Hands On! is published semi-annually by TERC, a non-profit education research and development organization dedicated to building futures for all learners through STEM education and teaching.

Copyright © 2023 TERC. All rights reserved. No part of this publication may be reproduced without written permission. Email: communications@terc.edu. *Hands On!* is available at www.terc.edu.

All opinions, findings, conclusions, and recommendations expressed herein are those of the authors and do not necessarily reflect the views of the funding agencies.

TERC STAFF FEATURE:

Brian Drayton



With this issue, we begin a series of staff profiles, doing a little investigation into the investigators themselves: what motivates them; what has shaped the trajectory of their work; and what they do outside of TERC. Our first story features Brian Drayton, Co-Director of the Center for School Reform, who came to TERC with degrees in linguistics and a resume that included running a rest home, and follows his path to plant biology, ecology, and teaching.



Brian Drayton (back row center) and TERC staff circa 1992.

A BEGINNER'S MINDSET

“The funding might come in, so why don’t you start August 1st, and we’ll see what happens?”

Brian Drayton recalls hearing these words from TERC’s then-Director Bob Tinker in 1986 and being grateful for the risk Bob was willing to take.

Brian, with undergraduate and graduate degrees in linguistics, had an unusual background which did not seem to prepare him for TERC: he’d worked as a freelance editor, run a rest home for three years, and worked in the customer education department of LISP Machine, Inc.

While Bob might have been the one taking the risk, Brian’s beginner’s mindset and curiosity have kept him at TERC for 37 years and counting.

“I was able to stay at TERC, I think, because I was willing to be a beginner over and over and over again, so I had several different careers,” Brian says. “The fascination of the work, the importance of the work, probably the diversity of the work, and also the people, those are the things that kept me.”

A PASSION FOR CLIMATE CHANGE

Over the years Brian has worked on projects ranging from research to curriculum and teacher professional development to electronic communities. The list of projects is too long to include here, but there are threads woven throughout that reveal Brian’s passion for ecology, which for him always included climate change.

“I look at the world like an ecologist. As I have said now for 20 years, the most important science for the 21st century is ecology.”

Though not his first project at TERC, Brian recalls that the Global Lab project sparked his ecology path. Soon after joining the project, he enrolled in a research master’s program in Plant Ecology at Boston University, followed by a Ph.D. The time devoted to his degrees gave him the confidence to take what he learned from Global Lab and co-create the *Ecology Curriculum*, integrating all levels of biology to address climate change.

Brian followed this by working on *Astrobiology: An Integrated Science Approach*, *Biocomplexity and the Habitable Planet*, *The Climate Lab*, and *Innovate to Mitigate*.

COLLABORATORS AND MENTORS

Brian emphasizes that almost every project he’s worked on has been collaborative from the beginning, and his collaborators have been mentors for him. “We’ve always told new people coming to TERC, ‘If you really want to succeed, find a buddy, find somebody you can work with, because the work is so much richer if you can collaborate.’”

His longest standing partnership is one he forged in the ’90s with Joni Falk. The pair have written many proposals together, leading to research projects such as “Researching science in the wireless high school” and “Eyes to the Future.” Brian had been part of some of TERC’s early electronic community projects (pre-internet) such as LabNet. He is fascinated by how learning happens

Global Lab was an international network of schools that participated in activities designed by TERC to help students use tele-collaboration to expand their scientific investigations beyond the classroom walls and into the world. Not only was Global Lab the National Science Foundation’s (NSF’s) first climate change curriculum but it was also the first climate change education grant awarded by the NSF.

in such networks and has played various roles in the string of electronic community projects that Joni spearheaded. LSC-Net, a community for Local Systemic Change (LSC) initiatives throughout the country; MSPNet, an online network that offered interactive online poster sessions, panels, and webinars; and the STEM for All Video Showcase, an interactive film festival that features videos from hundreds of projects aimed at improving STEM education: all focused on creating collaborative networks for people to collaborate and mentor each other.

In the late '90s, when Joni Falk and Brian were researching how middle-school science teachers understood and enacted inquiry, Brian began to consider what 'inquiry' meant. His search to understand inquiry and its implications for his work led him to co-found TERC's Dewey Group, colleagues inside and outside TERC who love thinking with and learning from each other. John Dewey was doing the philosophy by writing about it — nearly 20 years later, the Dewey group reads selections from Dewey and meets, continuing their mutual education through dialogue. Brian believes his thinking, his writing, and his own inquiries have come to be flavored and re-tuned by this long engagement with Dewey and some friends.

“Dewey always invites the next question, always asks about consequences, always dares to think aloud. The Dewey Group has given me an experience of inquiry in company, mutual education through dialogue.”

ALWAYS THINKING OF THE TEACHER FIRST

While research has always been part of Brian's work, the root of much of this research is his fascination with how and why teachers do what they do, and how they learn their practice. His persistent goal has been the positive impact research can have for teachers and their classrooms.

“The thing about teachers is that they have an unpredictably large impact on the world. You never know who their teaching is going to touch,” Brian observes. “What we (researchers) can do for teachers enables that, in a sense. It gets amplified by whatever they do, and we'll never know, but that's okay.”

It's no surprise that Brian's latest project is *Climate and Equity: Summer Institute for Learning and Teaching* with Gilly Puttick (another longtime collaborator) and Folashadé

Solomon. The goal of this project is to foster teachers' collective growth as they work with their students on climate change and justice, which are inseparable strands in our society's current crisis. In a way, this project ties a bow around Brian's passions: climate change, collaboration, and helping teachers.

Teaching is a thread for Brian not only at TERC: his wife Darcy, with whom he lives in the Monadnock region of New Hampshire, is an artist and Waldorf teacher; and he has presented and published widely on Quaker spirituality and history.

There is no doubt that Brian's work has advanced the field of STEM education, and his work and that of his collaborators is widely cited. That is not how Brian measures success for himself, though. Instead, every year Brian asks himself, “Can I point to any specific teacher or student who has had a better experience in science class this year? Who has had more joy and learned more? That's been the fundamental driving question of my career in many ways.”



Brian Drayton (fourth from the right) and TERC staff with teachers from across the U.S. at the 2022 Climate and Equity Institute.

Climate and Equity Institute goals are to develop a foundation for understanding what content, resources, and pedagogical strategies best support teaching about climate and equity across widely diverse school and community contexts. To learn more about past institutes and how you can join Brian and Gilly and their team on a Climate and Equity summer retreat, visit www.terc.edu/climateandequity/.

Exploring STEM Education and Professional Growth Through Mentorship

*Reflections from
Three TERC Scholars*

The TERC Scholars Program provides college and graduate students with the opportunity to engage in meaningful STEM education research in a professional setting. Since its inception in 2017, the program has attracted a diverse set of students from a variety of backgrounds, majors, and interests. Each scholar is carefully matched with a mentor who helps them gain insight into the professional workplace and guides them in contributing to authentic research activities that advance project goals.

The following blog post excerpts give a glimpse into the unique experiences of three TERC Scholars — Akiko, Sophie, and Claire. Their reflections recount how the program has helped them to grow and develop professionally. Their stories are a testament to the power of mentorship and the impact of the TERC Scholars Program. Read on to learn more about their journeys and the lessons they have learned along the way.

VisTe's Impact Outside the Classroom: Reflections of a TERC Scholar Intern

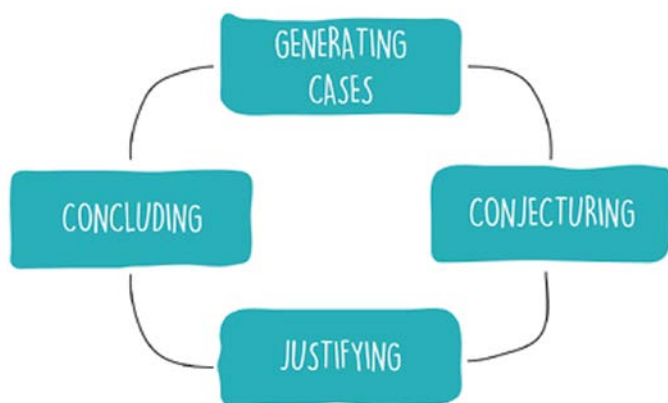
BY AKIKO VOELCKER

Before becoming an intern at TERC, I did not have any research experience. After graduating from a vocational school in Tokyo, I worked in Japan for three years and attended an English language school. I wanted to travel and experience life abroad to explore different career options. I moved to Massachusetts, where I attended Bunker Hill Community College (BHCC) and earned a qualification in early childhood education, then started working at a Japanese daycare. As a student at BHCC, I joined the TERC Scholars Program through the BHCC Learn and Earn partnership.

The Challenge

The project I interned for was Visualize Teaching (VisTe), a National Science Foundation–funded project that provides professional development to middle school teachers and coaches to improve mathematics education in middle schools. In my role I supported the research data analysis by cleaning and refining transcripts from classroom videos. Although a professional transcriber does the first pass from an audio file, my job was to watch the full video recording and include detailed information, such as which students spoke and which students interacted with the teacher. I created a more complete record that will be much more useful for quantitative analysis.

English is a second language for me, so this role was challenging. Middle school students talk very fast, use slang, and don't always speak clearly. I needed to replay the audio many times when I started. It was also hard to hear some prepositions like “a” or “the” because these words do not exist in Japanese. Another challenge I encountered was understanding the math vocabulary the students and teachers used. Although I studied statistics at a community college, I had never studied mathematics in the United States, so I did not know many mathematics terms.



VisTe Argumentation Model.

'Argumentation' Has a Place in the Classroom

What I noticed while working on the transcripts is how important math 'argumentation' is in American classrooms. I had only taken math classes in Japan, so valuing 'argumentation' was very new and interesting to see in these American classrooms. In my experience as a student in Japan, we see that there is a math problem in the textbook, the teacher explains how to solve it, the practice problem in the textbook is given as homework, and the answer is reviewed in the next class.

On the other hand, from what I saw, American math education is different. From watching the classroom videos, I noticed how groups of two or three students work on a single problem. Each group then summarizes their ideas and presents them to the class. If an incorrect answer is shared, the teacher often asks for a classroom discussion of the incorrect answer.

In participating as an intern for the Visualize Teaching project, I learned the importance of having your own opinion, and, in this case, participating in math argumentation. By encouraging this skill at a young age, children will be able to listen to others' opinions and be able to respond based on their own understanding of various ideas. Math argumentation does not need to be limited to the math classroom, but its use can expand to other disciplines and other real-world situations.



Akiko Voelcker, a student at the Bunker Hill Community College, is interested in business, microeconomics, and marketing, and aspires to become a marketing analyst. During her internship at TERC, she worked with the Visualize Teaching project, where she assisted with collecting, organizing, and cleaning data received from teacher participants.

From Miss Delaware to iSWOOP Research Associate Intern

Before Sophie Phillips left TERC, she was interviewed by her mentor, Martha Merson, to discuss her experience as an intern with iSWOOP (Interpreters and Scientists Working On Our Parks). Here is an excerpt of their conversation.

Sophie, you left a banquet hall as Miss Delaware and went to the Chihuahuan desert in July. What were your impressions?

When I first got there, I was completely blown away by the landscape. It had been several years since I had been to a desert, and I had never seen Carlsbad Caverns National Park before. That night, I got to see the bat flight event for the first time. It is very hard to explain the feeling you get when you watch an entire cave full of bats all emerge at one time. It was fascinating and beautiful, and I felt so lucky.

Did iSWOOP offer you the chance to work with new technologies?

I used a thermal camera for the first time, which was honestly my favorite part of the whole experience. We used the camera to take population counts of bats emerging from the main cave. I also collected data in the gas and oil fields using these small devices known as “audio moths.” They record the soundscape and then you can listen in. If you have the right software, you can create visual files from the data and analyze the volume and frequency of the different sounds.

Explain a bit more about the research underway and how you contributed.

The park is surrounded by oil rigs and gas drilling operations. This means that light and noise from human activity have utterly transformed the desert at night, and bats—with their keen hearing and sight—have had to deal with these changes



Sophie collecting data in the gas and oil fields using an audio moth to record the soundscape.

during their hunting and feeding times. Researchers like Louise Allen and Nick Hristov have set up studies of compressor sites in the gas and oil fields around the park to examine the effects on bats. Several years of data are needed to know if the compressors are really affecting bats’ ability to hunt or if the lights attract insects and make it easier for bats to catch moths. Early results of iSWOOP researchers’ studies show that certain bats are negatively affected by the noises coming from the gas and oil sites.

Have you had any ‘ah-ha’ moments while working with iSWOOP?

My biggest ‘ah-ha’ moment came when visitors approached me while I was using the thermal camera. Visitors from all over the country were asking me about bat biology and behavior and about the work I was doing. I realized how much I truly love talking about science. I always hoped while I was out with the camera getting data that visitors would come up to me and ask questions.

What is one takeaway from your time as an iSWOOP research associate?

iSWOOP holds high standards for science communication. I have to be able to not only talk to the public about science but make it memorable. iSWOOP has taught me how to be creative. I try to have the public use all five senses because that helps them remember what they learned long after they have gone back home. Getting them involved by having them answer questions helps them remember their time with you as well.

How can people follow you/your work?

With iSWOOP leaders and scientists, I have co-authored two journal articles for kids with iSWOOP for Frontier for Young Minds entitled: “Indicator Species Reveal Environmental Health” and “Millions of Monarch Butterflies and the Quest to Count Them.” The first of these focuses on frogs, which are outstanding indicator species in the Indiana Dunes and elsewhere. The second features monarch butterflies and new technology being used to count them as they overwinter in Mexico.



After being crowned Miss Delaware 2021, Sophie Phillips came to TERC as a graduate student in Energy and Environmental Policy at the University of Delaware. With an extensive background in wildlife studies and environmental field work, Sophie ran a successful electoral campaign in November 2022 and was elected to Delaware’s 18th District in state government.

TERC Intern Perspective: *A Mentor Found*

BY CLAIRE SHAPIRO

Finding myself at TERC this past summer felt largely serendipitous. I had originally planned to work for a Boston-area venture capital firm. That appealed to me in some respects, but I kept questioning if that was how I wanted to spend my time. A reflective conversation with a family friend, Jennifer Dorsen of ScienceQuest, about an independent course I'd done in high school on American public education inequality, helped me tune back into my interest in education research. Jennifer helped connect me with several education researchers who specialized in diversity in higher STEM. I soon found myself on a Zoom call with Dr. Maria Ong, a field leader and long-time TERC researcher. She gave me the advice to reach out to anyone in the field whose work interested me. I remain grateful for her many insights and for this simple but powerful directive.

I feel immensely lucky to have ended up with a mentor like Dr. Asbell-Clarke, who immediately encouraged me to just call her "Jodi." Jodi took me seriously from day one, despite my relative youth and inexperience, delegating a literature review for her book and asking me to read the manuscript. To have her solicit my genuine input (and criticism) so early on was an empowering way to begin the summer.



I continued to do some literature review work and also began to assist Dr. Ibrahim Dahlstrom-Hakki with data-analysis tasks. A round of data had come back from students using learning assessments

to measure their Computational Thinking (CT) practices in a study of INFACT (Including Neurodiversity in Foundational and Applied CT.) We set forth to assess internal consistency and figure out if performance was related to any marker of neurodivergence.

While I am still uncertain what my path after Middlebury College will look like, it is encouraging to know that I will carry the skills I developed and the relationships I built at TERC with me for the rest of my career. Looking back on my summer at TERC, I think of improving programming in R, developing literature review and other research skills, learning how grant application processes work, navigating the world of book publication, and soaking in the complex process of trying to create curricula that will benefit as many learners as possible. I also think of simple but crucial workplace learning, like how to organize and accomplish 40 hours of work efficiently, how to build meaningful work relationships that balance the personal with the professional, or how to ask for support. Lastly, I think of an enthusiastic, intelligent, dedicated group of coworkers who welcomed me with such kindness and genuine excitement.



Claire, a student at Middlebury College, is passionate about education equity, diversifying STEM, and working towards more pluralistic, inclusive education models. During her internship at TERC, she worked with Jodi Asbell-Clarke and Ibrahim Dahlstrom-Hakki, supporting the work of the INFACT and EdGE (Educational Gaming Environments) groups to promote inclusive models of teaching computational thinking to elementary and middle school students.

About the TERC Scholars Program

Whether on site or online, each TERC Scholar becomes an active member of a project team and works under the supervision of the project's leaders to help advance project goals and gain STEM education knowledge. Scholars engage in authentic research activities, such as classroom data collection, literature syntheses, instrument testing, data coding and analysis, and case study development.

TERC Scholars come from a variety of backgrounds and majors. Each scholar is assigned a mentor who assists them in navigating a professional workplace and guides them toward professional development opportunities. Visit www.terc.edu/work-with-us/interships/terc-scholars-program to learn more.



TERC | Increase math and science skills for all
Biennial Impact Report | 2020 - 2021

The following pages feature highlights from our recently-published *Biennial Impact Report*.
Visit www.terc.edu/biennial-impact-report to read the full report.

WE ARE



TERC has long since been at the forefront of STEM education and research. Despite our long history of significant contributions, we have never produced a comprehensive report that highlights the crucial data about our initiatives and the people we impact and work alongside. The recently published

Biennial Impact Report 2020-2021 is changing that. By providing an in-depth look at our mission and vision, project focus and content areas, DEIB overview, project highlights, partners, and funders, we aim to build trust and knowledge of our vital work.

ETERC



For over 55 years, TERC has been dedicated to advancing STEM education while creating equitable opportunities for all learners. We envision a future where diverse communities engage in creative, rigorous, and reflective inquiry—where questioning, problem-solving, and experimentation are commonplace. This vision is grounded in the belief that STEM literacies are critical to strengthening and preserving a democratic society.

At TERC, 60+ math and science education and research experts:

- Work at the frontiers of theory and practice to develop a deeper understanding of learning and teaching
- Develop innovative curricula and materials
- Enhance instruction through professional development
- Design educational applications of new technologies
- Create rigorous evaluation plans to support reform

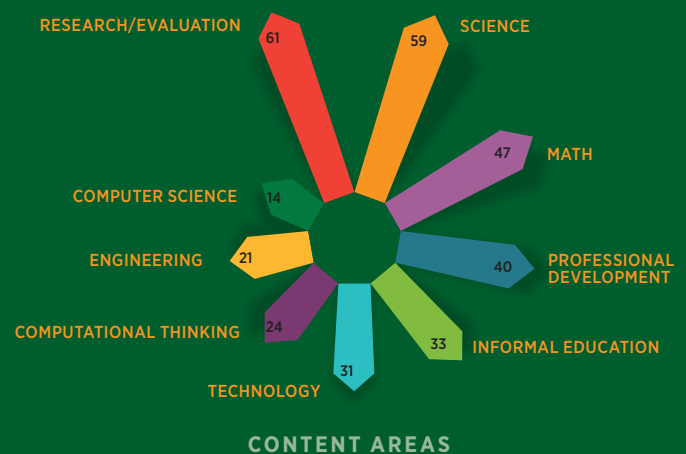
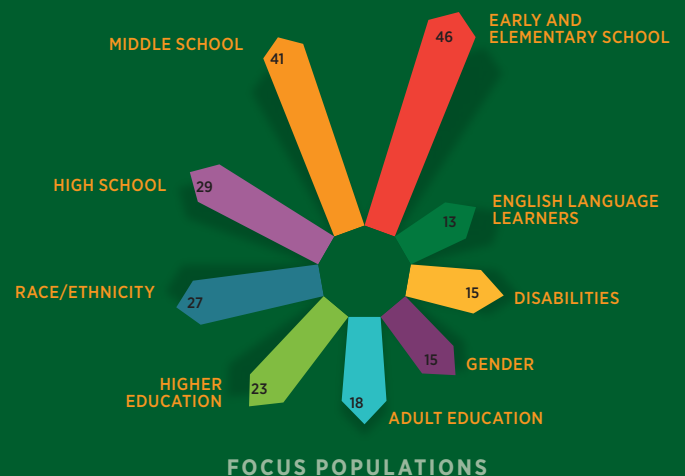
We are committed to providing learners with the knowledge and skills necessary to ask questions, solve problems, and expand their opportunities. We are passionate about supporting educators with professional development and evaluation to help them utilize new tools, materials, and inquiry-based strategies to enrich their students' experiences.

TERC By the Numbers

In 2020-2021, over 100 TERC-led projects reached 25,805 people worldwide, from design research to data collection to dissemination/reporting.

TERC's work revolves around fundamental questions related to teaching and learning in both formal and informal settings. Much of this work stays grounded in the realities of today's education spaces by collaborating directly with teaching professionals.

Covering a wide range of subjects within STEM education, TERC's projects inspire and engage many populations of learners.



The data represented above reflects the 2020-2021 projects that fall into these focus populations and content areas. An individual project may be categorized in multiple areas.



Diversity, Equity, Inclusion, Access, and Belonging

At TERC, we are dedicated to developing innovative strategies to break down systemic racism and create equitable educational environments. For this to happen, the foundation of our work must be committed to equity, access, inclusion, and belonging. We are constantly reflecting, evaluating, and re-evaluating our antiracist and culturally responsive practices to ensure everyone has the opportunity to thrive in STEM.

Learn how we are:

- › Centering marginalized voices and perspectives in TERC’s research.
- › Cultivating an internal environment that promotes equitable access and career advancement.



Learn more at
TERC.edu

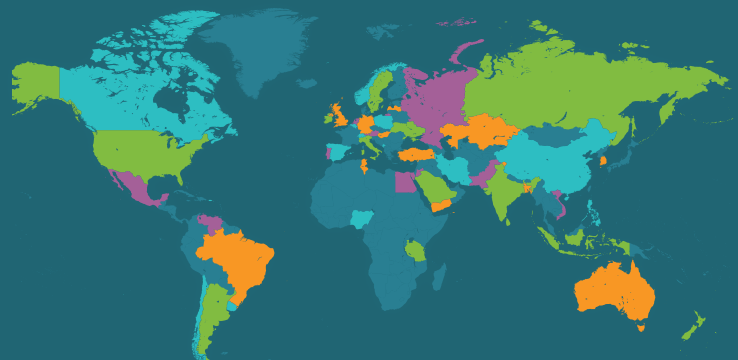
Unlock the World of STEM Education at TERC.edu!


- › **Products and Materials:** Our groundbreaking research projects often result in materials for learners of all ages — many of them free! From bilingual engineering activities to materials that mix math into everyday life, to unique approaches to the study of matter and robot design challenges, you’ll find something to suit your needs. Many of these resources are funded by the National Science Foundation.
- › **Publications:** Our publications provide an in-depth look at the research and projects undertaken by TERC staff. From books to peer-reviewed journals, op-ed pieces, and conference presentations — stay abreast with the latest in STEM education.
- › **Hands On! Magazine and Blog:** Explore the latest projects and research with articles written by our STEM education and research experts. Dive deep into fascinating STEM topics, discover what our researchers are passionate about, and hear from the voices of learners involved in our projects.

All of this and more is available at [TERC.edu](https://terc.edu) — start exploring today with our Advanced Search Bar.

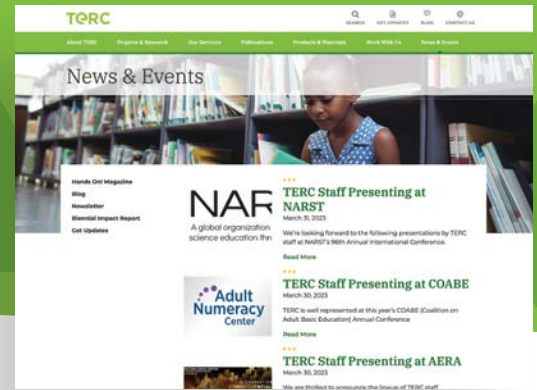


HOW FAR TERC’S WEBSITE REACHES



 = Countries where materials have been downloaded from terc.edu

What's New at TERC.edu?



Finding the information you're interested in has never been easier. Looking for the latest news? Click on "News and Events" in the top menu. terc.edu/news-events

REVISE Center

<https://www.terc.edu/projects/revise/>

We are excited to introduce the *Reimagining Equity and Values in Informal STEM Education* (REVISE) Center. In a cooperative agreement with the National Science Foundation's (NSF) Advancing Informal STEM Learning (AISL) program, this new equity resource center will serve as a critical voice and champion for advancing equity in the Informal STEM Education (ISE) field. REVISE seeks to cultivate lasting change among the ISE community and the broader STEM education ecosystem.



REVISE leverages the strength of community-building through inclusive, collaborative design, and the sharing of resources and ethical practices to establish long-lasting compassionate relationships, particularly in building trusting relationships among historically disenfranchised communities. This includes our commitment in bolstering infrastructures to extend research capacity and expand access to funding. In doing so, we will highlight more scalable, equity-focused, culturally responsive evaluation, and research findings to iteratively improve ISE programming. REVISE will additionally support increased diversity in leadership and advancing the customized adaptation of ISE program components to empower new learners and leaders with diverse perspectives to influence informal STEM.

These collective efforts will promote inclusive communication and outreach that broadens participation and achieves sustained organizational change and transformative social justice, and will fortify safe spaces of belonging in STEM to create a more informed public that values STEM in everyday life, work, and global citizenship.

Nadine Bonda, New Board of Trustees Chair

<https://bit.ly/3omcHdj>

We are delighted to welcome Nadine (Binkley) Bonda, Ph.D., as the new Chair of TERC's Board of Trustees! Nadine has been a passionate supporter and advocate of TERC for many years, and her wealth of expertise and knowledge is an invaluable asset to our organization. Read on to hear directly from Nadine and learn about her background and her aspirations for TERC going forward.

I am excited and humbled to chair the Board of Trustees of TERC. TERC is an amazing nonprofit doing important research in all aspects of STEM education. In my own career, I am very interested in understanding how teachers and students think about the teaching and learning of STEM disciplines and, therefore, I am passionate about the work that TERC does.



Our Board is made up of exceptional leaders in their fields and my job is to bring those Board members together to form a cohesive group that works in the best interest of TERC. I have three personal goals this year as Chair.

- First, I want to work with the Board in supporting the President, Laurie Brennan, as she guides the organization in a year that is one of TERC's most successful in terms of grant awards.
- Second, I would like to support Board members as they work to understand how they can, in their own careers, be strong advocates for TERC.
- And third, I would like to support the Board in always keeping equity in the forefront of our minds as we carry out the work of the Board.

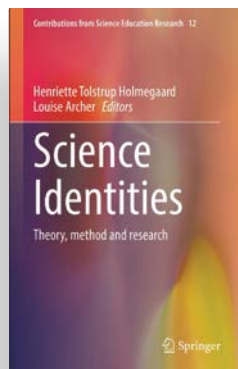
I am looking forward to chair the Board of Trustees of TERC and confident that we'll continue to make a positive impact on STEM education research.

How Activity Frames Shape Situated Identity Negotiation: Theoretical and Practical Insights from an Informal Engineering Education Program

<https://bit.ly/3KRghyZ>

Smirla Ramos-Montañez and Scott Pattison, *Science Identities*

In this Chapter, Smirla and Scott draw from 4 years of identity research through the *Designing Our World* project to share a theoretical model and complementary methodological approach for understanding the interplay between agency and structure for adolescent youth (10- to 14- years old) negotiating their identities as part of an informal engineering education program.



Congrats to Storytelling Math, a collaboration between TERC and Charlesbridge Publishing, for winning multiple awards at the 2023 Mathical Book Prize!

The Mathical Book Prize is an annual award for fiction and nonfiction books that inspire children of all ages to see math in the world around them. See which books won!

<https://bit.ly/41nSdPV>



Boundary Crossing in Student-Teacher-Scientist-Partnerships: Designer Considerations and Methods to Integrate Citizen Science with School Science

<https://bit.ly/41GHZKh>

Anushree Bopardikar, Debra Bernstein, and Susan McKenney, *Instructional Science*, 2023

In this article, the authors focus on Student-Teacher-Scientist Partnerships (STSPs) which provide opportunities for students and teachers to participate in citizen science. STSPs engage with scientific concepts and practices, thereby bridging school learning with issues of importance to society, such as climate change. This three-year case study illuminates how successful designers tackled boundary crossing challenges while creating a scalable STSP for environmental education.

Supporting Math Learning Online Workshop

<https://bit.ly/3LggNgh>

This 7-week asynchronous online workshop focuses on the teacher's role in supporting the range of learners in K-5 math classrooms. Appropriate for both users and non-users of the *Investigations™* curriculum, the weekly sessions include interactive math tasks and discussions, as well as opportunities to analyze student thinking, and explore a variety of instructional strategies to effectively support and engage all students in math learning.

June 21-August 8, 2023





Because math and science build futures

2067 Massachusetts Avenue • Cambridge, Massachusetts 02140

terc.edu @TERCtweets TERced tercstemed

Nonprofit Org. U.S. Postage PAID Permit No. 402 Brockton, MA

“Grounded in research and practice, this compelling book skillfully reveals the experiences of women of color navigating systemic challenges in the field of physics.”

—SHARON FRIES-BRITT, PROFESSOR OF HIGHER EDUCATION, UNIVERSITY OF MARYLAND

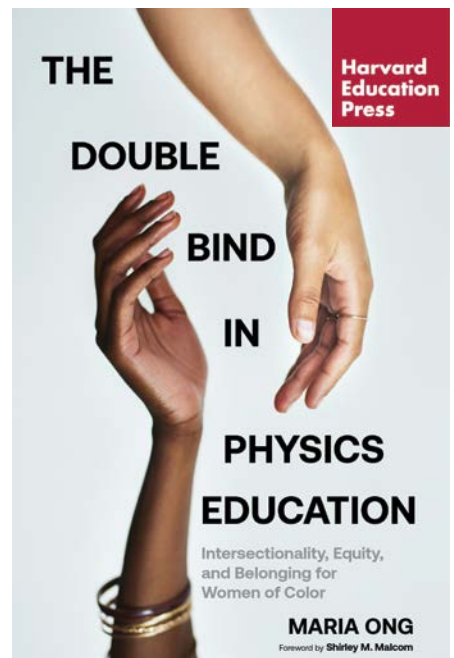
THE DOUBLE BIND IN PHYSICS EDUCATION

Intersectionality, Equity, and Belonging for Women of Color

BY MARIA ONG

Foreword by Shirley M. Malcom

In a detailed exploration of inclusion in physics, social scientist Maria Ong makes the case for far-reaching higher education reform, noting that despite diversity efforts to recruit more women and students of color into science and mathematics programs, many leave the STEM pipeline. The Double Bind in Physics Education takes readers inside the issue by following 10 women of color from their entrance into the undergraduate physics program at a large research university through their pursuit of various educational and career paths. Candid interviews with these women, their instructors and mentors, and their peers, conducted over 25 years, allow Ong to trace how pervasive challenges, such as navigating the intersectionality of race and gender discrimination, have shaped their academic opportunities and career choices.



SAVE 20% when you mention sales code DBPE23 (Offer expires 9/9/23)

<https://bit.ly/43Z7eK3>