



PUSHing to Recognize Equitable STEM

THE FUTURE NEEDS A PUSH

JUNE 2023

FEATURED

BRAIDING SWEETGRASS: MORE ABOUT THE BOOK

SCIENCE IN THE CITY: BOOK OVERVIEW

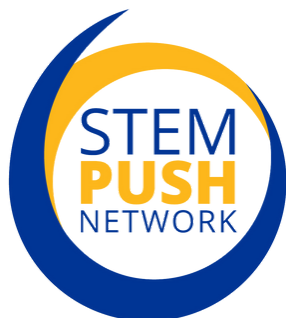
CONTINUING THE CONVERSATION FOR SYSTEMS CHANGE

Broadening participation in post-secondary STEM for Black, Latina/o/e and Indigenous students is STEM PUSH’s ultimate goal. We do a number of things to achieve this, including equipping pre-college STEM program (PCSP) leaders with tools to strengthen programs - an identified lever we believe will effectively impact a high number of students. We consistently apply research to validate our theory of change and aim to scale important ideas. We also know it’s crucial that we understand—in order to disrupt—our larger cultural narrative about who can do STEM, thus making STEM a more equitable area of study and work.

STEM PUSH thinks about science, engineering, technology and math - STEM - through the lens of racial equity. Equity is the approach with which we review all of our work, processes, learning and research.

STEM PUSH continues to share resources and support PCSP leaders in connecting these resources and associated content into programs. As part of this approach, STEM PUSH conducted two additional book studies (**read more about the first book study**) to examine how PCSPs can make STEM more culturally relevant and appropriate for Black, Indigenous and Latina/o/e students. Reading, discussing, and applying texts as a Network community supports program leaders, Hub members, and Ecosystem leadership in learning new concepts, applying them to programs, and looking to collectively change systems.

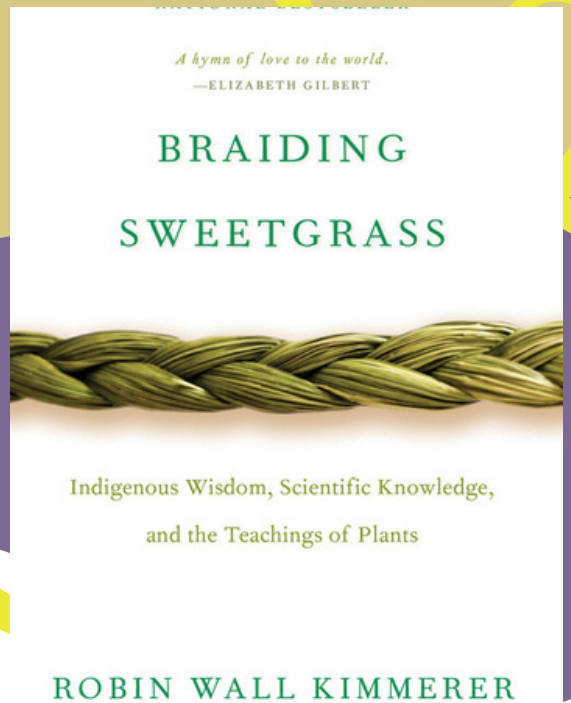
This newsletter will review our learning after reading *Science in the City* and *Braiding Sweetgrass*, two books that focus on science tools and the navigation of racist STEM systems, while working on impacting larger system change.



Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants

Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants is a book by Potawatomi Professor Robin Wall Kimmerer, about the role of Indigenous knowledge as an alternative approach to Western mainstream scientific methodologies.

Indigenous people have always been scientists, despite western ideologies devaluing ancestral knowledge. There is an importance in navigating how to frame forms of cultural knowledge as assets and as "scientific" when higher education institutions do not recognize that systematically. The book explores reciprocal relationships between humans and the land, with a focus on the role of plants and botany in both Native American and Western traditions. STEM PUSH pre-college STEM Programs read *Braiding Sweetgrass* and then participated in small groups discussions to reflect on connections between the themes of the text, their personal or professional experiences, and their program practices.



About the Author

Robin Wall Kimmerer

Robin Wall Kimmerer is a mother, scientist, decorated professor, and enrolled member of the Citizen Potawatomi Nation. She is the author of *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants* and *Gathering Moss: A Natural and Cultural History of Mosses*. She lives in Syracuse, New York, where she is a SUNY Distinguished Teaching Professor of Environmental Biology, and the founder and director of the Center for Native Peoples and the Environment.



Photo courtesy of <https://www.robinwallkimmerer.com/>

Program leaders discussed the **challenges** they face and the work they are doing to reconcile struggles between cultures in their program; where and how they see possibilities for **reciprocity** (with community ways of knowing) in their programs; and ways the understandings from the book **resonated** with their own lives and experiences. These reflections led to a vibrant discussion about STEM Competencies that matter and equitable ways of thinking about who belongs, and how we increase belongingness and success for Black, Latina/e/o, and Indigenous students.

Some key takeaways from the discussion include:

The need to recognize the contributions of all Indigenous peoples to science, despite western ideologies that devalue ancestral knowledge.

There is a real importance in having diverse teachers and mentors that reflect the student's identities and backgrounds and can make emotional and cultural connections with students in order for them to relate better and cultivate feelings of belongingness.

Storytelling –in both teaching and demonstrating STEM knowledge– is a powerful way to tap into students' connections to and understandings of scientific ideas.

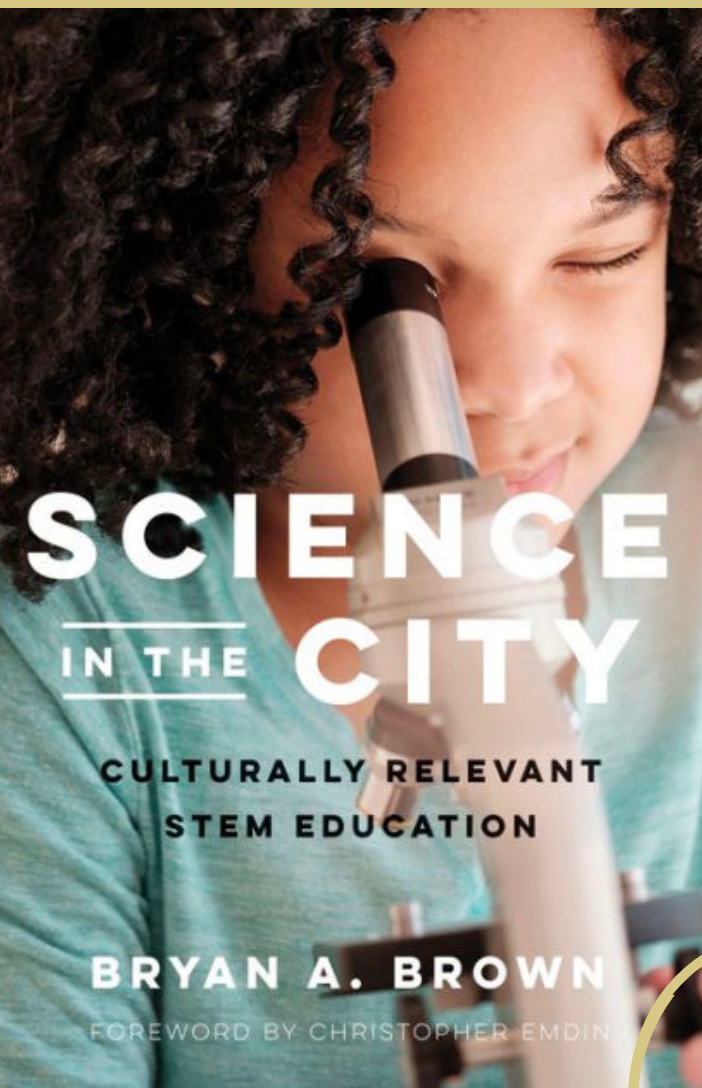
One program leader noted this need for equitable representation within indigenous communities, in their program.

“Representation continues to be Navajo-centric. Working to decenter my/ourselves and recognize other tribal voices and experiences.”

A program leader shared, “As a foundation to their projects, students work within their own communities, talking, interviewing, and capturing the stories and ideas of community members”

In the book, author Robin Wall-Kimmerer discusses the specific kind of research skills in ecology that she possessed and developed throughout her life that were not initially recognized by the science culture that she was formally educated in. This understanding resonated with our pre-college programs, in both their students and program leaders' experiences.

Book study participants stressed that we must link the research work back to the students' lived experiences when trying to educate underrepresented students in STEM. Often when students come into new spaces, especially in STEM, they are seen as blank slates rather than as contributors to learning.



Science in the City: Culturally Relevant STEM Education

Pre-college STEM programs read and gathered in small groups to discuss *Science in the City: Culturally Relevant STEM Education* by Bryan A. Brown, a book that explores the role of language and culture in science teaching.

Science in the City reviews the foundational issue of traditional STEM teaching, which typically requires Black, Latina/o/e and Indigenous students to align with and understand examples and language of the dominant white culture. The book then reflects on how impactful teaching and learning could be, especially within Black, Latina/o/e and Indigenous communities if the examples and language were more connected to a diverse set of backgrounds and experiences.

Small groups came together after having read the book and explored the connected and curated resources on Dr. Brown's website to **share** the information and resources they found that was new and/or most relevant to them; **connect** this learning with their prior understandings and previous readings and viewings done in the Network; and to **act** or plan for action using what they have learned from the book to change or forward work in their program or collectively. As a final reflection, programs discussed what all their discussion and understanding ultimately meant for improving our work with Black, Latina/e/o, and Indigenous students.

Find the Resources:

<https://scienceinthecity.stanford.edu/resources/>

About the Author: Bryan A. Brown

Bryan A. Brown is a professor of teacher education. His research interest explores the relationship between student identity, discourse, classroom culture, and academic achievement in science education. He focuses on the social connotations and cultural politics of science discourse in small-group and whole-group interaction. Additionally, his research work in science education examines how teacher and student discourse serve to shape learning opportunities for students in science classrooms. Dr. Brown's work in science education in urban communities focuses on developing collaborative curricular cycles and classroom pedagogy based on developing discourse intensive instruction for urban learners. His research has expanded beyond his focus on science education, to include issues of college access in urban communities. His recent work explores how classroom and school culture shapes access to higher education. He conducts mixed methodological work exploring how race, language, and culture impact students learning in urban science classrooms.



Photo courtesy of <https://ed.stanford.edu/faculty/brbrown>

TAKEAWAYS FROM THAT DISCUSSION INCLUDE:

Language is significant to developing one's identity. Providing students with language they can understand to begin a lesson is critical for them to successfully develop a clear concept of the material and a sense of identity in STEM.

Grounding learning within student experiences - meeting them where they are - and centering learning with students is critical. This includes providing the space and support necessary to share their views and experiences in STEM.

Supporting teachers to use methods/approaches that are validating to students includes connecting to relevant histories that show the ways STEM knowledge shapes experience, connecting back to thinking about how we present new material and assess communication skills, and recognizing how having a standardized science vernacular detracts from the insights and value that can be added when we include more dialects to scientific classroom.

Science in the City and additional resources shared by STEM PUSH encouraged more culturally relevant language, stories, and learning activities to be more inclusive of all students.

While *Science in the City* offered a number of resources and ideas to better implement culturally relevant science teaching and learning, the book, in addition to other digital resources, and surrounding discussion offered PCSPs a way to engage in continuous dialogue and examination of our current STEM systems. It introduced a space where language and culture matter for teaching and learning science.

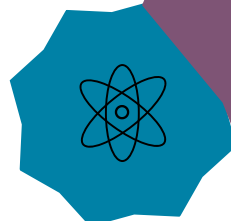
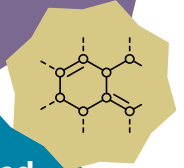
PCSP leaders found that resources on the website aligned with and built upon existing activities within programs. In their discussion, program leaders highlighted the specific resources they were going to use and take back to their colleagues, from specific programs and sites such as <https://www.genderinclusivebiology.com/> to broader practices such as formative assessment.

From a participant's perspective, "I think it is an opportunity to engage with our youth more intentionally around language and the words we use and why we use them."

One participant noted of the book and resources - "Information validated the importance of designing authentic activities tied to students' culture and language."

A program participant shared their ultimate takeaway - "This means that I can help bridge cultural and language barriers in the Museum so that interns feel more confident while they're here, and that it carries over into a sense of belonging in STEM spaces when they leave the Museum."

Some programs noted they wanted to share this book and the associated resources directly with their program colleagues, with one PCSP lead noting, "...I want to have my staff read the conclusion as a part of our spring semester training to help us brainstorm actionable next steps we can implement during programming."





The book studies covered in this newsletter are just one way in which STEM PUSH weaves equity into our work.

Preparing Black, Latina/o/e and Indigenous students in STEM is a first step toward equity in post-secondary STEM. And by giving PCSPs the resources and tools to better understand their students, to meet them where they are, and to further support their cultural development in conjunction with STEM, more racially and ethnically minoritized students will understand their “rightful presence” (Calabrese Barton & Tan, 2022) and persist in STEM fields.

Preparation with STEM skills alone, however, will not equip students to face and persist within existing racist systems that favor white dominant culture. Through discussions about the intersectionality of race and STEM, the STEM PUSH Network continues to host an important dialogue about preparing youth to navigate racist systems while also trying to change those systems.

Join the conversation www.stempushnetwork.org

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www.stempushnetwork.org