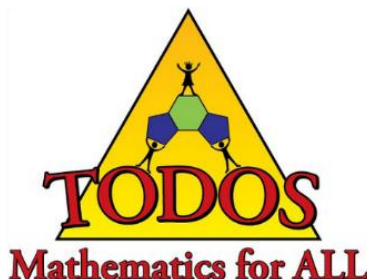


TEACHING FOR EXCELLENCE AND EQUITY IN MATHEMATICS



TEACHING FOR EXCELLENCE AND EQUITY IN MATHEMATICS

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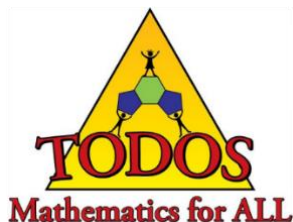
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From the Editors

Dear *TEEM* Readers,

Welcome to what we hope is the first of two *TEEM* issues for 2026. This is a regular, albeit longer issue of *TEEM*. The next one will be the special issue on Funds of Knowledge in honor of late Dr. Luis Moll, edited by Crystal Kalinec-Craig, Carlos LópezLeiva, and Carlos Nicolas Gómez Marchant. As 2026 continues to pose challenges and obstacles for students, educators, and broader communities, we are excited to publish this issue that confirms our commitment to the dual mission of *TEEM* and TODOS, “to advocate for equity and high quality mathematics education for all students – in particular Latina/o/x students” and that aligns with the latest TODOS position statement, *Centering Healing, Political Clarity, and Resistance Amidst Threats to Equity, Diversity, and Inclusion* found on the [TODOS website](#). We believe that our mission resonates with the broader mathematics education community, as we have been receiving a larger number of submissions than usual. To ensure that we give all the submitted manuscripts the care they deserve and to allow us to give authors timely feedback, please consider becoming a *TEEM* reviewer if you are not already. You can contact us at teem@todos-math.org to sign up!

This issue marks the first after Founding Editor Larry Lesser stepped down from editor work, after thoughtfully copyediting and proofreading every page of *TEEM*'s first 20 issues. While Larry needed to free up that time to attend to new challenges, he remains grateful for so many meaningful experiences with authors and *TEEM*-mates, and he contributed two items to this issue! Jordan Register graciously agreed to become *TEEM*'s next Copyeditor, adding this title to her already existing Journal Manager one.

As in previous issues, we want to take this opportunity to thank all the previous editors and editorial panelists whose vision had made *TEEM* into the journal it is today. We refer readers who are not familiar with the history of *TEEM* and its past leadership to the article “Still *TEEM*-ing with Enthusiasm: A History of TODOS’ esTEEMed Journal,” which can be found on page 37 of [TEEM 14\(1\)](#).

As a reminder to our readers, we have expanded the types of submissions we accept for publication in *TEEM*. If you implemented a lesson from an article or incorporated a *TEEM* article into your curriculum in a meaningful way or with insightful results, you can write about it. We also invite creative submissions in the form of stories, poems, and visual arts. If you are not sure that your idea for a submission will work, please [contact](#) us, we are always open to new ideas!

More [information about TEEM](#) and the [submission process](#) are available on our website. We encourage you to consider submitting. We strive to make the submission process as accessible to authors as possible, and are always interested in submissions from classroom teachers and first-time authors. We have created a [submission checklist](#) and

an [article template](#) to minimize the guesswork for the authors about what they need to submit. Please make sure to use the checklist and template to make work easier for Jordan Register, and Layout Editor, Susie W. Håkansson, who worked tirelessly to make sure that this issue of *TEEM* looks good and is error-free.

This issue of *TEEM* is published through Open Journal Systems (OJS). All issues of *TEEM* are freely available to all readers, and readers can download individual articles and entire issues. You can find the current and previous issues at the [TEEM homepage](#). Please note that *TEEM* does not have a fixed publication schedule, and that a new issue is published whenever we have enough articles. However, OJS allows us to publish individual articles on the *TEEM* website before an entire issue is ready, so authors can share their work sooner.

And finally, here are the contents of *TEEM* 17(1). The authors in this issue include TODOS president Kari Kokka, a high school teacher, and four high college students, among others; and the submissions include a poem, in memoriam, and an invited manuscript; in addition to three peer-reviewed articles.

The invited article, which was editor-reviewed, is “Mapping the Terrain of Mathematics Equity: *TEEM*’s Contributions (2009–2025),” by Madeline Keyes, Ricardo Martinez, Jiyeong Yi, Christa Jackson, and Shristi Shrestha, members of the TODOS Research & Publications committee, who identify trends in the articles published in *TEEM* during the last 17 years. The authors analyzed articles’ alignment with TODOS five goals, encouraging future work that engages underrepresented goals and populations.

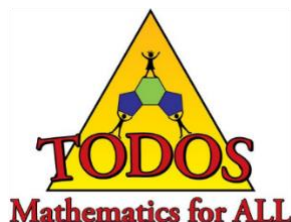
The three peer-reviewed articles are described below:

- In “When Are We Going to Use Math to Actually Make Change?” A Social Justice Routine for the Mathematics Classroom, Eric Fishman incorporates a social justice warm-up routine to make it a part of the fabric of his 5th and 6th grade classes. Students analyze real-world data visualizations to investigate issues such as economic inequality, public health, and environmental justice. Through structured discussions centered on fairness, students develop statistical reasoning, critical thinking, and civic awareness while learning to use mathematics as a tool for questioning inequities and advocating for change.
- In “Analyzing Real Traffic Stop Data for Racial Bias,” Vineesh Adala, Tim Jun, Jason Pereira, Vivaan Sandwar, and Anthony Fernandes present a statistical investigation conducted by four high school students using authentic local traffic stop data. Through descriptive and informal inferential analyses, the students examined patterns of racial bias in policing while developing critical statistical literacy and a deeper understanding of systemic racism. The article illustrates how engaging students with real-world datasets can foster meaningful mathematical inquiry, critical thinking, and civic engagement.
- In “Centering Culture, Language, and Identity in a History of Mathematics Course for Preservice Teachers,” Luis Miguel Fernández and Tenchita Alzaga Elizondo present the redesign of a history of mathematics course in which they infused a community- and family-centered pedagogy. The authors describe how prospective teachers elicited families’ community practices and made connections to a conception of mathematics beyond Eurocentric narratives.

Other content includes: a statement of goals for TODOS by President Kari Kokka, a note of gratitude to Larry Lesser, Larry Lesser’s poem in honor of Funds of Knowledge to be sung to the music of Bruce Springsteen’s Born to Run, and his personal reflection about the impact of Dr. Richard Tapia on him and the mathematics and STEM community as a whole.

As always, we are grateful for the dedication and expertise of all our reviewers and authors. *TEEM* gratefully acknowledges the support of all the leaders in our sponsoring organization, TODOS: Mathematics for ALL. We hope *TEEM* continues to serve the TODOS membership and that this issue serves as a resource for the community and a source of inspiration for future contributions to the journal. We stand in solidarity with our colleagues and our students and continue to advocate for culturally sustaining, socially just, and antiracist mathematics education.

The Editors



Mapping the Terrain of Mathematics Equity: *TEEM*'s Contributions (2009–2025)

Madeline Keyes

Boston College

Ricardo Martinez

Pennsylvania State University

Jiyeong Yi

Iowa State University

Christa Jackson

Saint Louis University

Shristi Shrestha

Iowa State University

Abstract

This review examines the landscape of the Teaching for Excellence and Equity in Mathematics (*TEEM*) journal from its inception in 2009 through 2025. Analyzing 80 articles using a combination of generative AI and iterative human coding, the authors identify key trends in authorship, grade-level focus, alignment with the mission goals of the TODOS organization, and topical themes identified in each reviewed article. The analysis culminated in five overarching themes: (1) Equity and Social Justice; (2) English Language Learners and Multilingualism; (3) Culturally Responsive Teaching and Practice; (4) Identity, Power, and Representation; and (5) Family and Community Engagement. The findings highlight the relative underrepresentation of family and community engagement compared to other themes, as well as an opportunity to expand authorship beyond university-based researchers. This retrospective analysis highlights key features of articles published so far, invites readers to think critically about how these findings could influence future submissions to this journal, and provides a critical lens for advancing equity in mathematics education.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. What were the main themes of the last *TEEM* article you read?
2. What do you think the articles published in *TEEM* mostly talk about?
3. Who do you think wrote and read most *TEEM* articles?
4. Which Mission Goals do you think are most relevant to *TEEM* articles?

Madeline Keyes (keyesma@bc.edu) is a doctoral candidate in Curriculum & Instruction at Boston College with an emphasis on mathematics education. Her current work examines the role of professional learning communities in supporting teachers' development of equitable mathematics teaching practices, as well as investigating the conditions necessary for systems-level change.

Ricardo Martinez (rjm5798@psu.edu) is an Assistant Professor at Pennsylvania State University, as a poet-scholar he works to create ontological playgrounds of liberation - spaces where young people can empower themselves and their community. His work centers on movements of critical youth studies and how they impact K-16 mathematics education.

Jiyeong Yi (jiyeongi@iastate.edu) is an Associate Professor at Iowa State University, where she develops instructional frameworks to support Emergent Bilinguals in rigorous mathematics. Her work emphasizes asset-based approaches, such as translanguaging and collaborative professional development, to foster inclusive and linguistically proud mathematics classrooms.

Christa Jackson (christa.jackson@slu.edu) is a Professor at Saint Louis University, where she focuses on instructional strategies teachers use that empower students to learn mathematics while fostering their productive mathematical identities. Her work centers on advancing STEM literacy, identity, and sense of belonging through innovative curricula and programs that bridge research with classroom practice.

Shristi Shrestha (shristi@iastate.edu) is a Human Computer Interaction doctoral student at Iowa State University. Her research interests lie at the intersection of design, technology, and pedagogy to build effective and ethical AI-augmented learning environments. Her work includes projects on human-AI interaction, teacher professional development, and inclusive pedagogy.

Mapping the Terrain of Mathematics Equity: *TEEM*'s Contributions (2009–2025)

Madeline Keyes, Ricardo Martinez, Jiyeong Yi, Christa Jackson and Shristi Shrestha

In 2024, our current TODOS Research & Publications Committee met for the first time. One of our earliest goals was to celebrate the work of TODOS' primary research publication, then in its 15th year, by providing an overview of the research published over the journal's tenure. As we enter our last year together as a committee, the Teaching for Excellence and Equity in Mathematics journal, more familiarly known as *TEEM*, is currently in its 17th year of publication with 20 issues, 80 articles, and additional content, including poetry in recent issues. We recognize the value of *TEEM*'s role in publishing mathematics education research not only connected to excellence and equity in mathematics but with an emphasis on connecting research that "can directly inform the practice of teachers or professional developers" with classroom practice (*TEEM*, n.d.). With this in mind, the aim of our review is to identify key trends and characteristics of studies published to date to start a conversation about which areas of research have been covered and unearth areas for further exploration, particularly as they relate to the mission of TODOS as an organization.

TODOS' mission is "to advocate for equity and high-quality mathematics education for all students — in particular, Latina/o/x students" (TODOSa, n.d.). To accomplish this mission, TODOS has established five goals that support and shape this work:

1. To advance educators' knowledge and ability that lead to implementing an equitable, rigorous, and coherent mathematics program that incorporates the role language and culture play in teaching and learning mathematics.
2. To develop and support educational leaders who continue to carry out the mission of TODOS.
3. To generate and disseminate knowledge about equitable and high-quality mathematics education.
4. To inform the public and influence educational policies in ways that enable students to become mathematically proficient in order to enhance college and career readiness.
5. To inform families about educational policies and learning strategies that will enable their children to become mathematically proficient (TODOSa, n.d.)

These goals target a variety of educational audiences, including educators, educational leaders, the general public, and families, and aim to generate and disseminate knowledge potentially to either broad or scholarly audiences.

Additionally, the goals position TODOS' work with mathematics in a few different ways. The ideas of equitable mathematics appear in the first and third goals, with the first goal specifically emphasizing language and culture. The idea of mathematical proficiency also appears in two goals connected to college and career readiness (Goal 4) and empowering families through information sharing (Goal 5). Given the breadth of the goals connected to TODOS' mission, we believe it is important to examine how articles published in *TEEM* have aligned with these goals and to identify common themes across the journal, which aims to engage "mathematics education topics involving excellence and equity simultaneously (rather than in isolation) in a way that connects research to classroom practice" (TODOSb, n.d.).

Thus, the purpose of this review is to identify trends across and within the articles published in *TEEM* over the last 17 years to not only celebrate the work that has been done but to also raise questions about the research we would like to include in the future. Our goal is to open up a conversation about areas of future research and invite submission of articles that address elements of TODOS' mission and goals that have not been represented in current published articles.

History of *TEEM*

The inaugural issue of *TEEM* was published in Fall 2009 under the editorial leadership of Cynthia Anhalt, Larry Lesser, and Miriam Leiva. In their warm welcome letter, the editors reaffirmed *TEEM*'s intended audience of mathematics educators, practitioners, leaders, and administrators at all levels. *TEEM* was introduced as a new, peer-reviewed journal to advance both excellence and equity in mathematics education. The first issue included peer-reviewed articles from past issues of TODOS' semiannual periodical *Noticias de TODOS*, with an extended invitation to submit new papers to the journal moving forward. This allowed *TEEM* to build on the foundation of *Noticias de TODOS*—with its combined function as a newsletter and publication with "quality peer-reviewed and invited articles on pedagogical activities, curriculum, and issues on topics of interest" (Editors, 2009)—while shifting toward a more comprehensive publication that connects research to practical application. The editorial team made a deliberate decision to include Discussion and Reflection Enhancement (DARE) questions at the beginning and end of every article to promote this connection between research and practice. In a retrospective of *TEEM*'s history, Lesser (2023) reflects on *TEEM*'s distinctive and intentional emphasis on aligning with TODOS' mission, targeting a variety of educational stakeholders, and publishing submissions from researchers at a variety of stages in their careers. The role of other TODOS publications, including the monograph series, was also celebrated and acknowledged as supporting the early development of *TEEM*.

The leadership structure of *TEEM* has continued to evolve since its inception. From 2009 to 2016, the journal had five Editors: Miriam A. Leiva (2009-2010), Cynthia Anhalt (2009 to 2013), Larry Lesser (2009 to 2013), Marta Civil (2012 to 2016), and Luciana C. de Oliveira (2015 to 2016). During that time, there have also been a number of Associate Editors, with Miriam Leiva serving as the first in 2010. In 2015, Cynthia Anhalt and Larry Lesser served as Associate Editors. In 2011, the journal established its editorial panel structure, expanding the number of editors involved. Those serving on the editorial panel have included: Marta Civil (2011), Alfinio Flores (2011-13), Eric (Rico) Gutstein (2011-13), Sylvia Celedón-Pattichis (2012-16), M. Alejandra Sorto (2012-23), Craig Willey (2015-21), Ksenija Simic-Muller (2015-23), Anthony Fernandes (2021-current), Eugenia Vomvoridi-Ivanovic (2021-current), José Martínez Hinestroza (2024-current), and Carlos Nicolas Gómez Marchant (2024-current). In 2017, *TEEM* established and named Marta Civil as Editor in Chief. Marta served in this role until 2023, when Ksenija Simic-Muller assumed the role. In 2020, Susie W. Håkansson became Layout Editor for the journal, and in 2024 Jordan Register assumed the role of Journal Manager. It is important to be explicit that these scholars have not only contributed to *TEEM*, they have aligned themselves with the mission and vision of TODOS and are a big part of why *TEEM* is the journal it is today.

TEEM has had three Special Issues, each with its own guest editor and focus. *TEEM* published its first Special Issue “Mathematics Education: Through the Lens of Social Justice” in 2016 under the leadership of Julia M. Aguirre and Marta Civil. The questions addressed in the special issue, “What can we do to dismantle institutional structures (inside and outside the classroom) that perpetuate these inequities in mathematics teaching and learning? What are we doing to transform mathematics education that leads to a more socially just mathematically competent citizenry (Aguirre & Civil, 2016, p. 6)?” still resonate today. The second special issue, edited by Zandra de Araujo, Sarah A. Roberts, Craig Willey, and William Zahner, received several submissions that led the editors to publish two issues that highlighted multilingual learners: “Special Issue on Multilingual Learners: Translanguaging” and “Special Issue on Multilingual Learners: Multilingual Practice.” To continue to dismantle systemic inequities in mathematics, the editors argue,

Many learners are excluded from mathematics learning environments on the basis of their identities, including students’ language(s) spoken, race, ethnicity, nationality, disabilities, gender, and sexuality. At a minimum, disrupting these patterns of exclusion, and building a more inclusive mathematics education requires that teachers purposefully include students from non-dominant communities in their classrooms (de Araujo et al., 2020, p. 6).

Again, due to a large number of submissions, *TEEM* published the “Special Issue on Antiracism in Mathematics Education” across two issues, one in 2022 and the other in 2023. The goal of this special issue, edited by María del Rosario Zavala and Ksenija Simic-Muller, was/is

to provide springboards into your own reflection and action, not to be a how-to manual. To that end, you may also notice a variety of genres in the articles such as memoir and reflection, self-study, classroom-based research, program analysis, etc. You may also notice that a number of manuscripts in both issues are collaborations across settings, job types, and lived experiences, reminding us that antiracist work needs community instead of isolation. We hope that this issue provides a sense of community for our readers (Zavala & Simic-Muller, 2022, p.7).

TEEM Special Issues ensured the journal focused on emerging topics while advancing the TODOS mission of improving the mathematical lives of all learners. To ensure *TEEM* is accessible, the journal shifted to 100% open source, and in 2025, under the leadership of the current Research and Publication committee, all *TEEM* articles have been retroactively assigned Digital Object Identifier (DOI) numbers, which enhances findability.

Methods for Review and Analysis

The goal of this review is to identify trends across articles published in *TEEM* from the initial issue in 2009 to the most recent edition published in 2025. Our first step to address this question was to investigate how articles aligned with the stated goals of TODOS and engaged with the ideas of excellence and equity in mathematics. To accomplish this goal, we used the Generative Artificial Intelligence tool PensieveAI (Shrestha, 2024) to support the initial identification of (1) three to five initial indicators of eventual themes present in each article and (2) alignment of the article with each of the TODOS mission goals.

We selected PensieveAI as an analysis tool due to its design with user privacy in mind—uploaded documents are neither stored nor tracked, and no data is used for training AI models. Once the data is analyzed and the session ends, all user data is discarded, ensuring complete confidentiality. This tool was developed by Author 5 to automate the thematic analysis of qualitative textual data, providing researchers with an efficient way to extract key themes, descriptions, and relevant excerpts. The tool integrates OpenAI’s GPT-4o mini AI model to process various forms of qualitative data, including articles. Users can upload documents and optionally provide customized instructions to guide the thematic analysis. Once submitted, the tool extracts text, constructs a comprehensive prompt integrating all inputs, and sends the data to OpenAI’s API for processing. Despite its advantages, human experts are needed to refine the thematic output due to the contextual limitations of large language models.

To facilitate identification of initial indicators and alignment with the TODOS mission goals, using the AI tool, the following prompt was used for each article: “What mission statements does this article explicitly align with among these five mission statements?” Included with this prompt were the mission goals. For example, we uploaded Yi et al.’s (2020) article “Fencing in the Goats: Adaptation of Modeling Framework for Emergent Bilinguals” from the *TEEM* Special Issue on Multilingual Learners into PensieveAI. The results yielded five initial indicators: (1) Culturally Responsive Teaching, (2) Language Development through Mathematics, (3) Scaffolding and Support for Emergent Bilinguals, (4) Empowerment through Agency, and (5) Iterative Learning Process. According to PensieveAI, the article aligned with mission statement goals one (increasing educator knowledge) and three (disseminating knowledge). After reading the article, we confirmed the AI-generated indicators were accurate and the mission statement goals aligned. Then, we conducted the initial stage of analysis with PensieveAI for all *TEEM* articles. We inserted the initial indicators and aligned mission goals into an Excel spreadsheet. We made the decision to delve deeper into other attributes of the article, so we included the article’s authors, research subjects, and relevant grade levels. We further classified the authors as researchers, teachers, graduate and/or postbaccalaureate students, K-16 students, and parents or community leaders based on the authors’ bio self-identification. We used these data to generate frequency counts.

During the next round of analysis, we used a process of color coding to consolidate our preliminary indicators into broader categories. Through a series of collaborative and iterative discussions, we synthesized these indicators—merging and refining categories multiple times—to establish a final thematic framework. This process resulted in five overarching themes that characterize the current landscape of equitable mathematics research within *TEEM*: (1) Equity and Social Justice; (2) English Language Learners and Multilingualism; (3) Culturally Responsive Teaching and Practice; (4) Identity, Power, and Representation; and (5) Family and Community Engagement. Table 1 shows selected examples of consolidated codes. It is important to note that although more asset-based terms, such as emergent bilinguals or multilingual learners, are formalized today for consistency, we use English language learners (ELLs) because it was used in some previously published articles.

After finalizing these themes, we recoded all articles, noting that several of the articles intersected across multiple themes. For example, Edwards’ (2011) article “Passion for Equity: An Asian-American Mathematics Educator’s Journey” was identified with both themes (1) Equity and Social Justice and (4) Identity, Power, and Representation, due to its dual emphasis on both equity and identity. Other articles were found to address as many as four themes simultaneously. For instance, Jackson and Roberts’ (2017) “Dimensions of Equity within Preservice Teachers’ Responses to Equity Quotations” explicitly engaged with how preservice teachers’ reflections on ideas connected to (1) Equity and Social Justice, while directly addressing (3) cultural relevance and responsiveness and (4) power and identity using Gutiérrez’s (2009) four dimensions of equity. Preservice teachers often incorporated support for multilingual students in classrooms (2) as part of their reflections on equity.

Furthermore, as we analyzed the alignment of the articles with the journal’s mission goals, we critically problematized the term “educational leaders” in the second stated mission goal to better understand its conceptual boundaries and implications for the field. Consultations with TODOS leadership confirmed that the term ‘educational leaders’ has been interpreted and applied expansively to include pre-service teachers, teacher educators, and administrators, alongside other affected parties committed to equitable mathematics education. Therefore, all articles were recoded to accurately address Mission Goal 2.

Our final phase of analysis included coding the type of paper (empirical/theoretical), grade level, and research participants.

Table 1*Examples of Theme Consolidation*

Theme	Selection of initial consolidated indicators	Sample articles (may appear more than once)
Equity and Social Justice	Equity and social justice in mathematics education, Addressing social issues through mathematics, Equity and access in mathematics education, Interrogation of White supremacy culture	Edwards (2011); Jackson & Roberts (2017); Kim & Suh (2020); Ramirez & McCollough (2012)
English Language Learners and Multilingualism	Language development through mathematics, Scaffolding and support for Emergent Bilinguals, Recognizing resources and strengths of multilingual learners	Jackson & Roberts (2017); Krause & Colegrove (2020); Kim & Suh (2020); Teemant et al. (2018); Yi et al. (2020)
Culturally Responsive Teaching and Practice	Culturally relevant pedagogy in mathematics, Global awareness and cultural competence, Culturally responsive teaching, Reflection and responsivity	Jackson & Roberts (2017); Teemant et al. (2018); Yi et al. (2020); Ramirez & McCollough (2012)
Identity, Power, and Representation	Identity in mathematics education, Political clarity and critical consciousness, Identity and race conversations in Education	Edwards (2011); Jackson & Roberts (2017)
Family and Community Engagement	Building relationships with families, The role of family in antiracist education, Experiential learning and community engagement	Krause & Colegrove (2020); Ramirez & McCollough (2012)

Analysis Results

In this section, we highlight key trends across the 80 reviewed articles. We begin by presenting the results of key background characteristics—author types, focal grade levels, and an overview of research participants in empirical studies—and then discuss the key trends based on the five themes and alignment with the TODOS mission statement goals. Lastly, we discuss the overlapping of themes with their corresponding characteristics (i.e., type of paper, grade level, research participants).

Background Characteristics of Studies' Authorship

Researchers, by a large margin, represented the highest percentage of authors of *TEEM* articles with 70% of total authors identifying as researchers, most often professors at higher education institutions. Seventy-two out of 80 total reviewed articles included at least one researcher as an author. Only 16% of authors were current K-12 teachers, while 24% of authors were current graduate students (most often doctoral students). Notably, 17 articles total had at least one teacher or graduate student author. Only one article included one K-16 student author, and three articles included community leaders as authors, most often affiliated with education non-profits (2 authors), with one author self-identifying as an activist-scholar. No articles were explicitly co-authored with parents or family members. Full results of this analysis are presented in Table 2.

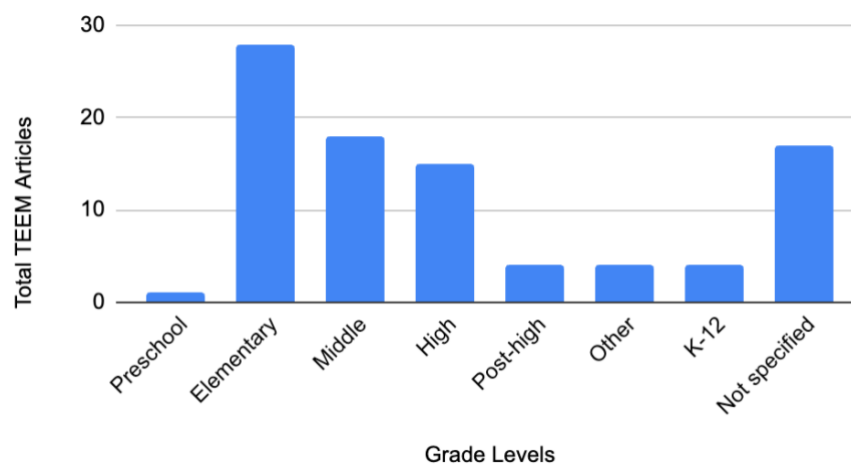
Table 2*Author Distribution*

	Number of authors*	Percentage	Number of articles
Researchers	140	70%	72
Teachers	32	16%	17
Graduate Students	24	12%	17
K-16 Students	1	0.5%	1
Parent/community leader	3	1.5%	3

*These author counts are not unique. Therefore, if one individual authored multiple articles, they would be counted as an author for each of those publications.

Grade Levels

The grade levels addressed across *TEEM* articles are reported in Figure 2. It is important to note that the grade levels captured in this graph refer to the level of mathematics education targeted. This means that an article focused on supporting preservice elementary mathematics teachers would count in the elementary mathematics category; even though the research participants were preservice teachers, the focus of the mathematics was on elementary mathematics. Some articles addressed more than one grade level; therefore, each article represented below is not unique. For example, six articles addressed both elementary and middle school settings, while five additional articles addressed both middle and high school settings.

Figure 2*Grade Levels Addressed in TEEM Articles*

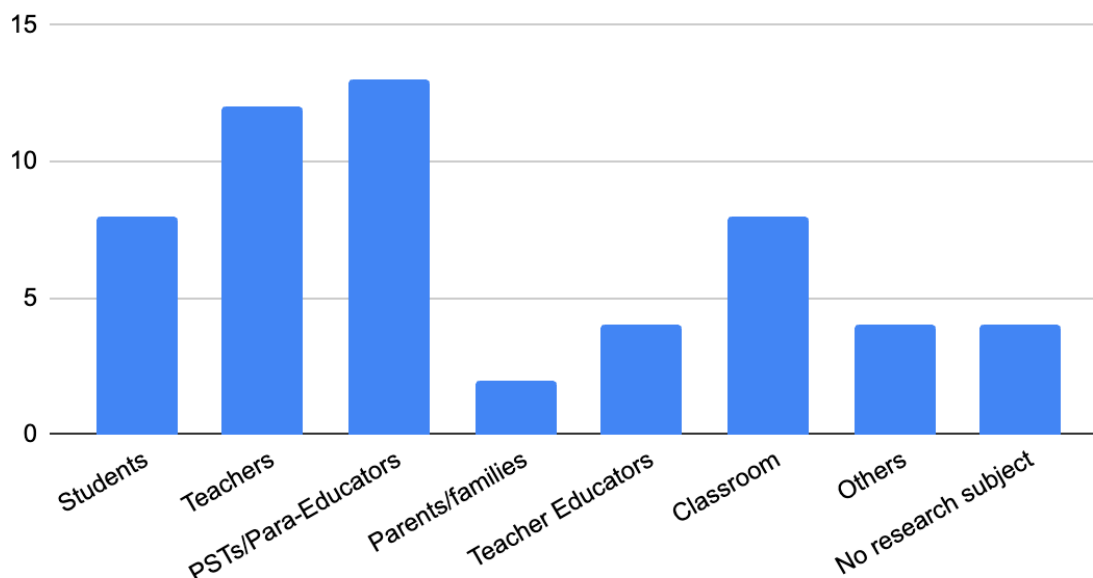
The highest number of articles addressed elementary grades in some capacity ($n = 28$), followed by middle school ($n = 18$) and high school ($n = 15$). Seventeen articles did not specifically address any grade level; in many cases, these articles were conceptual frameworks that did not specifically target any particular grade level. The four articles classified as “other” primarily included author self-reflective essays about their own mathematics education experiences.

Exploration of Research Subjects in Empirical Studies

After exploring authorship and focal grade levels, we wanted to understand more about the research participants in studies. To conduct this analysis, we first identified the number of empirical studies; we identified 55 out of 80 total articles as being derived from empirical data. From those, the main research subjects were coded (see Figure 3).

Figure 3

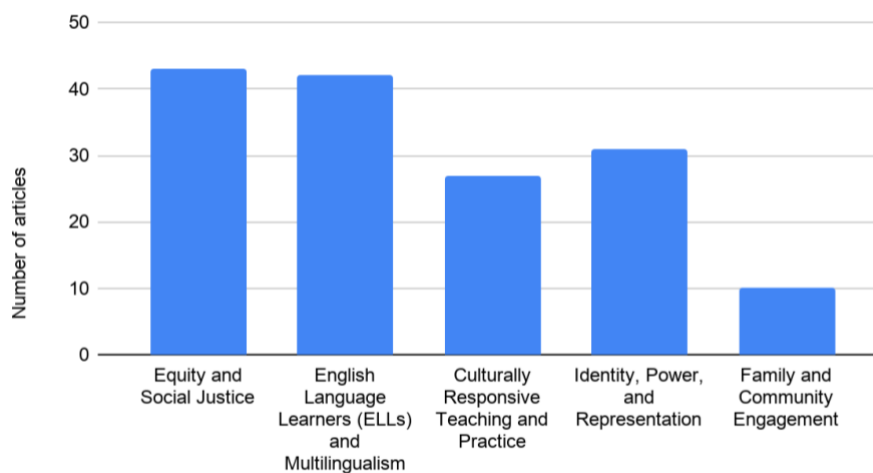
Research Participants in Empirical Articles



The group of preservice teachers and paraeducators is the most frequent ($n = 13$), followed by teachers ($n = 12$). Beyond these articles, eight include both students and teachers in classroom settings or center students exclusively. It should be noted that there are only two articles on parents and communities, which could represent an opportunity for future articles. The other three articles in the “Others” category include teacher and district leaders, library-based educators, and the author’s self-narrative. Articles that do not include a human research subject primarily include textbooks, task analyses, or course redesigns.

Themes and Mission Goal Alignment

We examined the total number of articles aligned with each identified theme and each mission statement goal. When we began this review, our initial interest was in identifying what broad topics *TEEM* articles addressed (i.e., article themes) and how the articles aligned with the TODOS mission goals to identify any potential goals that authors may want to address in articles in future issues. The total number of articles aligned within each theme and mission goal is listed below. It is important to note that several articles addressed multiple themes and mission goals; therefore, the total number of articles represents more than the 80 total articles reviewed.

Figure 4*Themes Identified in TEEM Articles 2009-2025*

The highest numbers of articles engaged with research topics connected to Equity and Social Justice (43 articles) or English Language Learners and Multilingualism (42 articles), followed by Identity, Power, and Representation (31 articles) and Culturally Responsive Teaching and Practice (27 articles). Only 10 articles directly addressed Family and Community Engagement.

With regard to mission goal alignment (see Figure 5), all 80 reviewed articles addressed mission goal 1 (advancing educator knowledge), 2 (developing and supporting educational leaders), and 3 (generating and disseminating knowledge to the public). This unanimous alignment with Mission Goal 3 is not altogether surprising, given *TEEM*'s primary purpose as a journal to disseminate knowledge to the broader TODOS and mathematics education communities. Neither is it surprising to find unanimous alignment with Mission Goal 1 due to *TEEM*'s emphasis on combining topics relevant to research and practice; by design, then, articles in *TEEM* should (and do!) support building educators' knowledge base. Lastly, given the expansive definition of "educational leader" provided by TODOS leadership, it follows that all *TEEM* published articles have some implications for educational leaders as well. Sixty-one articles addressed Mission Goal 4, connected to informing the public and influencing educational policy. Articles that did not address this mission goal were primarily concerned with classroom-focused instructional moves. Lastly, the fewest number of articles (15 in total) directly addressed Mission Goal 5, which aimed at informing families about educational policies and learning strategies. This represents a potential area for article focus in future issues.

Overlap Between Themes and Mission Goals

Combining the analysis of themes and mission goals allows us to investigate patterns in how articles addressing different mission goals may foreground certain topics captured in our themes. In Table 3 below, you may note that these numbers are reflected in the alignment of each theme with goals 1, 2, and 3. Therefore, this table is most useful in looking at the overlap between themes and goals 4 and 5.

Of the 61 articles that explicitly addressed Mission 4 (see Figure 5), most were connected to Equity and Social Justice (35 articles) or ELLs and Multilingualism (31 articles). Only 5 articles addressed Family and Community Engagement in connection with Mission 4's goal of influencing educational policies and informing the public. Mission 5 aligned with only 15 total articles, most often overlapping with the themes of Equity and Social Justice (11 articles) and Identity, Power, and Representation (9 articles). Relatively few articles addressed both informing families about educational policies or learning strategies directly connected to ELLs and Multilingualism (4 articles)

or Family and Community Engagement (2 articles). Moreover, the five articles that addressed both Mission Goal 5 (informing families about educational policies or learning strategies) and family engagement came from 2020's Special Issues on Multilingual Practice (e.g., Krause & Colegrove, 2020) and Translanguaging (e.g., Translanguaging Study Group, 2020). It is worth noting that while 10 articles aligned with Theme 5 (Family and Community Engagement; see Figure 4), 15 articles aligned with Mission Goal 5 (informing families about educational policy; see Figure 5). This suggests that, beyond the five articles addressing both, other articles that included families or communities as part of their research design were perhaps not explicitly written with an audience of family or community members in mind, or vice versa, where some articles explicitly aimed to share the results of research in schools with families or community members.

Figure 5

Mission Goal Alignments in TEEM Articles 2009-2025

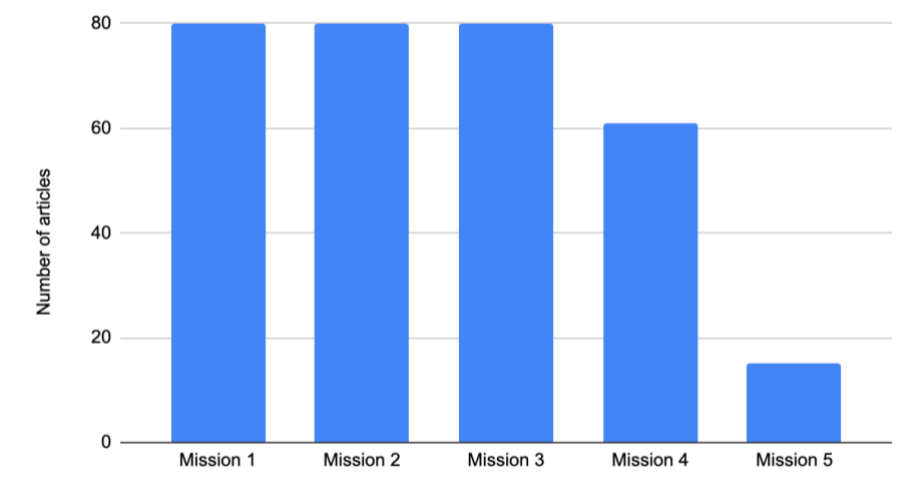


Table 3

Mission Goal and Theme Comparison

	Mission Goal 1	Mission Goal 2	Mission Goal 3	Mission Goal 4	Mission Goal 5	Totals
Equity and Social Justice	43	43	43	35	11	175
English Language Learners (ELLs) and Multilingualism	42	42	42	31	2	159
Culturally Responsive Teaching and Practice	27	27	27	22	4	107
Identity, Power, and Representation	31	31	31	24	9	126
Family and Community Engagement	10	10	10	5	5	40
Totals	153	153	153	117	31	607

From this point forward, we center our analysis on how the five themes overlap with the articles' background characteristics, as opposed to their alignment with the mission goals. We chose to deemphasize alignment with the goals due to the alignment of all articles with the first three mission goals; therefore, overlap with themes is a more fruitful line of analysis.

Exploration of Themes and Overlap With Relevant Characteristics

We then decided to explore how our five identified themes overlapped with each other and different characteristics of *TEEM* articles, including author professional identity and the research participants in empirical studies.

Concurrence Between Themes

Table 4 details the co-occurrence of the five identified themes with one another. There was significant overlap between studies that addressed both Equity and Social Justice and Identity, Power, and Representation (25 co-occurrences). The themes of Equity and Social Justice and ELLs and Multilingualism only co-occurred eight times, despite the high incidence of both themes independently. One key example is Kim and Suh's (2020) article entitled "Transmodalising for Equitable Mathematics Instruction for Multilingual Classrooms."

Table 4

Concurrence Between Themes

	Equity and social justice	ELLs and multi-lingualism	Culturally responsive teaching and practice	Identity, power, and representation	Family and community engagement
Equity and Social Justice	43	8	15	25	5
ELLs and Multilingualism		42	14	8	5
Culturally Responsive Teaching and Practice			27	9	6
Identity, Power, and Representation				31	3
Family and Community Engagement					10

Culturally Responsive Teaching and Practice co-occurred frequently with both Equity and Social Justice and ELLs and Multilingualism. This shows that many articles place a joint emphasis on how to teach multilingual learners in culturally responsive ways. A few key articles that highlight this relationship with multilingual learners include Teemant et al.'s (2018) "Differentiating Mathematics Instruction for Multilingual Students using Critical Sociocultural Practices" and Vomvoridi-Ivanović and Razfar's (2013) "In the Shoes of English Language Learners: Using Baseball to Help Pre-service Teachers Understand Some Complexities of Language in Mathematics Instruction." Similarly, an emphasis on the relationship between culturally responsive teaching and equity is

represented in articles such as Wilson and Alasry's (2023) "Antiracist Care in a Linguistically Diverse Mathematics Classroom: A Case Study."

60% of articles that addressed Family and Community Engagement also addressed Culturally Responsive Teaching, while 50% also addressed either Equity and Social Justice or English Language Learners and Multilingualism. The lowest area of overlap for articles addressing Community and Family Engagement was with Identity, Power, and Representation (3/10 articles).

Themes by Author Group

Turning toward the overlap between article authorship and our five identified themes (see Table 5), it is first perhaps noteworthy that all articles authored by K-16 students and community leaders involved Equity and Social Justice and Identity, Power, and Representation. Interestingly, all 10 articles addressing Family and Community Engagement included researcher authors. The number of articles largely follows expected patterns, given the overrepresentation of articles authored by researchers.

Table 5

Themes by Author Group

	Equity and social justice	ELLs and multilingualism	Culturally responsive teaching and practice	Identity, power, and representation	Family and community engagement
Researchers	36	40	25	27	10
Teachers	12	5	5	10	1
Graduate Students	11	9	5	7	0
K-16 Students	1	0	0	1	0
Parent/community leader	3	0	1	1	0

Research Subjects and Themes

We now return to the 55 empirical studies to examine their themes and research subjects. For ease of interpretation, we only included the research participants categories containing more than three studies and excluded the "other" category (see Figure 3)—this left us with students, teachers, PSTs, teacher educators (excluding the joint article with PSTs), classroom-focused articles, and articles with no human research subject. The results appear in Table 6. While multilingualism is the most frequent theme, closely followed by Equity and Social Justice, Family and Community Engagement remains the least prevalent. The number of articles could be counted across multiple themes because a single article may include more than one theme.

It is notable that within studies that address Family and Community Engagement, preservice teachers were the most represented research participants. This is heartening to see that preservice teachers are being involved in considering family and community engagement heading into their future classrooms. It is also particularly noteworthy that out of the eight total articles focused on students and teachers in classrooms, all eight address English Language Learners and Multilingualism in some capacity.

Table 6*Themes by Research Participants*

	Equity and social justice	ELLs and multilingualism	Culturally responsive teaching and practice	Identity, power, and representation	Family and community engagement
Students	3	6	1	3	0
Teachers	7	6	3	4	0
PSTs / Paraeducators	5	7	7	5	3
Teacher Educators	3	1	0	1	0
Classroom focus	2	8	3	3	0
No human research participants	3	1	2	3	1

Next Steps and Future Directions for *TEEM*

The purpose of this review was to highlight trends across *TEEM* articles published from 2009 to 2025. While we offered insight into trends and patterns across the articles, this is not an exhaustive list. We hope readers use some of the patterns highlighted here to inform future articles they wish to submit to *TEEM*. For example, there is a clear opportunity to expand participation in the authorship of articles beyond researchers and graduate students to students, families, and community members. At the same time, we celebrate teacher authors and hope to see this trend continue. We want to acknowledge the importance of critical authors/scholars who have been naming and attempting to transform unjust structures within mathematics education and those who work towards being more inclusive by encouraging new authors to continue to share their efforts and accomplishments that align with the mission of TODOS. Another key trend is the relative underemphasis of Family and Community Engagement. We know and recognize there is great work occurring in classrooms, schools, districts, and educational communities connected to engaging families and local and regional communities in mathematics. We need to remind people and make it known that *TEEM* is an outlet to highlight this work.

While we acknowledge that the *TEEM* journal is uniquely positioned within the TODOS organization to address Mission Goal 3 “to generate and disseminate knowledge about equitable and high quality mathematics education,” as well as supporting educators in incorporating language and culture in the teaching and learning of mathematics (Goal 1) and supporting educational leaders (Goal 2), it is worthwhile to consider how articles could more explicitly engage with the latter two mission goals. In other words, how could future *TEEM* articles explicitly inform the public and families about learning strategies for mathematical proficiency? Or is it better delegated to other segments of the TODOS organization? We believe there is potential for authors to think critically about audiences and explore how to translate existing work published in *TEEM*.

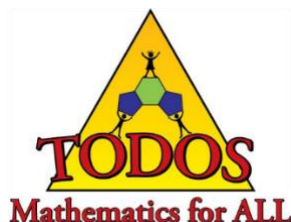
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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. What should be the foci of future *TEEM* articles based on the mission of *TEEM*?
2. What would you like to read most from the future issues of *TEEM*?
3. How are *TEEM* articles related to or supporting your current work in teaching and research?



“When Are We Going to Use Math to Actually Make Change?” A Social Justice Routine for the Mathematics Classroom

Eric Fishman

Abstract

This article describes the development and implementation of a social justice warm-up routine for the mathematics classroom. In this routine, students are presented with data and are then asked to answer a question that begins with: “Is it fair that ...?” I discuss how I used this routine with my 5th and 6th grade students to explore questions of income inequality, labor rights, racial justice, and environmental justice. I reflect on ways I observed students’ critical consciousness develop over time by engaging with this routine. I end by illustrating how students used this routine to analyze the connection between tap water contamination and poverty, and how they took action by writing letters to government officials about their findings.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. If you use warm-up routines in your classroom: what mathematical and socio-emotional skills do your current routines help students build?
2. In what ways, if any, do these routines build students’ critical consciousness and capacity to take action for justice?
3. If you don’t currently use warm-up routines: what has prevented you from doing so, and what supports might help you to experiment with them?
4. How do your students currently engage with discussion and debate around real-world issues in your mathematics classes? If they don’t currently do so, what have been some of the barriers? What supports might help you to do so?

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“When Are We Going to Use Math to Actually Make Change?” A Social Justice Routine for the Mathematics Classroom

Eric Fishman

Years ago, a fifth-grade student in my mathematics class shared some feedback with me: “Mr. Eric, I like that you include Black Lives Matter protests and social justice topics in your word problems, but when are we going to use math to actually make change?” Shawn’s question¹ made me reflect on the inadequacy of the frameworks I was using in my mathematics class. I realized that I had no consistent structures that asked students to use mathematics as a tool to illuminate and dismantle injustices. I considered how to develop a routine that would work toward what Eric Gutstein describes as the three “social justice pedagogical goals” for mathematics teaching. Building on Paulo Freire’s frameworks for liberatory literary education, Gutstein asserts that these goals are reading the world with mathematics, writing the world with mathematics, and developing positive social and cultural identities (Gutstein, 2006). I was struck by Gutstein’s (2003) description of reading the world with mathematics:

[To use mathematics to] understand relations of power, resource inequities, and disparate opportunities ... dissect and deconstruct media and other forms of representation ... examine these various phenomena both in one’s immediate life and in the broader social world and to identify relationships and make connections between them. (p. 45)

Inspired by my conversation with Shawn, and by Gutstein’s framework, I developed a warm-up routine called “Is it fair that ...?” In this routine, I would present students with a data visualization and ask them to answer a question beginning with “Is it fair that ...?” For example: “Is it fair that the American government spends our tax money like this?” or “Is it fair that the world map used in most classrooms is the Mercator projection?” Generally, each iteration of this routine took around fifteen to twenty minutes, including time for students to examine the data, write reflections, share with a small group, and discuss as a class. We completed one of these activities every two to three weeks.

I found that this activity was adaptable to meet the needs of a wide range of students, and I successfully implemented versions of this routine in two different school settings: the first over the 2017-2018 academic year and the second over the 2020-2021 and 2021-2022 academic years. At the start of developing this approach, I was teaching a small fifth-grade mathematics class, with fewer than 10 students, at a suburban independent school near Boston. The families in this school were predominantly upper and owning class. These students identified as white, Asian American, and Black. Several students had mild to moderate learning disabilities. I further developed this routine in my sixth-grade inclusion mathematics class in a Boston public school with around 25 students. Since this was an inclusion classroom, several students had IEPs or 504 plans. Around half the class identified as white and around half identified as People of Color, predominantly Latine and Black, and some students were emergent bilinguals. Their families came from highly diverse social class backgrounds and, since this was a pilot school, students commuted from neighborhoods throughout the city.¹

The kinds of personal experiences students had with the social justice issues addressed in this routine, and their ability to make “text-to-self” connections with the data, varied based on their identities. However, students consistently asserted that the “Is it fair that ...?” routine was one of the most engaging activities of our class. In both settings, the routine resulted in some of the liveliest mathematical discussions I’ve experienced. In this article, I explore my implementation of this routine in both schools.

The next section describes the implementation of this routine in the Boston public school classroom from the 2020-21 and 2021-22 school years, and my description of the water justice project in “Using Data to Take Action” is from my classroom in the suburban independent school during the 2017-2018 school year.

¹ I have changed all student names in this article.

Developing Themes and Facilitating the Routine

To build students' understanding over time, I developed themes to connect the data visualizations we examined over the course of each year. In this article, I'll share two examples of year-long themes: inequity during the Covid-19 pandemic, and environmental justice. In order to develop these activities, I periodically reviewed some of my favorite data sources in search of visualizations addressing topics related to the year's theme (see "Resources for Developing 'Is it fair That ...?' Activities," below). In selecting visualizations, I tried to give students experience with a diversity of data representations, including different approaches to graphs, charts, and maps. I also considered the complexity of each visualization to determine what supports would be necessary for all students to fully participate in the analysis and discussion. Depending on the complexity of the visualization, I offered a more scaffolded interpretive process. For example, adapting the Visual Thinking Strategies prompts (e.g., Chaparro, 2022), I sometimes asked a series of questions to deepen students' understanding of the data: "What do you think is going on in this graph? What do you see that makes you say that? What more can we find?" Once I was confident that students understood the visualization, we would move to discussing "Is it fair that...?" questions. For instance, in one routine, students were asked to examine the graph from [this New York Times article](#) exploring the distribution of COVID-19 vaccinations between rich and poor countries, in order to answer the question: "is it fair that COVID-19 vaccines are being distributed like this?"

Framing this routine around questions of "fairness" invites students to grapple with what they mean when they ask whether something is "fair." I tried to consistently connect these mathematical discussions to conversations we had at other times in our classroom, about what it means to work for equity and liberation, not just equality (e.g., Center for Story Based Strategy, n.d.). I also found that students' divergent understandings of fairness were an important feature of the discussions. As will become clear in the classroom examples below, this framing pushed students to engage with questions such as: "Who is helped and who is harmed by this? In what ways?"

During the 2020-21 school year, while teaching my 6th grade class, we focused on questions of inequity during the Covid-19 pandemic. We examined data that addressed rates of vaccine distribution to different countries, uses of federal funding during the pandemic, and shifts in wealth distribution in the United States. Over time, my hope was to build students' critical analysis connected to inequality during the pandemic.

Early in that school year, we considered the question, "Is it fair that billionaires gained so much money during the pandemic?" Students watched a video - including several graphs - showing that between March 2019 and September 2020, American billionaires had become \$637 billion richer (Woods, 2020). After discussing the graphs in small groups, their responses were divergent.

"It is fair, because they already have so much money, so \$40 billion would not do much to their bank account," shared Luca.

"And they do deserve it, because people bought from them and they are working hard," agreed George.

Betsy asked their classmates to consider the context: "It depends on how you got your money and what you are using it for. If you are using it for good then it's okay, but if you got your money from things that aren't good and you're wasting it, then it's not fair."

Others had a clear opinion that this was inequitable. Maya said: "Millionaires should give money for Covid testing. Or to help people buy things like groceries."

John agreed. "It is not fair that billionaires gain so much money. They should give more money away than they gain. That is money that could have gone to help people during the pandemic," he asserted. "Now I'm mad." Students often shared their emotional responses to the data we examined, and several remarked that they were not used to feeling emotional investment in what we studied in mathematics class. Their emotional engagement also led them to look closer at the data – and to ask questions about actions we could take in response to what we were learning.

My personal response to the questions I posed to students was often, "No, this isn't fair." But I tried as much as possible to let the students offer feedback to each other, instead of trying to control the discussion — as long as

nothing students shared was hurtful. I did offer guiding questions during some discussions in response to students' observations. For example, I later asked George, who thought it was fair for billionaires to make that much money because they are working hard, "do you think the billionaires are working harder than the people who work for them?" I asked Betsy, "do you think it's better for rich people to 'do good' with their money, or for the government to provide services for people?"

I often reminded students that there was no one "correct" answer to the questions we explored in this routine. I myself didn't always have answers to students' questions. I would often either encourage students to do their own research and get back to us about what they found out, or I would offer to investigate an unanswered question myself, and then give them an update. If discussions became heated, I found it helpful to refer all of us back to our collectively created classroom agreement (for further reflections on classroom agreements, see Fishman, 2021).

In June 2021, as an extension to the "Is it fair That ...?" routine, students completed a multi-day project exploring the gap between salaries of CEOs and the lowest paid workers in their companies. This project asked students to utilize a range of mathematical skills learned throughout the year, including division with decimals, as well as simplifying and reasoning with fractions and ratios (see, e.g., the [handout](#) I developed for this activity, which utilizes data from the U.S. Securities and Exchange Commission, n.d.) You could also make this project slightly easier by compiling a list of options of CEO salaries and corresponding worker salaries for students to use, instead of having them look up the salary information themselves (see, e.g., Equilar, 2024).

Although there was some disagreement between students about the "fairness" of the salary gap during this final project, I noticed a significant shift in students' reasoning over the course of the year. Some students who had previously been in favor of billionaires making more money had changed their thinking. George, for example, now asserted, "No it's not fair, because the CEO of Nike gets paid \$26,750 per hour and the workers make \$20 an hour or less."

Others demonstrated a more robust critical and mathematical analysis than earlier in the year. Elliot, for example, argued that "The CEO barely does anything besides make choices! Workers are tired from working 40 hours or more a week."

"It's not fair because Elon Musk isn't working as hard, but he gets over 80,000 times the pay as his workers in Tesla," agreed Meyer.

Maya made a connection to her learning about labor strikes during the pandemic. "Amazon people went on strike." George asked why, and Maya explained. "They weren't getting paid enough, even though they were working twice as hard as the CEO." Even though each "Is it fair that ...?" activity is short, students can build insight over the course of the year through practice with this routine.

During the 2021-2022 school year, many of the "Is it fair that ...?" conversations connected to units from students' ELA, social studies, and science classes about environmental justice, and particularly climate justice (for an example of this theme-based climate justice curriculum, see Fishman, 2023). For example, we examined data related to the distribution of green space in Boston, Black farmers' loss of land in the United States, and the question of international climate change reparations. This was another approach to help deepen student responses, despite the routine's relative brevity: building on background knowledge students were acquiring in other subjects. For students who might otherwise struggle to think critically about the data, these connections were helpful. For example, when examining a visualization depicting the connections between countries' relative wealth and their CO₂ emissions, I could ask students: "Does this data remind you of anything we read about the idea of 'climate justice' in *How to Change Everything* (Klein, 2021) last week?" Drawing these thematic connections also helped students see their mathematical learning as more integrated with the reading, writing, and thinking they were doing in other subject areas.

Using Data to Take Action

For Gutstein, “writing the world with mathematics” is “a developmental process, of beginning to see oneself capable of making change ... developing a *sense of social agency* ... a belief that [one is] capable of contributing to historical processes” (Gutstein, 2006, p. 27). My student Shawn’s original question demonstrated just such a desire for social agency: “When are we going to use math to actually make change?” This question stuck with me, and I often considered how I could expand this routine to help students use what they’d learned to take action.

I’ve found that there is space for this routine to evolve into longer youth action projects, such as an environmental justice investigation that asked: “Do different communities in the Boston area have fair access to clean water?” We began with a discussion of the history of governmental neglect of clean water access in working class communities and communities of color. Students then used the Environmental Working Group Tap Water Database (2021) to study whether there was a correlation between poverty levels and the level of contaminants in public water supplies in the Greater Boston area. Each student chose two cities or towns to analyze; students combined their data to develop visualizations and draw inferences. Students researched possible solutions, then wrote letters to stakeholders, including state senators, the Massachusetts governor, and the director of water supply protection for the state. Although not all students received responses, a handful did later receive replies from the stakeholders, thanking the students for the perspectives they shared and outlining steps they were taking to work toward tap water purity.

In their letters, students explained the main conclusions they wanted people to take away from their research. Edgar, for example, explained:

We found that as poverty level increases the concentration of contaminants over the health guideline increases. For example, if you live in North Amherst, the concentration of the contaminants in the water is 7,000 to 8,000% higher than what’s healthy. Many of these contaminants such as bromodichloromethane, chloroform and many more can cause cancer. People are suffering from their contaminated water.

Yasir gave a powerful argument for why the Massachusetts Department of Public Health should take action:

We think you should take action because, word for word, your website says, “the Department focuses on preventing disease and promoting wellness and health equity for all people.” Your mission is to help people have health equity. This data shows that people do not have health equity with water. Here are some suggestions: fund programs that improve tap water quality, replace old, corroded pipes, upgrade treatment and distribution facilities and strengthen and enforce existing standards.

Later that week, I watched Shawn look determined as he put his letter into the mailbox. He turned to me and smiled. He was using math to make change.

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Resources for Developing “Is It Fair That ...?” Activities

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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. In what ways could “Is it fair that ...?” build on mathematical routines or discussion structures already present in your classroom?
2. What structures, practices, and classroom agreements would support your students to effectively engage in hard conversations brought up by this routine?
3. What social justice theme(s) would be engaging for your students to investigate using this routine in math class this year? Try having a conversation with your students to explore what topics are on their minds. Or ask other teachers on your grade team to find out what social justice theme(s) students are learning about in their other classes.
4. Try this: using the resources above, find 2-3 data visualizations as a starting point to implement a version of “Is it fair that ...?” in your classroom.

Lesser Is Greater: Thanks to the Outgoing Associate Editor and a Founding *TEEM* Member

This issue of *TEEM* is the first without Larry Lesser in a leadership role. Larry is one of the three founding editors of *TEEM*, along with Cynthia Anhalt and Miriam Leiva. Larry served as Editor for the first five issues, between 2009 and 2013; and was the Associate Editor for all subsequent issues, a total of 20. He also named the journal!

Larry's dedication to *TEEM* has been unwavering. He has championed the journal widely and has run many information sessions for prospective authors and reviewers to demystify *TEEM*'s submission and review process. His insistence on including DARE pre- and post-reading questions in articles makes them more applicable and centers practitioners as readers of *TEEM*. His, and other founding editors', vision for the journal as a space for practitioners and researchers, teachers and academics, families and communities, to highlight high quality mathematics experiences for all learners, especially Latina/o/x, has been an inspiration for all who have worked with him on *TEEM*.

Larry's skill with language and proofreading abilities are legendary. It is unlikely that anyone will be able to read articles so deeply and incisively as he has. He is the master of catching typos, incorrect use of the APA format, and awkward sentence structure. His deep reading often results in many questions for authors, who may not always want to do another round of revisions, but who produce a better and clearer publication as a reward, thanks to Larry's efforts.

Susie W. Håkansson, past TODOS president and long-time Layout Editor for *TEEM* says the following about Larry's service to the journal:

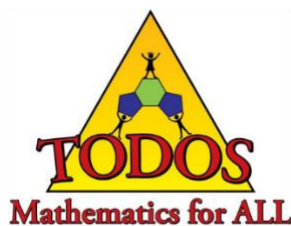
"Larry was the Proofreader for *TEEM* when I became its Layout Editor in 2015. He had an astute eye and knowledge for maintaining consistency within an article and for following APA Style Guidelines. Drafts sent to him to proofread were returned within a day, sometimes within an hour. He was very passionate about promoting *TEEM* and had the belief that *TEEM* could become a highly respected mathematics education journal among scholars.

I became a better layout editor because of Larry, often consulting with him about questions related to formatting or style. He always had an answer and sometimes, he would leave the final decisions to me. *TEEM* was fortunate to have had Larry Lesser as one of the Founding Editors."

We will miss Larry, but are glad to have him as a contributor in this issue and hopefully in issues to come. We are grateful for his vision for *TEEM* and will honor that vision in our future work.



Photo courtesy of Lauren Davis



Singing the Praises of Funds of Knowledge

Lawrence M. Lesser
El Paso, TX

Abstract

The lyric of Bruce Springsteen's signature anthem "Born to Run" was rewritten by the author to offer an efficient gateway to inspire teachers in a professional setting to learn (more) about and implement the transformative students' funds of knowledge pedagogy of Dr. Louis C. Moll. This manuscript includes the rewritten lyric, intention/context, references, and DARE questions.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. What are some affordances of song in building community and efficiently communicating a message in a memorable way? If you have used or experienced educational song in a professional development or classroom context, describe the experience
2. How might/should your teaching be informed by the history and culture of the community where you teach?
3. Were you aware of Moll's work on students' funds of knowledge? If so, where and how did you learn about it? Do most teachers at your school seem to be aware of this approach? Explain.
4. NCES (National Center for Education Statistics) data show that about $\frac{3}{4}$ of public schoolteachers are White/non-Hispanic, which is less diverse than the students they teach. What are your thoughts about the causes, challenges, opportunities, and implications of this dynamic?

Lawrence (Larry) Lesser (ProfessorLesser@gmail.com) is an award-winning songwriter/educator, former high school teacher, and a Founding Editor of *Teaching for Excellence and Equity in Mathematics*. His interests include language, student engagement, teacher preparation, statistics education, and STEAM.

Singing the Praises of Funds of Knowledge

Lawrence M. Lesser

Context and Intention

Before moving to El Paso, I taught full-time at a pluralistic Jewish high school where virtually the whole student body shared a minority culture (Jewish). I used an adapted “funds of knowledge” approach by sitting in on their Judaics classes and having informal conversations with them in settings (advisory periods, assemblies, club meetings, field trips, study away trips) beyond mathematics classes. This sustained broader contact helped me envision how their experiences and cultural/religious identities could connect to learning mathematics (Lesser, 2006). When I began working at UTEP, it felt natural for me to learn about the dominant culture (Latinx/Hispanic) of the student body and to create lessons accordingly, such as my award-winning lesson connecting the teaching of probability to the beloved games *Toma Todo* and *La Lotería*: <https://www.CAUSEweb.org/cause/ecots/ecots22/activity-contest/winners>. It was also natural for me to reflect on how what I had learned about linguistic resources, struggle, and privilege from my experiences in the Jewish world helped me better appreciate the linguistic resources many of my El Paso students have (Lesser, 2015).

The upcoming *TEEM* special issue on Moll’s work inspired me to write a lyric that can be energetically sung to the tune of (the first half of) Bruce Springsteen’s iconic signature anthem from his same-titled album (Springsteen 1975) that has been played for 5+ decades on rock and classic rock stations, performed in a Super Bowl halftime show, landed on “all-time greatest songs” lists (by *Rolling Stone*, NPR, the Rock and Roll Hall of Fame, etc.), and declared by *Billboard* as “simply one of the best rock anthems to individual freedom ever created” (Carlin, 2025). His song captures passionate pursuit of liberation (in the face of adversity, mediocrity, or indifference) which is not unlike what is needed in many classrooms. His overall body of work reflects a commitment to singing about matters of injustice and the struggles of the working class and marginalized, in songs such as “Born in the USA,” “American Skin (41 Shots),” “Lost in the Flood,” “The Ghost of Tom Joad,” “Jack of All Trades,” “We Take Care of Our Own,” and (most recently) “Streets of Minneapolis.”

With my lyric, I intend to inspire teachers (by reading or singing the lyric on their own, in a faculty/department meeting, or in a professional development setting) to feel part of a supportive peer community and have increased motivation to learn (more) about and implement Dr. Louis Carlos Moll’s profound pedagogical approach of students’ funds of knowledge (see Moll 2015 to hear him speak) to help students better connect with mathematics content as well as build a more reciprocal, engaging classroom culture where everyone belongs and contributes. Most public schoolteachers likely did not have the opportunity to be taught this way, so it can help to tap artistic as well as scholarly resources to help bring about still-needed transformation and liberation. I hope this lyric efficiently conveys (it can be sung in under two minutes) enough information to inspire teachers to want to learn (more) about Moll’s work (see References and papers in the upcoming *TEEM* special issue) and I’ll be even happier if teachers are inspired to collaborate with their students to write their own poem or song on this theme, using whatever genre or style honors their own funds of knowledge. But for now, enjoy singing the lyrics alone or with colleagues.

The Lyric: “Students’ Funds (of Knowledge)”

Some teachers teach like they’re just banks that fill up empty heads,
But we know students come to us with knowledge that they live:
How they garden and how they heal,
What they sing and build and play that’s real.
Oh, the history of life in the home
Or community where no one’s alone:
Gotta let their song be sung
Teachers like us need to honor students’ funds!

So why are funds of knowledge so empowering to use?
Confianza with our students makes our lessons true!
Context makes our students care
And helps us teachers be more aware.
Oh, so much life beyond these walls,
So many assets in us all:
Leave the books that leave us numb!
Teachers like us need to honor students’ funds!

It’s fund-amental: we need to honor students’ funds!
It’s fund-amental: we need to honor students’ funds!

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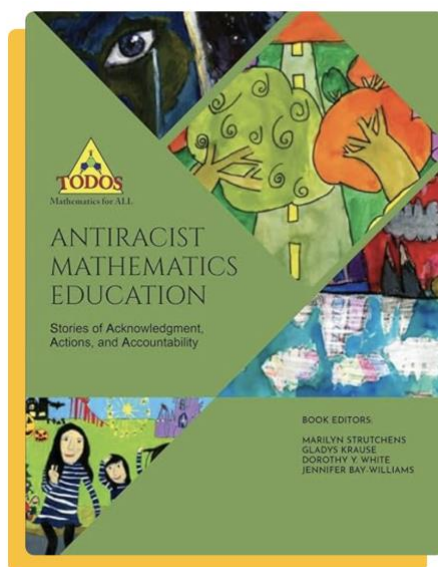
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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. Based on what you know about Moll's work, constructivist learning theories, and Paulo Freire's banking model of education, discuss the meaning of the lyric's opening two lines.
2. The first verse goes on to give examples of realms of a student's home or community life where they have important knowledge and experiences that can enrich the learning within your classroom. Which of these realms (or possibly other realms not listed in the lyric) have helped you connect with your students? How and when do you make room for this in your time with them?
3. The second verse of the lyric mentions *confianza*. What does this word mean to you and how does it affect your lessons and interactions with your students?
4. Near the end, the lyric exhorts, "leave the books that leave us numb." Describe a time you were inspired (perhaps by your students) to go beyond an uninspiring piece of curriculum and make a more authentic connection in your class.
5. If you were not already familiar with Moll's ideas, does this lyric inspire you to want to learn more about them (e.g., see the upcoming *TEEM* special issue)? If you were already familiar with Moll's ideas, do you feel this lyric aligns and summarizes them well? Why or why not?
6. What characteristic of "Born to Run" do you think most affects its level of effectiveness for this purpose? Is it its genre? Is it that it is an uptempo song in a major key? Is it its fame or critical acclaim? Is it some characteristic of Springsteen himself (his ethnicity, his work ethic, his writing about working class American life, his social critiques of American society, etc.)? How might you choose a song that would be of even greater interest than "Born to Run" in your school community? Could you imagine joining forces with teacher or student collaborators to rewrite the lyrics of your chosen song to further share and celebrate Moll's ideas? Why or why not?

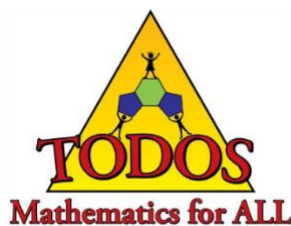
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Analyzing Real Traffic Stop Data for Racial Bias

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Jason Pereira
University of North Carolina
Chapel Hill

Vivaan Sandwar
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Abstract

This student-authored paper describes our—four high school students’—statistical investigation with a sample of 5000 traffic stops from our city. In addition to sharing our analysis to show that Black drivers were disproportionately stopped, we seek to highlight the possibilities that analysis of large datasets open up about talking about race and racism, especially institutional racism. We share this work to inspire teachers to engage their students in developing their critical statistical literacy through investigating real-world data.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. Have you, a friend, or family members, experienced a traffic stop? Did you feel like there was racial bias in the traffic stop?
2. What is race? [Note that this is challenging to answer and the Supreme Court has ruled this in two different ways in *Ozawa vs U.S.* (1922) and *Thind vs U.S.* (1923)]
3. How can you conceptualize racism as a system?
4. If you were examining a traffic stop dataset to determine if there was bias or not, what variables would you like to use in your analysis? Why?

Vineesh Adala (va138@duke.edu) is a student at Duke University studying Public Policy and Economics. He is interested in data analysis and its role in shaping effective public policy. He plans to pursue a career in law, where he hopes to apply quantitative methods to issues in criminal justice.

Tim Jun (tj144@duke.edu) is a student at Duke University who is currently studying Mathematics and Economics, and is involved in the Applied Machine Learning and Quantitative Finance club. He is interested in teaching younger students and using math to model and better understand issues in the humanities.

Jason Pereira (jasonpereira.518@gmail.com) is an Honors Carolina student at the University of North Carolina at Chapel Hill studying Computer Science and Statistics & Analytics. He is actively involved in CS+Social Good and Velocity Labs, where he applies artificial intelligence and machine learning to real-world challenges. He is an Eagle Scout and TEDx Speaker, and will be interning at Amazon Web Services (AWS). His research interests lie in AI and machine learning, particularly in developing data-driven solutions for society.

Vivaan Sandwar (vsandwar@umich.edu) is a student at the University of Michigan - Ann Arbor, studying Mathematics and Economics. On campus, Vivaan is involved in Michigan Venture Club, Michigan Engineering Consulting Group, and Wolverine Sports Analytics. Passionate about the intersection of humanities and financial mathematics, Vivaan is interested in learning more about how to create societal change through the quantitative lens of mathematics.

Anthony Fernandes (anthony.fernandes@charlotte.edu) is Professor in the Department of Mathematics and Statistics at University of North Carolina at Charlotte. He is interested in how statistical analysis of large datasets on social issues can promote critical consciousness of future mathematics and statistics teachers.

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Analyzing Real Traffic Stop Data for Racial Bias

Vineesh Adala, Tim Jun, Jason Pereira, Vivaan Sandwar, & Anthony Fernandes

We are four high school students at Ardrey Kell High School in Charlotte, North Carolina, who came together around our interest in data science. We wanted to get exposure to data science and got in touch with the last author who had designed data investigation modules for mathematics pre-service teachers, as part of their content courses. We were intrigued by the traffic stops module that used real data from the city that we lived in. Though our main interest was gaining experience with data investigations, we learned the importance of understanding the context to interpret the statistical results. The traffic stop investigation was related to racial justice. Based on our own experiences, and our friends', we were familiar with traffic stops and were aware of the issue of 'Driving While Black' where Black drivers are more likely to be stopped. However, we had not seen if the same was true with local data. In this article we describe our experience working with the traffic stops data. We believe that our experience and insights will help teachers who are interested in working with real data to draw insight into a particular social issue.

Dataset and Work

The City of Charlotte regularly publishes traffic stop data. We worked with a random sample of 5000 traffic stops, which were taken from about 124,000 traffic stops between January 2020 and October 2021. We used the Common Online Data Analysis Platform (CODAP) to complete the analysis. The dataset included variables such as the month of the stop, race and gender of the driver and officer, driver ethnicity, was a search conducted, police division, officer age, the reason for the stop, and the result of stop. We met online regularly as a group for about 8 months to reflect on our work. In the initial meetings, we learned how to use CODAP and then attempted to answer the overarching research question: Is there racial bias in the policing of traffic stops in Charlotte? Based on the research question we worked individually, exploring statistical questions that related to the overarching research question, then shared our work and had discussions during the meetings. Below we share samples of explorations using descriptive statistics and informal inferential statistics. Given that Black¹ and white drivers were a majority of the stops conducted, we decided to focus on these races in the questions we asked.

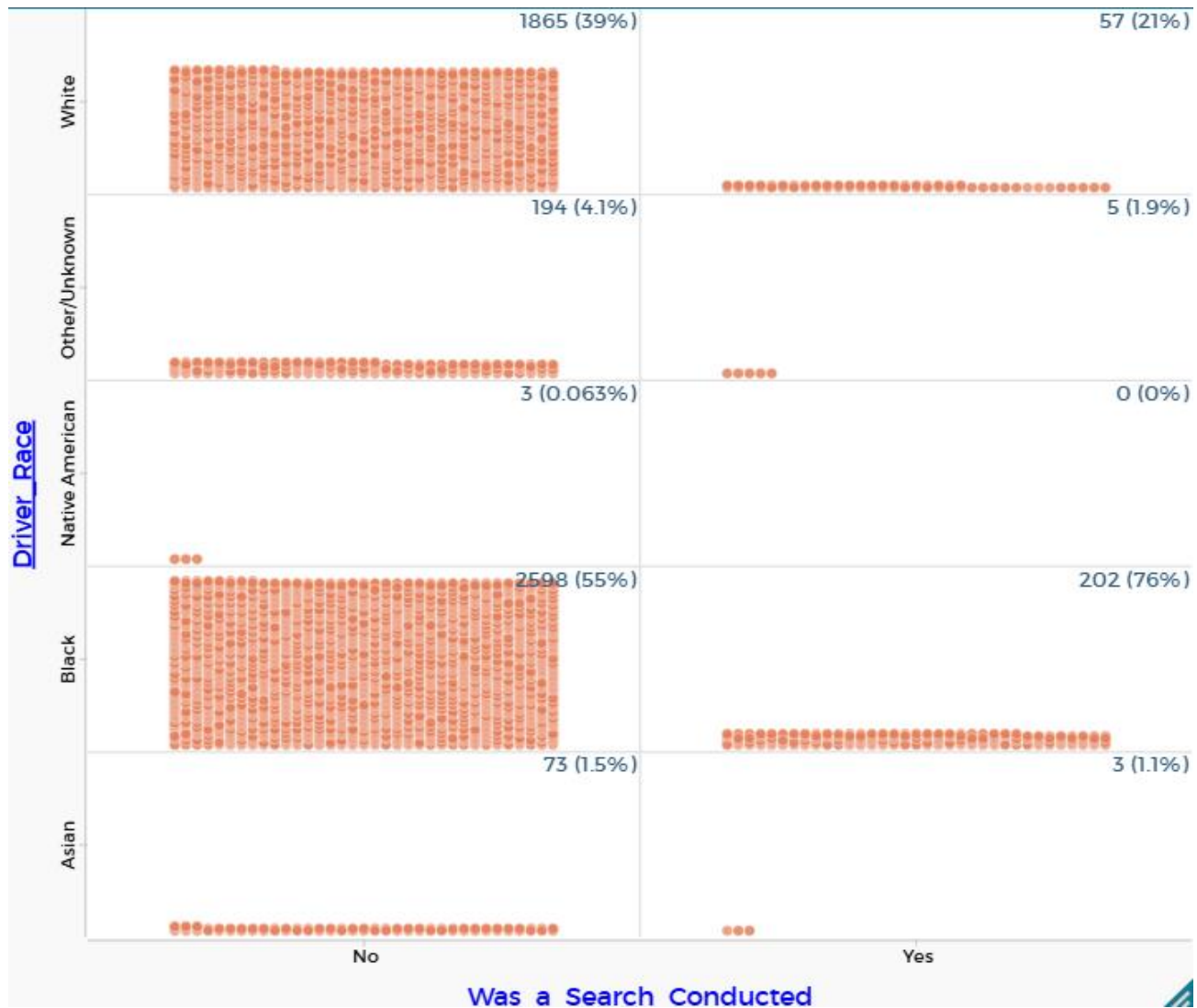
¹ Our motivation to capitalize Black, and not white is guided by Laws (2020) [<https://www.cjr.org/analysis/capital-b-black-styleguide.php>]

Are Black Drivers Searched More Often Than White Drivers After a Stop?

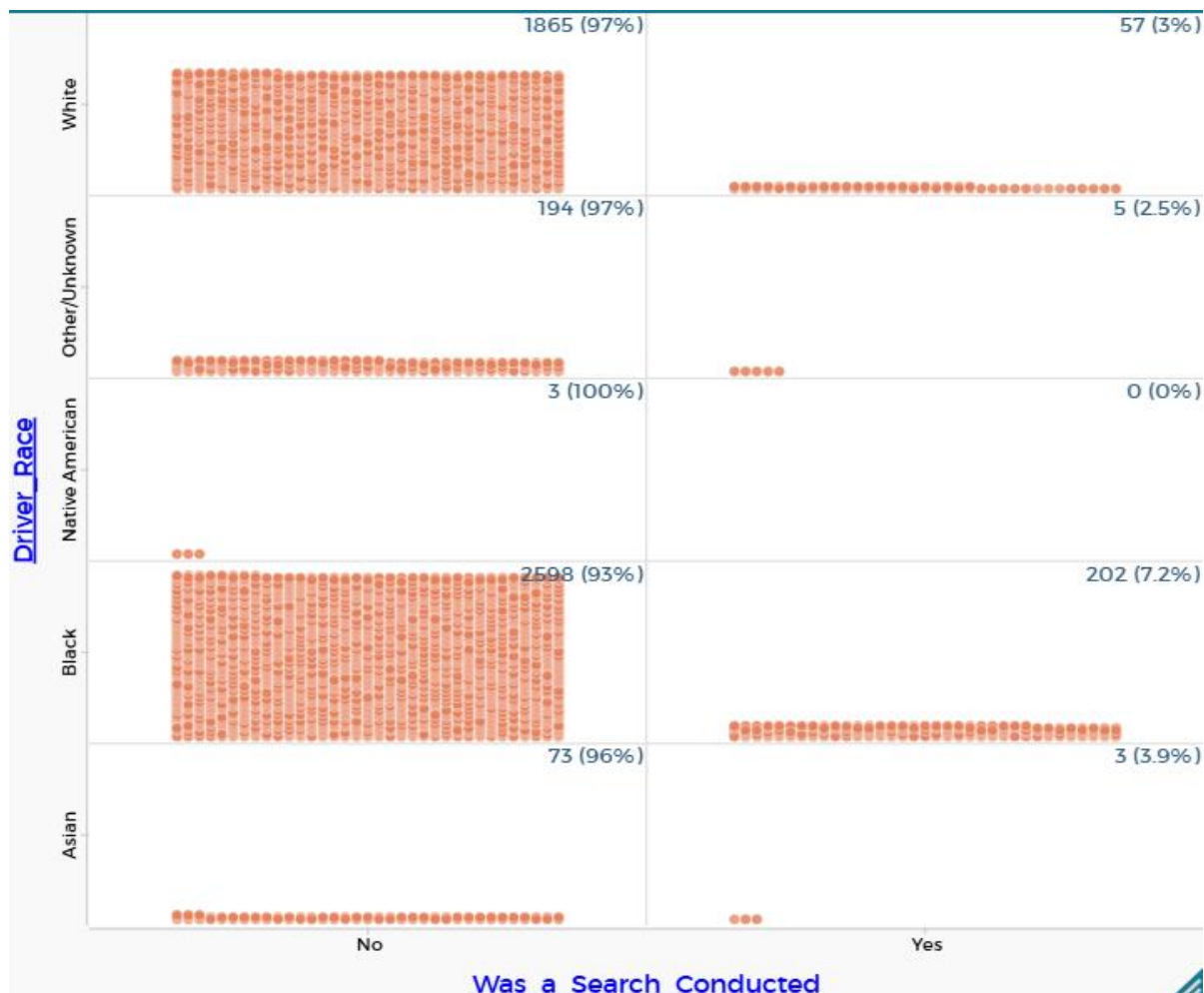
We created a two-way table/graph between driver race and whether a search was conducted, and filtered this by the race of the driver. Black drivers formed 76% of the drivers who were searched, compared to white drivers who were 21% of those searched (Figure 1). This seemed excessive given that Black drivers were 56% of all the stops in the sample.

Figure 1

Searches by driver race (Percents by column)



Further, looking across by race (Figure 2), 7.2% of Black drivers were searched, compared to 3% of white drivers. Thus, Black drivers were 2.4 times more likely to be searched.

Figure 2*Searches by driver race (Percents by rows)*

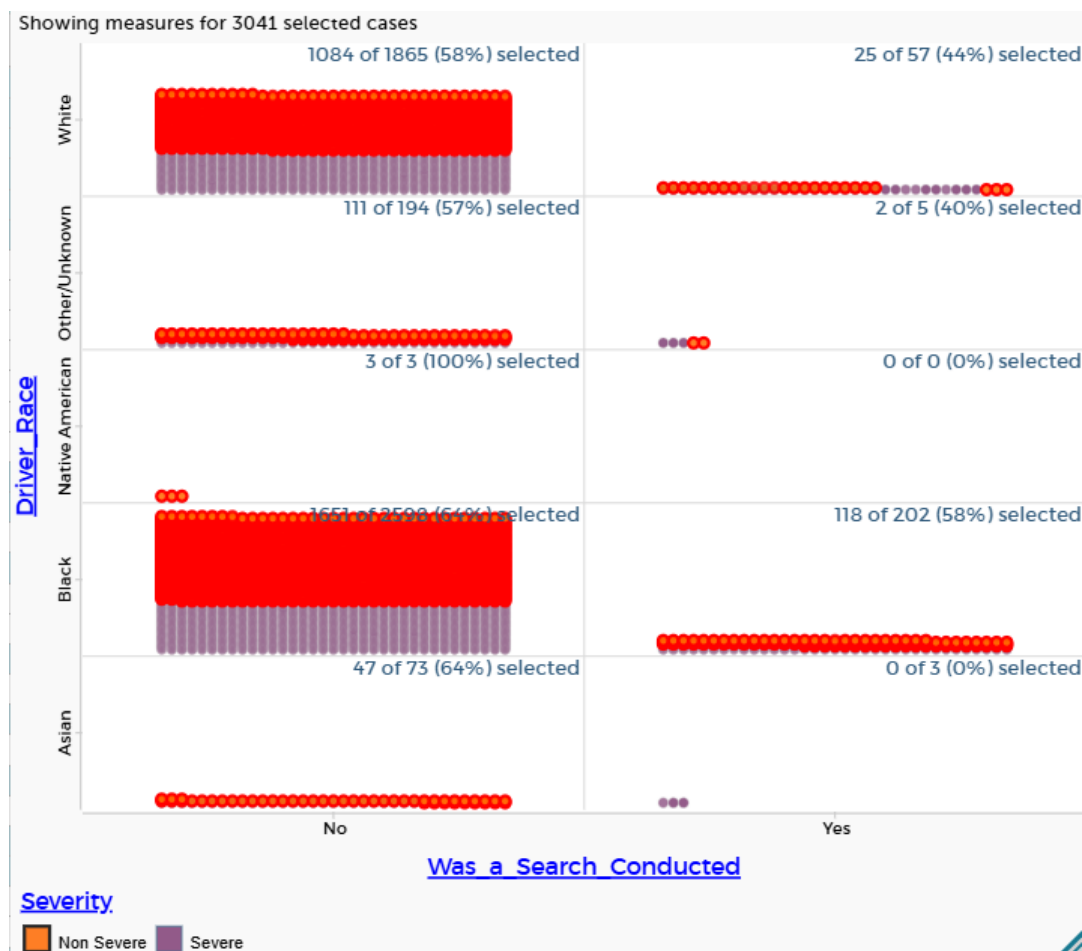
Figures 1 and 2 provided some indication that there could be bias on the part of the officers as they decided who to search. However, we could not be quite sure so we decided to look at the consequences after the search. We conjectured that if the officers' suspicion was not justified, then the driver would have a low consequence. This led to the next question.

Are There Any Differences in the Severity of Consequences for Black Drivers and White Drivers Who Are Searched?

After a stop the drivers get one of the following consequences: no action taken, verbal warning, written warning, citation, or arrest. To answer our question, we created two categories: severe and nonsevere. Severe consequences included citations issued and arrests, and nonsevere consequences included no action taken, verbal warnings, and written warnings. We dropped the severity variable in the middle of Figure 2 (a feature of CODAP) and obtained Figure 3 which allowed us to filter the drivers, who were searched or not, by severity. We also looked at each cell individually and selected the nonsevere consequences. From Figure 3, we see that 58% of Black drivers who were searched received a nonsevere consequence (118 out of 202), compared to 44% for white drivers (25 out of 57). Thus, we see that (a) the suspicion of the police officer seems to play a role in searches, and (b) for most of the Black drivers the search does not yield a severe consequence.

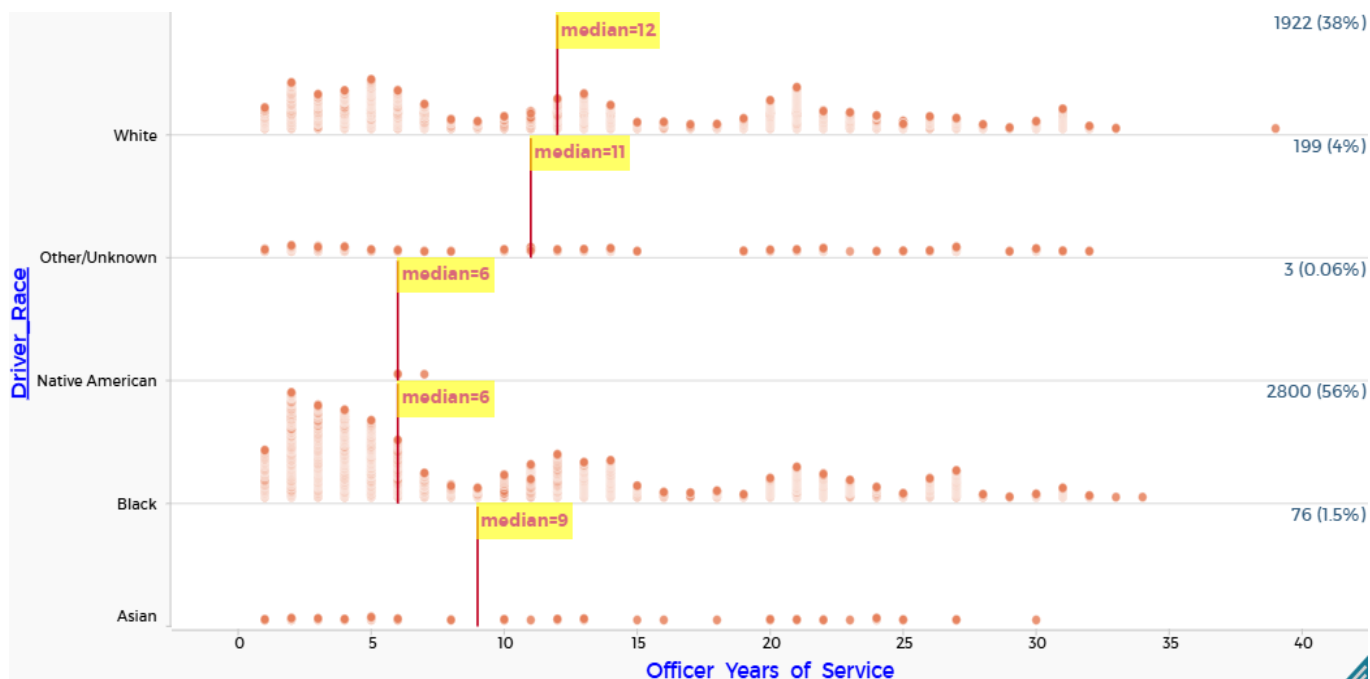
Figure 3

Severity of consequence after a search (Totals by cell)



Are There Differences Between the Race of the Driver That More Experienced Officers Stop, Compared to Less Experienced Officers?

Another exploration was related to the officers' years of service. We believed that officers with fewer years on the force would most likely be younger, would have had interactions with people from other races, and would be more receptive to diversity training. On the other hand, we assumed that officers with more years of service would be older and less likely to be open to diversity training. Looking at the officer years of service partitioned by driver race (Figure 4), we observed that Black drivers were stopped by officers who, on average, spent less time in the force (median 6 years) compared to white drivers, who were stopped by officers with more time on the force (median 12 years). We noted that our assumption about the officers' years of service and the drivers they stopped were not supported by the data. Instead, we wondered if newer officers were being sent to areas that were predominantly Black?

Figure 4*Differences in stops made by race and years of service*

We decided to filter the data by the race of the officer. From Figure 5 we see that the median years of service of Black officers who stop white drivers is 6.5 years and Black officers who stop Black drivers is 6 years. When we filter for white officers (Figure 6), the median years of service is 13 years for officers stopping white drivers, and 6 years for officers stopping Black drivers. From these results we inferred that there are racially segregated neighborhoods in the city that are mostly patrolled by newer officers, both Black and white. We wondered if newer officers were being sent to predominantly Black neighborhoods that were perceived as being more dangerous? Note that we cannot draw causal conclusions from this data and it is possible that deployment practices varied by department and policy.

Are There Differences Between the Proportion of Black Residents in the City and the Proportion of Black Drivers Who Are Stopped?

After the initial exploration, a major question that remained was how we could determine if there was a significant difference between the proportion of Black drivers who were stopped and the proportion of Black residents in the city. One graph that we examined at the beginning (Figure 7) showed that 56% of the drivers stopped were Black. Could it be that the proportion of Black residents in the city was close to 56%?

Figure 5

Differences in stops made by race and years of service, filtered by Black officers

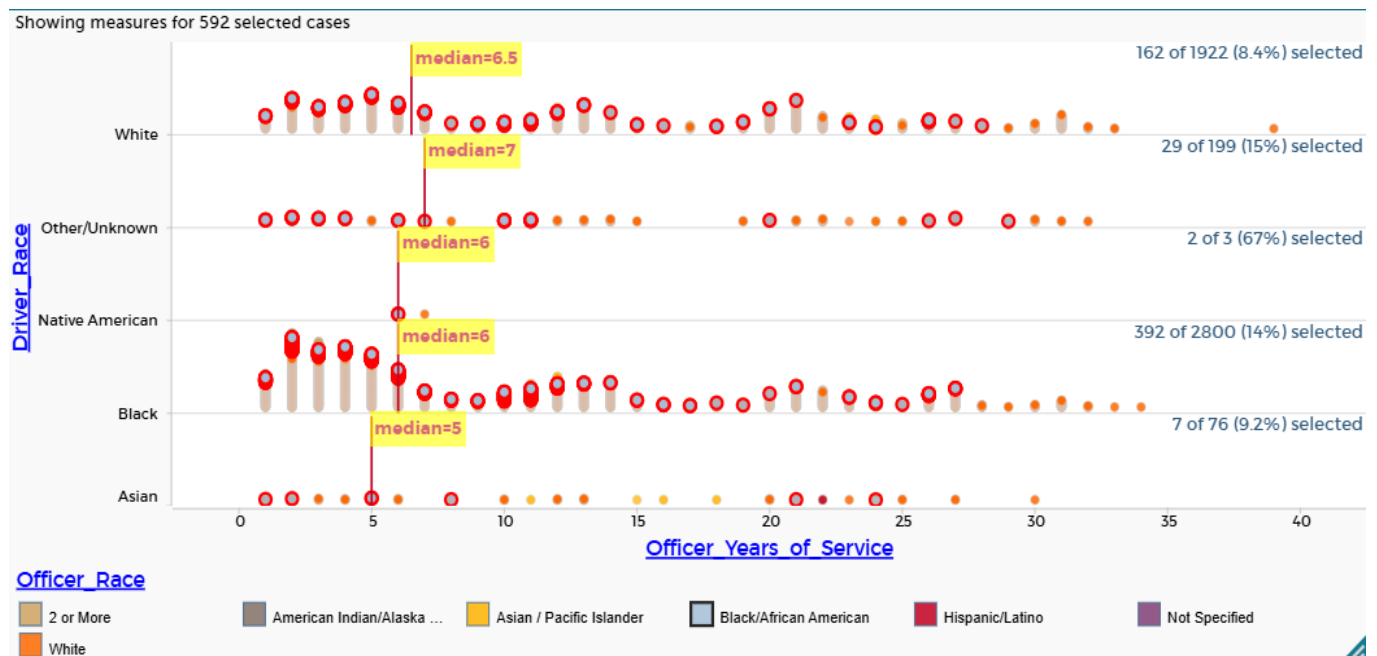


Figure 6

Differences in stops made by race and years of service, filtered by white officers

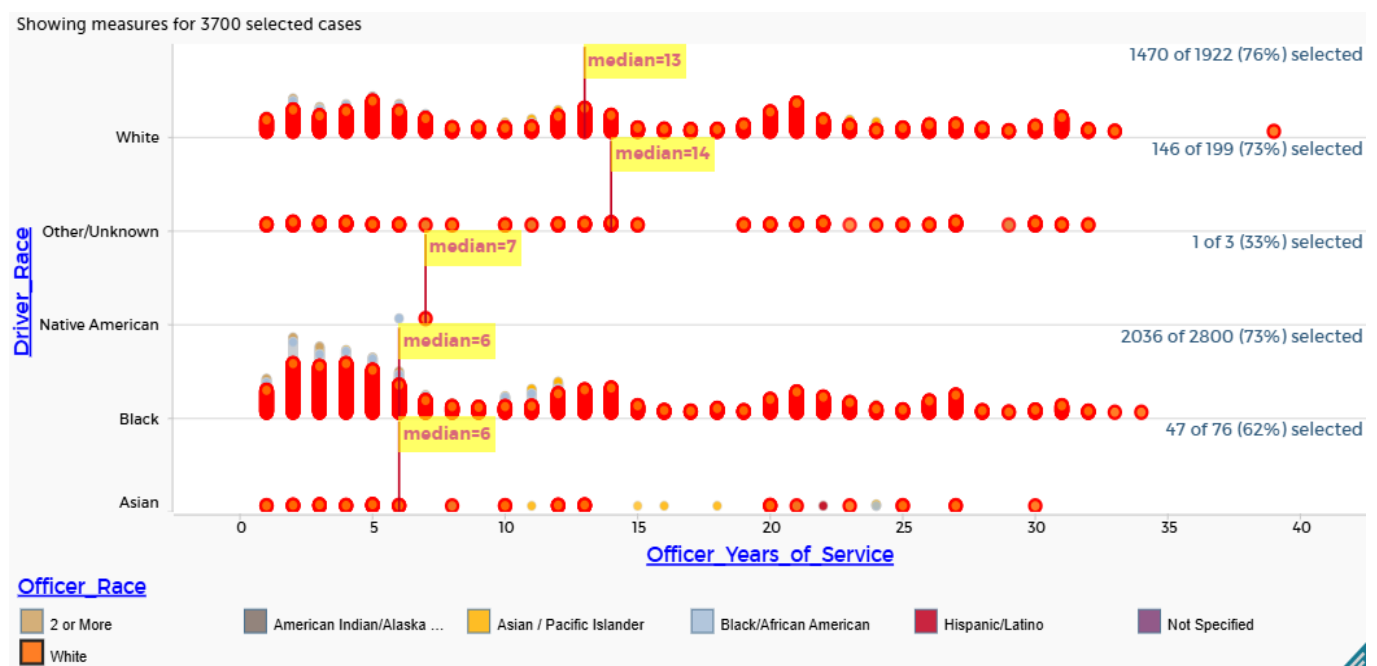
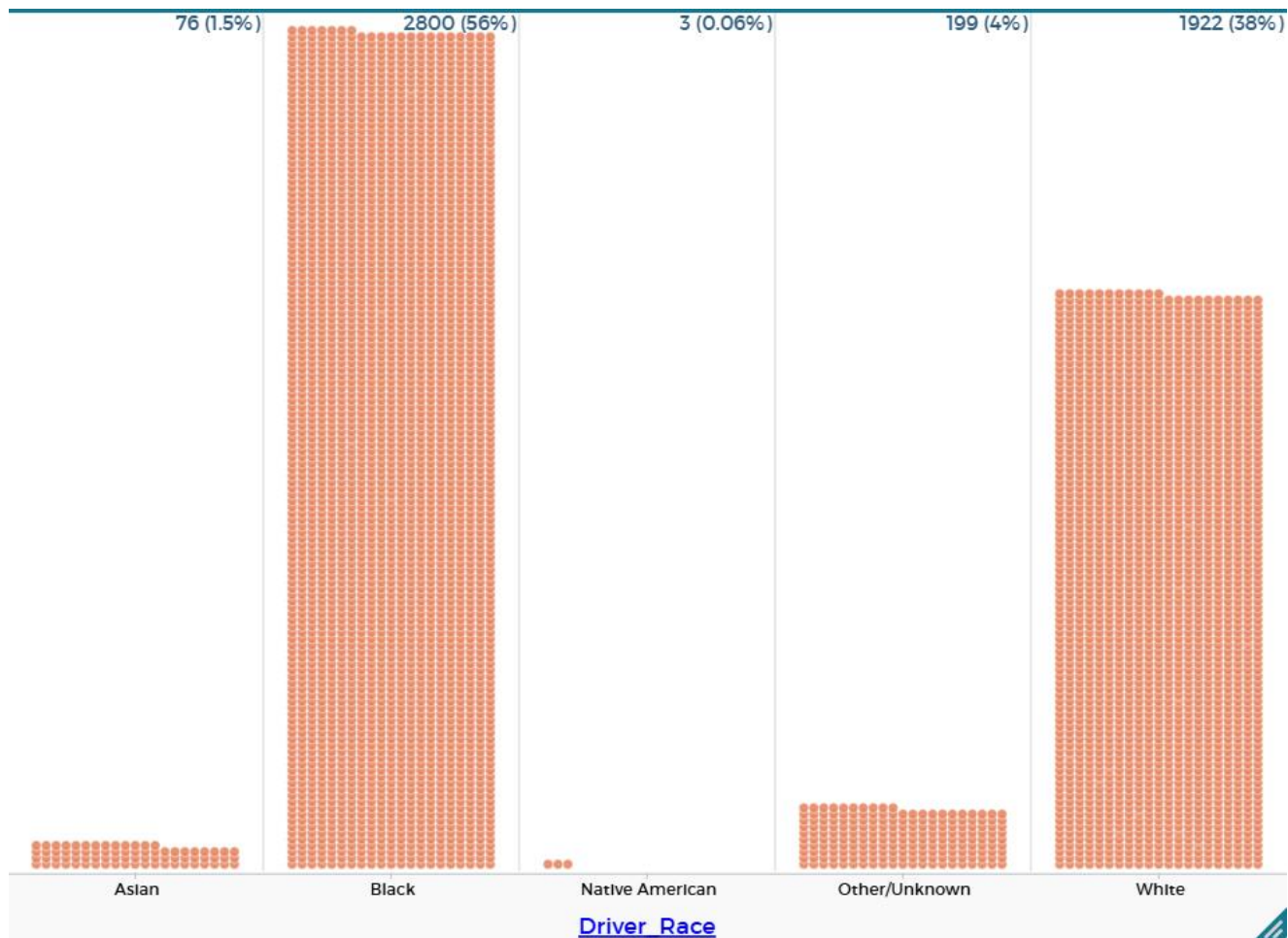


Figure 7

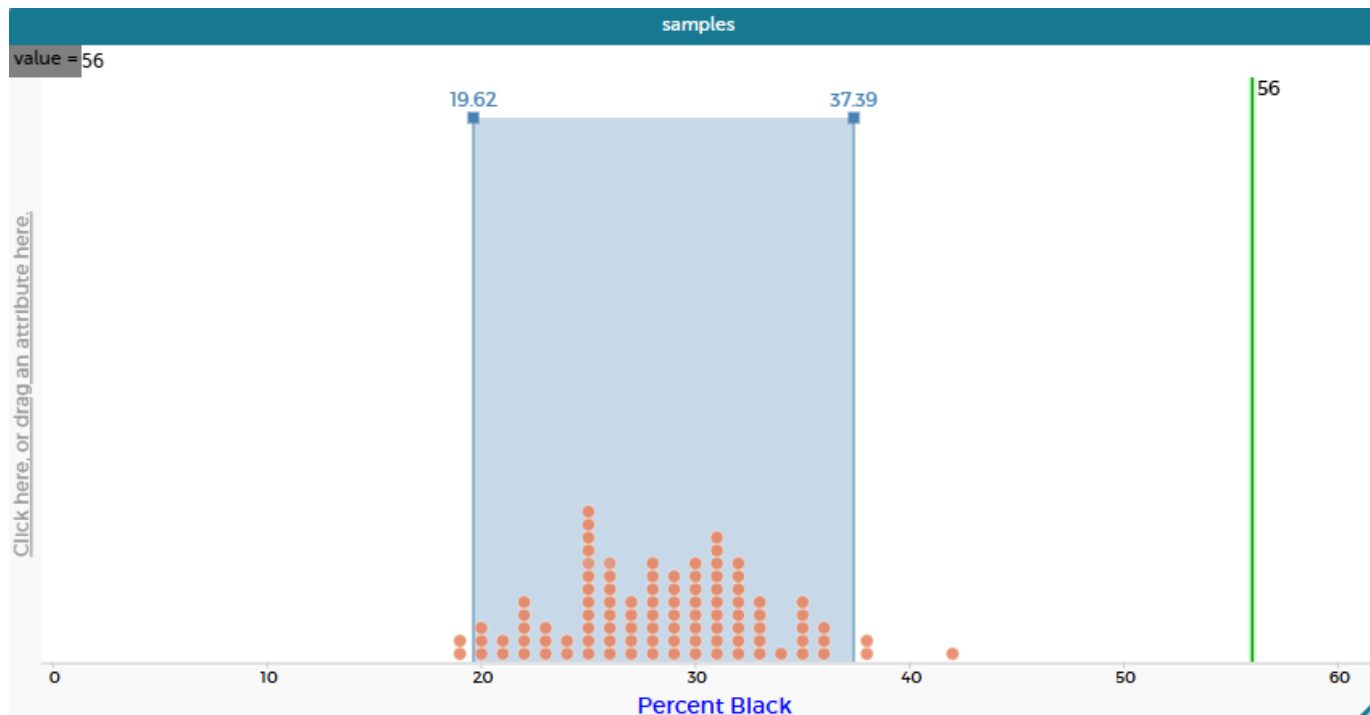
Drivers stopped in the city by race (Asian - 1.3%, Black - 56%, Native American - 0.066%, Other/Unknown - 4%, white - 38%)



Using the 2020 Census, we found that 33% of residents were Black. Thus, there seemed to be a notable disparity in the proportions of Black residents to Black drivers that were stopped. To investigate our question, we conducted an informal inference by designing a simulation (Zieffler et al., 2008). We imagined 5000 residents that reflected the racial demographics of the city and drew random samples of size 50. We used $n=50$ based on the assumption that the police stopped about 120,000 drivers in a city with a population of about 800,000. This would lead to using a sample of about 750 with 5000 stops. However, using a much smaller number like 50 would account for more variation in the sampling distribution and thus highlight the unusual nature of the observed result. Note that $n=50$ was greater than the minimum sample size of 30, yielding a distribution of proportions that could be approximated using the normal distribution according to the Central Limit Theorem. After drawing 100 samples, we approximated the 95% confidence interval by bounding 95 of the 100 dots. We observed that none of the random samples had a proportion as high as 56% (Figure 8). Thus, we knew that we were observing something that was highly unlikely to happen by chance and that there was an underlying reason for the difference.

Figure 8

Results of the simulation of Black drivers stopped in the city. Includes the approximate 95% confidence interval estimate of the proportion of Black drivers.



We examined two reasons for the difference in proportions: algorithms and laws. The city used PredPol, a predictive algorithm that was used to guide the placement of officers in various areas of the city based on the street crime data (O’Neil, 2017). We were unclear about the connection between street crime and traffic stops. Further, the presence of officers in over-policed areas meant that they would report more crime in these areas compared to other (predominantly white) areas that were not patrolled as often or policed with officers intent on finding crime (Gordon, 2022). The algorithm would add the new data and decide that the officers patrol the same areas due to a predominance of crime, thus creating a feedback loop (O’Neil, 2017). This could explain the disproportionality that we observed. We also examined two court cases that impact the policing of traffic stops - *Terry vs Ohio* (1968) and *Whren vs U.S.* (1996). According to Baumgartner et al. (2018), *Terry* lowered the bar of policing from ‘probable cause’ to ‘reasonable suspicion’, which could let bias enter the officer’s decision. Further, *Whren* opened the door for pretextual stops based on traffic laws. Together the two cases opened the possibility for more stops to be made based on suspicion. We believe that the lighter consequences for Black drivers, including when their vehicles are searched, points to police bias.

In the end, we concluded that there was racial bias in policing, and it was because of a combination of factors that went beyond just individual officers. Historically, segregation caused a separation in the population by race that still seemed to persist over time. Amplifying this, were the laws and policies in policing that allowed officers to act on suspicion. Finally, the use of algorithms caused a feedback loop that magnified the problem.

Learning

This activity was the first time that we had worked with a large real-world dataset. Working with data from our city was motivating. Usually, we worked with small made up datasets where there was always a ‘right’ answer. We also learned that data exploration with real data was not as cut and dry as we initially believed, with only one answer. We

had to construct various graphs to answer the overarching research question. Further, we had to draw on an extensive array of statistical techniques. Given the real-world nature of the investigation, we were also not sure of the path to take initially, so there were some ‘blind alley’ explorations. However, this indirectly pointed to more promising ways to explore the data. Throughout the process we had to discuss our ideas, helping us to gain a better understanding of statistical concepts and how to apply them in real-world scenarios. For example, we had learned about hypothesis testing, but we had not taken a simulation approach, which gave us a better understanding of how hypothesis tests work.

In addition to getting a better grasp on the statistics, we also learned about race and racism in the context of policing traffic stops. In this activity, the context was crucial to making sense of the statistical analysis that we were doing. For example, we were forced to think about the context when we had to explain the gap between the proportion of Black residents in the city and the proportion of Black drivers who were stopped. This gap was not by chance, and in our quest to understand the gaps, we learned about the broader factors affecting these disparities like the court cases, segregation, and the policing algorithms. In the process, we broadened our understanding of racism and how it operates in the system. For instance, that racism does not just happen between individuals. Rather, the disparate impact of laws and policies on certain groups also constitutes a form of racism. We learned that this is referred to as institutional racism, which according to Racial Equity Tools (2021), “refers specifically to the ways in which policies and practices of organizations or parts of systems (schools, courts, transportation authorities, etc.) create different outcomes for different racial groups” (Racial Equity Tools, 2021, Glossary).

Recommendations

As students ourselves, we have not experienced using real-world and civically important data in the classroom. However, after engaging in this project, we noticed that the scope of mathematics is larger than numbers; applying mathematics to real world issues like racism can improve students’ understanding of the society around them. For example, we found that racism is a much deeper issue than the surface-level knowledge that most students have and penetrating the systems that we operate within. By digging deeper into these concepts, the students of the future have the potential to be more educated and aware of the problems at hand, enabling them to mitigate issues of racism. Though we recognize that race-based discussions can be controversial, many of our peers expressed interest in engaging in these types of activities. They felt that if the teacher set up an open environment for discussion, students could learn a lot from each other. We spoke with an AP Statistics teacher at our school, and he agreed that it would be beneficial for the students if they worked with more civically relevant datasets. However, we also understand that conversations about policing and traffic stops can be emotionally triggering, particularly for Black and other students of color. To mitigate this, teachers can normalize emotional reactions in the class, offer students different options in how they choose to participate, and set up norms for participation, to name a few teaching approaches for potentially controversial topics (see Appendix for more resources). Further, we do not need the teachers to be “experts” on racism to do this work. Instead, teachers can be reflective and thoughtful about how they frame and facilitate the investigation, emphasizing humility, preparation, and co-learning with students.

Allowing students to work through data sets, figuring out what works and what does not work, gives students the opportunity to explore different conclusions from data. Students are usually limited to worksheets and homework, but more freedom in the classroom to explore personally relevant data sets would allow them to better understand what they are being taught. For instance, the data from this study connected to our personal experiences of seeing our adult family members stopped by police and a number of our peers drive, so we were better able to reach the goals of the learning experience.

To set up data analysis projects, we believe teachers should provide students with a pre-existing dataset. The dataset can originate from local data or be something that pertains to the students. Using software like CODAP can allow students to handle larger datasets. Students will need some guidance initially, so it is important to have

examples of graphs and tables that they can take inspiration from. However, when students start to encounter more advanced concepts in the software like statistical inference, it is helpful to provide some direct instruction on the concept before allowing students to explore it in the software. For example, educators should explain what inference is and its various types before allowing students to apply inferential methods to the dataset. A project like this is a hands-on experience, so it would be nice to allow students to produce their own end products and conclusions.

Students will come to class with their own worldviews and biases that will come through in their investigation. Instead of minimizing these biases, teachers could encourage them to use statistics to justify their point of view. For example, it was challenging for us to understand why the gap between the proportion of Black drivers stopped was so much more than the proportion of Black residents in the city. Even if we came into the class with a pro police bias, we would still need to explain the gap we observed in the analysis.

Critical court cases and the history behind the data gave us a more open-minded perspective on our data exploration. For example, when we didn't see any discrepancies between Black and white drivers, our first instinct wasn't to reject ideas of institutional racism; instead, we referred back to the court cases to hypothesize whether they had an influence on the results we were observing. To help students learn about these concepts, it is important to provide them with the historical and legal influences that have shaped them. This will inform their analysis.

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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. Based on your reading of the article, what recommendations would you give the police department to lower racial bias?
2. What is your understanding of institutional racism now?
3. What other datasets can you use for statistical investigations around race, racism, and racial bias?
4. Do you think that the context interferes with learning statistics in investigations like the one in this article?

Appendix

- Project website: <https://pages.charlotte.edu/datamodulesandsystemicracism/>
 - Includes slides, instructor guides, and resources, for two modules: traffic stops and school discipline
- City of Charlotte Open Data Portal (for Charlotte traffic stop data): <https://data.charlottenc.gov/>
- The Stanford Open Policing Project (for traffic stop data of other cities across the U.S.): <https://openpolicing.stanford.edu/>

Resources for Conversations about Race and Racism

- Chapter 2 from [*High School Mathematics Lessons to Explore, Understand, and Respond to Social Injustice*](#)
- [Norm Setting Activity](#) from the A³IMS project
- Arao, B., & Clemens, K. (2013). Title of chapter. In L. M. Landreman (Ed.), *The art of effective facilitation: Reflections from social justice educators* (pp. 135 - 150). Routledge.
<https://doi.org/10.4324/9781003447580>
- [Let's Talk: Discussing Race, Racism and Other Difficult Topics with Students](#) (from *Learning for Justice*)
- Singleton, G. E. (2021). *Courageous conversations about race: A field guide for achieving equity in schools* (3rd ed.). Corwin Press.
- [The four agreements of courageous conversations about race](#) (5:25 minute video)

Resources for Using CODAP

- [Awash in Data](#). An ever-evolving open book on teaching lessons on data science using CODAP
- [For Educators: Teaching with CODAP](#). The creators of CODAP created this page of resources for educators using CODAP in their teaching

TODOS Mission and Goals

The mission of TODOS: Mathematics for ALL is to advocate for equity and high quality mathematics education for all students, in particular, Latina/o/x students.

Five goals define the activities and products of TODOS: Mathematics for ALL

- Advance educators' knowledge and ability that lead to implementing an equitable, rigorous, and coherent mathematics program that incorporates the role language and culture play in teaching and learning mathematics.
- Develop and support educational leaders who continue to carry out the mission of TODOS.
- Generate and disseminate knowledge about equitable and high quality mathematics education.
- Inform the public and influence educational policies in ways that enable students to become mathematically proficient in order to enhance college and career readiness.
- Inform families about educational policies and learning strategies that will enable their children to become mathematically proficient.

In Memoriam: Richard Tapia, Bridging Excellence and Equity

A Personal Reflection by Larry Lesser

Dr. Richard A. Tapia passed away at 88 on May 22, 2026 after a long career at Rice University, where he achieved excellence in his mathematics research (especially in numerical optimization) as well as in his leadership and advocacy for equity. Rather than just repeat the stunning quality and quantity of accolades from the feature on p. 29 of the Fall 2011 issue of *TEEM* and various recent “in memoriam” pieces (e.g., Spafford & Garfinkel, 2026; Leeson, 2026; Williams, 2026), I offer a more personal reflection incorporating my first-hand experience and connections to *TEEM*.

The son of Mexican immigrants and first from his family to attend college, Richard Tapia inspired me long before he collaborated with leaders from my current campus (UTEP) to support students from groups historically underrepresented in STEM. As a Rice undergrad, I had the good fortune to take classes from him that proved to be pivotal in my journey. His MASC 310 (Linear Algebra) restored my confidence that I could still major in math after my rough time in sophomore honors calculus, and his MASC 460 (Optimization Theory) gave me the confidence and interest to pursue graduate school. I still remember the day when I asked a question in that latter class and he responded that my question was particularly insightful and at the level of what a graduate student would ask.

No less important or memorable than course content was the wisdom he would casually impart during office hour conversations. Seeking clarity about my own path, I remember once asking why he chose academia over industry. He said, “No special reason – I could have been happy either way.” I remember that he even took class time to invite us to think about a bigger picture. Each Friday of that MWF optimization theory course, he would pose the “Friday Question” that was “unrelated” to math and we would discuss it for about 15 minutes before resuming the regular curriculum. While I don’t remember what some of those Friday Questions were (it’s been 4+ decades!), I absolutely remember that he did it, and the feeling of how it built classroom community, humanized the course, and encouraged us to think beyond the box and beyond minimum requirements. In the spirit of the TODOS mission, Tapia helped *all* achieve excellence while maintaining particular interest in students from underrepresented backgrounds, including many of the 38 doctoral students he supervised.

Fun fact: as a teenager, he built a car with his twin brother, Bobby, that in 1968 set a fuel dragster world speed record: a quarter-mile in 6.54 seconds! Years later, he wrote mathematical articles and gave talks on drag racing – you can find online his talk “Math at Top Speed,” his article “The Fair Head Start in a Drag Race,” etc. He was also a passionate restorer of classic muscle cars, most notably his award-winning custom 1970 Chevrolet Chevelle named *Heavy Metal*.

Showing up as a whole person is a powerful, beautiful thing, and the way he embraced and integrated his personal and professional interests and identities inspired me to later do so with mine. His contributions to uplifting the field and making it accessible to all inspired me to similarly strive in my own way, on my own scale by moving to an open-access Hispanic Serving Institution doctoral research university (The University of Texas at El Paso) in 2004, exploring culturally relevant pedagogy (e.g., Lesser, 2022), doing research on and with emergent bilinguals learning statistics (e.g., Lesser, 2020), and serving *TEEM* as Founding Editor, then Associate Editor.

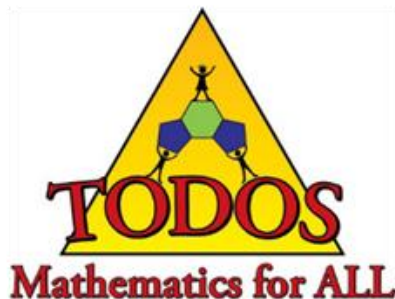
Tapia’s research has yielded 100+ research papers, editorships of three mathematics research journals, and many huge (inter)national recognitions. Rice University gave him the very rare honor of University Professor (there have been only 10 others in Rice’s history), a title which Rice states is “awarded to select outstanding faculty members who, because of their groundbreaking accomplishments and eminent national and international stature, qualify for an appointment that transcends any single unit.... A university professorship allows the titleholder to teach in any department at Rice.”

And no less significant was his commitment to equity, from being a founding member of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) to publishing a book (Tapia, 2022) discussing causes and remedies for underrepresentation. And in 2011, when President Obama presented him the National Medal of Science (the government's top honor for scientists), both areas were explicitly mentioned in the citation. It's hard to find anyone who has given more in *both* realms (mathematics and advocacy work) combined. Guillermo Mendieta, inaugural recipient of the TODOS Iris Carl Leadership and Equity Award, said: "Equity without quality is useless, quality without equity is unjust." And Tapia clearly saw equity and excellence as necessarily related: "In talks and interviews across four decades, Tapia described his work using a single sentence: 'I have to serve as a role model by first being an excellent scientist.' Excellence in the discipline was the precondition for the mentorship mission. He believed the field would not open itself to students from underrepresented groups until they saw researchers from those communities doing first-rate technical work. Therefore, he insisted on doing it himself" (Spafford & Garfinkel, 2026). The excellence-first sensibility is in the name of the Tapia Center for Excellence and Equity in Education (<https://tapiacenter.rice.edu>) that Tapia founded three decades ago. The center offers residential professional development camps for K-12 educators and residential STEM camps for secondary school students. That excellence-first sensibility is also reflected in the order of words in the name of this journal, *TEEM*.

His name will live on through Rice's Tapia Center, the CMD-IT/ACM Richard Tapia Celebration of Diversity in Computing Conference, the Blackwell-Tapia Conference, and the Dr. Richard A. Tapia Bridge (formerly, the Sam Houston Tollway Ship Channel Bridge)! How appropriate for someone who built bridges in so many ways – among people and between excellence and equity. I'm forever grateful for his well-lived life of facing challenges with great humility and humanity, passion and purpose. May his example continue to uplift us all, as we recall one of his favorite sayings: ¡Sí, se puede!

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Centering Culture, Language, and Identity in a History of Mathematics Course for Preservice Teachers

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Abstract

This article presents the redesign of an undergraduate History of Mathematics course for preservice teachers at a Hispanic-Serving Institution. Grounded in Community- and Family-Centered Pedagogy (CFCP) and Marshall's framework for culturally sustaining mathematics teaching, the course intentionally moved beyond Eurocentric narratives to center students' linguistic, familial, and cultural resources as integral to mathematical meaning-making. Two core assignments anchored the redesign: (1) evolving Padlet reflections that connected global mathematical histories to students' family and community practices, and (2) bilingual *Cuentos Matemáticos* that wove mathematical concepts with personal and cultural narratives in English and Spanish. Selected student reflections illustrate how these experiences created opportunities for students to express pride, connection, and agency as learners of mathematics and as future teachers. The redesign offers one example of how content courses can position mathematics as both a cultural and intellectual endeavor while supporting more affirming and inclusive approaches to teacher preparation.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. Have you ever seen your family's everyday practices (e.g., cooking, building, budgeting) as mathematical? Why or why not?
2. What kinds of personal or community resources might students draw upon to make sense of mathematics?
3. How might everyday family or community activities reveal mathematical thinking?
4. How might mathematics learning change when students' languages, cultures, and identities are affirmed in the classroom?
5. How can an instructor sustain students' languages and cultures in the mathematics classroom rather than simply acknowledging them?

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Centering Culture, Language, and Identity in a History of Mathematics Course for Preservice Teachers

Luis Miguel Fernández and Tenchita Alzaga Elizondo

“Para mí fue un momento de orgullo aprender cómo mi cultura, a través de los aztecas y los mayas, ayudó a influir en la actualidad de las matemáticas.” – Laura

Mathematics courses in the United States often emphasize Eurocentric figures and developments, frequently highlighting Greek geometry, Newtonian calculus, and Gaussian number theory (Ernest, 2021; Rowlands & Carson, 2000). Although these courses may occasionally reference non-Western mathematical contributions, rarely do they reflect or validate the lived experiences, home languages, or community-based knowledge systems of the actual students in the room, particularly students from historically marginalized backgrounds (Moreno & Moreno, 2021). This gap is especially important in teacher preparation, where preservice teachers are not only learning mathematics but also developing ideas about what counts as mathematics, whose knowledge is valued, and how mathematics can be taught.

History of Mathematics courses offer one promising space for addressing this issue. Prior scholarship suggests that learning mathematics through historical perspectives can support preservice teachers' content and pedagogical knowledge (Clark, 2012; Furinghetti, 2007; Galante, 2014), provide preservice teachers with new ideas and perspectives for instruction (Furinghetti, 2007; Youchu, 2016), and increase preservice teachers' motivation and interest in learning mathematics (Charalambous et al., 2009; Liu, 2003; Schubring et al., 2000). These benefits are often attributed to the ways historical perspectives can humanize mathematics by helping students see mathematics as a field shaped by people, questions, struggles, and cultural contexts rather than as a collection of fixed truths (Barbin et al., 2002; Schubring et al., 2000). This is not always the case, however, as scholars have also found that preservice teachers can also leave history of mathematics courses feeling even more disconnected from the topic, failing to see their struggles as akin to those of historical mathematicians (Charalambous et al., 2009).

This article presents a practice-based, expository account of a redesigned undergraduate History of Mathematics course for 6th–12th grade preservice teachers at a Hispanic-Serving Institution in the southwestern United States. The course served a predominantly Latino, bilingual, and first-generation student population and carried an official English-Spanish bilingual designation. Rather than critiquing mathematics as a discipline, the redesign responded to dominant ways of presenting mathematical history that can privilege Eurocentric, monolingual, and decontextualized narratives. In this article, we focus on two central assignments, Padlet reflections and *Cuentos Matemáticos*, as illustrative examples of how the course invited students to examine whose mathematical knowledge is centered, how mathematics connects to lived experience, and how future teachers might draw on students' cultural and linguistic

resources in their own classrooms. Selected student responses are included not as systematically analyzed findings or generalized evidence of impact, but as examples of the cultural, linguistic, and mathematical connections that emerged through the course. We conclude by presenting student reflections that illustrate important outcomes of the course redesign.

Guiding Frameworks

The course redesign was grounded in Community- and Family-Centered Pedagogy (CFCP; Ramirez et al., 2024), an approach that centers reciprocal relationships among classrooms, families, and communities and treats family and community knowledge as central to learning rather than as supplemental context. In mathematics education, this means recognizing that mathematical thinking can emerge through everyday practices such as measuring, counting, building, cooking, budgeting, storytelling, and navigating family or community responsibilities. In this course, CFCP shaped the assignment structure by inviting preservice teachers to interview relatives or close community members, respond to community-based prompts, and connect everyday family and community practices to mathematical ideas.

Marshall's (2023) framework for culturally sustaining mathematics teaching provided a complementary pedagogical lens for interpreting and valuing those connections. We use culturally sustaining in line with Marshall's mathematics-specific framing in that instruction should not only connect mathematics to students' lives, but also sustain students' linguistic, cultural, familial, and community-based ways of knowing as legitimate resources for mathematical meaning-making. To this end, Marshall's (2023) framework includes four overlapping but distinct dimensions: Anti-Assimilationism, which focuses on resisting classroom norms that pressure students to leave behind their languages, cultural practices, or ways of participating in order to be viewed as successful in mathematics; Strength-Based Teaching, which focuses on how instruction identifies, uses, and builds from students' existing cultural, linguistic, familial, community, and mathematical knowledge as resources for learning; Power and Justice, which focuses on how mathematics, schooling, and historical narratives legitimize some forms of knowledge while marginalizing others, and how mathematics can be used to examine inequity; and Identity Affirmation, which focuses on how students are recognized and positioned as mathematically capable people whose cultural, linguistic, and mathematical identities belong within mathematics. These dimensions overlap in practice, but they foreground different questions: what resources are used for learning, whose ways of being are sustained, whose knowledge is legitimized, and how students are positioned in relation to mathematics.

Together, these two frameworks created a productive tension that resonates with Gutiérrez's (2013) framing of the dominant and critical axes of mathematics education. On one hand, the course had to "play the game" by engaging preservice teachers with canonical mathematical histories and disciplinary knowledge, material that remains central to institutional definitions of mathematics. On the other hand, it sought to "change the game" by centering the preservice teachers' lived experiences, languages, and cultural practices as equally valid sources of mathematical knowledge and identity. Holding these commitments together reflected the course's broader equity orientation: preparing students to succeed within dominant systems while also reimagining mathematics as a cultural, relational, and justice-oriented practice.

Two Central Assignments: Padlet Reflections and Cuentos Matemáticos

Padlet Reflections

In this course, Padlet.com, a shared digital board for posting text, images, videos, and comments, served as the hub for weekly reflections tied to mathematics history topics. Each week, students co-presented historical themes that included both canonical European figures and contributions from Mesoamerican traditions, particularly Aztec and Mayan mathematics. By broadening the historical lens, the course invited preservice teachers to view mathematics as a multicultural human endeavor and to connect course content to cultural, linguistic, and community knowledge.

Shortly after each weekly student presentation, the first author posted a Padlet homework prompt designed to extend the historical theme into students' family and community contexts. For each prompt, preservice teachers were asked to (1) interview a relative or close community member using questions aligned with the weekly topic, (2) create a short video diary retelling their interviewee's story and linking it to the week's mathematical theme in the language or languages of their choice, and (3) engage with at least five classmates' posts. In doing so, the weekly homework activities flowed from classroom exploration to family narratives and back into the shared digital space.

Each week's prompt was developed iteratively, with one primary dimension of Marshall's (2023) framework serving as the instructor's intended emphasis (see Table 1). As preservice teachers engaged with the prompts through family interviews and video diaries, however, their responses often moved beyond that initial emphasis, highlighting the overlapping nature of Marshall's (2023) framework through their own stories, examples, and interpretations. In this sense, Table 1 identifies the instructor's intended primary dimension for each prompt while also presenting one enacted version of the course. Different students, family stories, and classroom conversations may lead other classes to foreground different prompts, dimensions, and students' examples.

Table 1

A summary of the weekly topics, family prompts, and their alignment with Marshall's (2023) framework.

Weekly topic	Historical focus	Family/community prompt (summarized)	Primary intended dimension*
Babylonian & Egyptian Mathematics	Counting systems, record-keeping	Ask a family member to share “non-traditional” methods they use for counting, measuring, or keeping records (e.g., tally marks, steps, household systems). Reflect on how these practices demonstrate intellectual resources comparable to Babylonian or Egyptian methods.	Strength-Based: foregrounds family and community strategies as mathematical resources.
Pythagoras' Theorem & Euclid's Elements	Numbers, patterns, sequences	Explore family traditions or beliefs involving numbers or patterns (e.g., lucky numbers, weaving, the number 15 in <i>quinceañeras</i>). Discuss how these traditions connect to broader cultural meanings of numbers, affirming them alongside Greek numerology.	Strength-Based: builds from existing cultural and practical knowledge.
The Concept of Zero	Origins and meaning of zero	Gather family stories, rituals, or practices connected to nothingness. Analyze how these narratives parallel the mathematical role of zero, showing that cultural worldviews also embody mathematical concepts.	Identity Affirmation: invites students to connect mathematical meaning to family stories and cultural interpretation.
Al-Khwarizmi & Muslim Art	Algebra, symmetry, tessellations	Document a family or cultural art tradition (e.g., embroidery, tilework, craft design) that uses geometry or symmetry. Explain how these practices reveal artistry as a form of algebraic and geometric reasoning.	Strength-Based: treats artistic and cultural practices as mathematically meaningful
The Mayans & their Codex	Knowledge preservation	Compare the Mayan use of codices to ways your family preserves mathematical knowledge (e.g., oral storytelling, photo albums, religious texts, heirlooms). Reflect on why these practices should be valued as intellectual traditions.	Anti-Assimilationism: resists narrow definitions of legitimate knowledge preservation.
Fibonacci's Sequence	Cultural exchange, numeral systems	Interview a family member about a journey, migration, or cultural exchange. Connect their experiences to Fibonacci's travels, showing how movement across cultures enriches mathematical knowledge.	Strength-Based: treats family histories of movement and exchange as resources for understanding how mathematical ideas travel.

Weekly topic	Historical focus	Family/community prompt (summarized)	Primary intended dimension*
Da Vinci & the Golden Ratio	Symmetry, geometry in art	Share a family artwork, textile, or crafted object with a geometric or symmetrical design. Identify the mathematical patterns it embodies, affirming these creations as legitimate contributions to mathematical reasoning.	Strength-Based: validates family creativity and design as mathematical resources.
The Copernican Revolution & Galileo's Trial	Shifts in worldview	Reflect on a family mathematical belief, value, or tradition that has changed over time due to new knowledge or perspectives. Connect these shifts to the Copernican Revolution, analyzing the power relations involved in challenging established views.	Power and Justice: foregrounds authority, legitimacy, and whose knowledge is accepted or challenged.
The Aztecs & their Calendar System	Calendrical systems, cycles	Ask family members about the mathematics they use to track important dates (e.g., holidays, harvests, work schedules). Reflect on how these practices show control of time and cycles. Then consider how some systems (e.g., Gregorian calendar, school schedules) were imposed over community-based calendars such as the Aztec's.	Anti-Assimilationism: recognizes community-based systems of timekeeping without treating dominant calendar systems as the only legitimate form.
Newton & Leibniz (Calculus Wars)	Intellectual rivalry, recognition	Ask about a family or community rivalry/competition that involved quantitative comparison (e.g., sports scores, production goals, academic achievements), and how this led to growth or recognition, paralleling the Newton–Leibniz dispute.	Power and Justice: foregrounds recognition, authorship, and whose contributions are legitimized.
Euler's Formula	Harmony, rhythm, cycles	Investigate music or dance traditions in your family. Identify rhythmic, cyclical, or symmetrical patterns and relate them to Euler's ideas of harmony and cycles.	Strength-Based: treats music and dance traditions as resources for mathematical meaning-making.

* In Marshall's (2023) framework for culturally sustaining mathematics

As a course design feature, the Padlet reflections offered one way to put the guiding frameworks into practice. The family interview component reflected CFCP (Ramirez et al., 2024) by positioning relatives and close community members as sources of mathematical knowledge. By semester's end, the Padlet served as a course archive of voices, perspectives, and connections that illustrated mathematics as lived, relational, and culturally situated. Figure 1 contains a screenshot of the Padlet space, blurred out to maintain student anonymity.

In what follows, we highlight selected tasks and student work to illustrate how the course created opportunities for preservice teachers to connect mathematical history with family, community, language, and identity. We selected examples that made visible the kinds of cultural, linguistic, familial, and mathematical connections the assignments were designed to invite, making note of the connection to Marshall's framework. These examples are not intended as formal coding categories or evidence of generalized outcomes. Rather, they illustrate how Marshall's (2023) framework informed the design and interpretation of classroom activities, while recognizing that students may have understood their experiences through different lenses and that any single response could reflect more than one dimension at once.

Noticing Mathematics in Family and Community Practices

Early prompts asked preservice teachers to introduce a relative and anticipate where mathematics might surface in their relative's daily lives. These reflections often revealed practices such as cooking, games, and religion, positioning

mathematics as cultural, practical, and deeply embedded in everyday activity. Drawing on these reflections, and using pseudonyms to protect participants' identities, Carolina described how *rosarios* are used in Catholic rituals following a death and how numbers carry special significance:

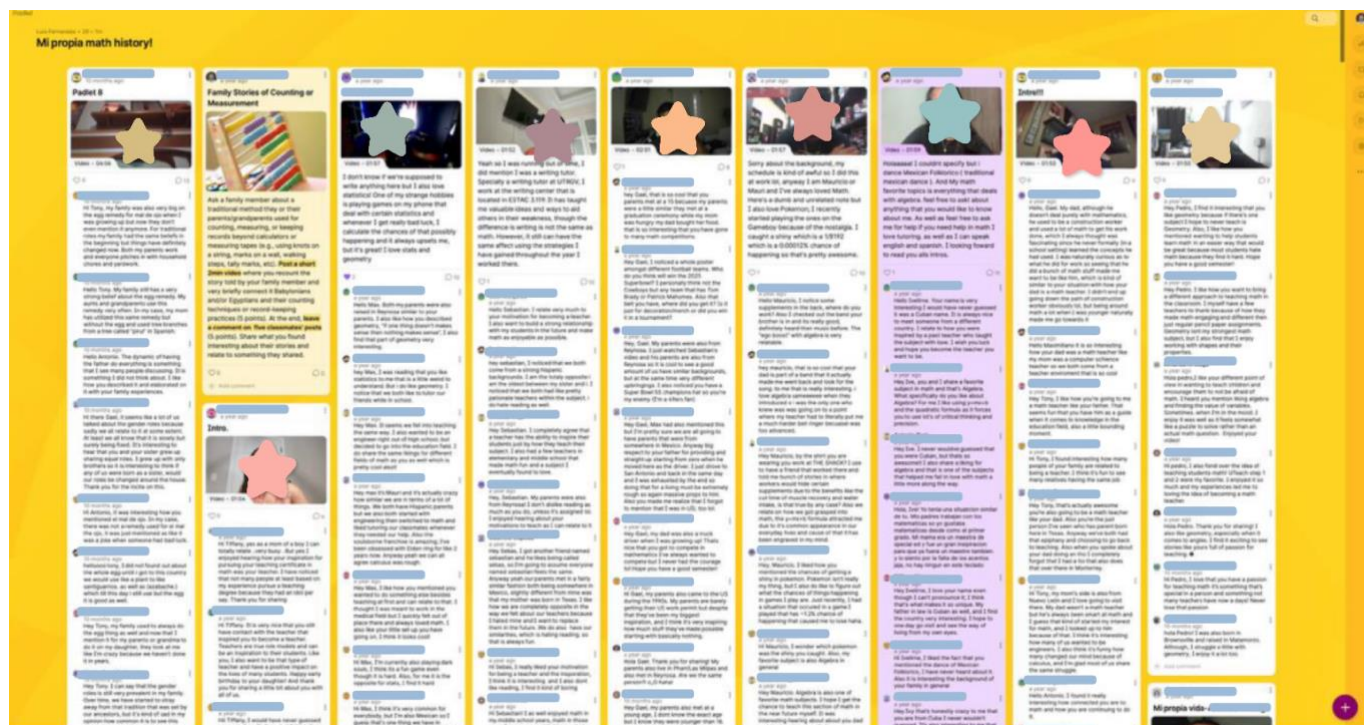
Cuando alguien muere, lo que hacemos es usar un rosario, que ahora que lo pienso es un patrón de números en específico...es un novenario...es que rezamos el rosario por nueve días después de la muerte del familiar... después, rezamos con las cuentas, son 50...el número 50 son los 50 pasos que damos hacia el Cielo, hacia Dios.

Similarly, Sofia interviewed her father and highlighted how, as a child, he used his hands to measure *chemas* while playing marbles:

When playing *canicas*, he measured in *chemas*, and that's the distance between your pinky and your thumb. I think it was an easy way to measure as a child, but also pretty advanced since it has to do with proportions, like in geometry.

These narratives illustrate how students identified mathematical ideas within practices their families already knew and used. In both cases, the mathematical insight did not originate from formal instruction alone but from family, religious, and community-based activity. Through Marshall's (2023) framework, these examples can be understood as reflecting strength-based teaching because they foreground family and community knowledge as mathematical resources. At the same time, they may also carry elements of identity affirmation, especially when students recognize value in practices connected to their families and cultures.

Figure 1
Sample Screenshot from the Padlet Digital Space



Connecting Mathematics to Cultural Practices and Personal Meaning

Later prompts encouraged preservice teachers to take more interpretive stances, moving beyond identifying where mathematics appeared in their relatives' daily lives to exploring how their own cultural practices embodied

mathematical meaning. Reflections on embroidery, music, and dance revealed how some students described connections between mathematics and cultural practices that were meaningful to them. One preservice teacher's video demonstrated how her aunts and great-grandmother created cross-stitch patterns on small handkerchief-like pieces of cloth, which were used as *recuerdos* for *quinceañera* and other family celebrations. Carolina explained:

They used to *bordar y tejer, bordar y tejer*. They would use patterns like this [shows example of a handkerchief-like piece of cloth]. As you can see, it says *Mis Quince*. It's a *recuerdo*. They are full of patterns; each letter is made up of tiny x's that you can count. The number of x's tells you how many stitches you go in and out, *derechos y reversos*. It's like measuring with numbers. You also want to keep it symmetrical so that it looks nice. We keep these as *recuerdos* of the event.

Andrea also connected her family's Cuban styles of dancing to fractional divisions of rhythm:

En Cuba, se usa mucho todavía el paso de tres, como la bachata. Muchos pasos son pasos de tres. Mi mamá me dijo que ella iba mucho a los bailes de pasos de tres. Siento que es algo muy interesante porque en folklórico uso mucho los pasos de ocho y en flamenco los pasos de doce. Los números son muy importantes para bailar. Como cultura, es hermoso cómo los números se juntan con el arte.

These narratives show how students positioned mathematics as connected to who they are, where they come from, and the cultural practices that shape their family lives. In both cases, mathematics was interpreted through cultural practices that carried personal and familial meaning. Through Marshall's (2023) framework, these examples can be read as reflecting identity affirmation because students connected mathematics to cultural belonging and self-understanding. They also reflect strength-based teaching because they identify cultural practices as mathematical resources.

Recognizing Mathematical Knowledge Beyond Formal Schooling

Other prompts focused on structural issues such as access to education and migration experiences. One student recounted how her father, despite struggling with formal mathematics, demonstrated strong mathematical reasoning in his work as a truck driver and construction worker, using his body and environment as intuitive measuring tools. Sofía shared:

He [father] told me he did not complete his education in Mexico and that he always struggled with math, numbers, and stuff like that. But he always worked in construction and driving trucks. I feel that for someone who has always struggled with numbers, he developed his own techniques. He said that to drive the forklift to carry pallets, he not only had to count the pallets but also measure the distance between them to be able to carry and drop them off, and that he would use nearby objects to measure distance. In construction, he would use his feet and hands a lot to measure how far away things were apart... I thought this was pretty cool because he says he is bad at math, but I think what he does is math.

This reflection highlights a tension between formal educational recognition and practical mathematical expertise. Sofía's father describes himself as someone who struggled with mathematics, yet Sofía recognizes counting, spatial reasoning, measurement, estimation, and embodied strategies in his work. Through Marshall's (2023) framework, this example can be interpreted as raising questions of power and justice because it asks whose mathematics is recognized as legitimate and how schooling can shape people's perceptions of their own mathematical ability. At the same time, the example also reflects strength-based teaching because it affirms workplace and embodied knowledge as mathematical.

Expanding the Meaning of Mathematical Concepts

Students were also asked to interview their relatives and reflect explicitly on the role that zero played in their relatives' mathematical practices and understandings. Laura shared:

Going over the number zero with my family was very surprising. The way they described it was as new beginnings. Growing up, my parents were migrant workers, and they said that every time they moved back here, and back and forth, that was their new beginning, their number zero. They said we would always have to start again, but they never saw it as something negative. They framed it as opportunities to make new friends, new memories. My grandmother described zero in a different way...in life and nature. She always lived alone, and every time a new season came, that was like a zero for her. She would change plants and do cleanings in her house. Start again. She would do this to not feel a sense of absence during the holidays, planting new trees and flowers.

This reflection expands the meaning of zero beyond a formal school-based definition. Laura's family connected zero to migration, renewal, nature, and emotional meaning, offering an interpretation rooted in lived experience rather than detached abstraction. Through Marshall's (2023) framework, this example can be read as reflecting anti-assimilationism because it resists the idea that mathematical concepts must be understood only through dominant academic meanings. At the same time, it may also reflect identity affirmation because Laura connects mathematical meaning to family history and migrant experience.

Cuentos Matemáticos

The second major assignment, completed at the end of the course, was titled *Cuentos Matemáticos*, or Mathematical Stories. This culminating project invited students to create a digital bilingual storybook that wove together mathematical content from the course with stories rooted in their families, communities, and cultural traditions. Students were required to synthesize at least six of their Padlet assignments into a cohesive narrative, highlighting the ways mathematics had been embedded across generations in their families. The project was completed using BookCreator.com, a platform that allowed students to integrate multimedia elements such as images, videos, and audio recordings alongside their written reflections (see Figure 2 for an example).

Figure 2

Sample Student Page from a Cuento Matemático Digital Storybook



The structure of the booklet was designed to guide students through a layered process of storytelling and reflection. Students began with a cover page that introduced their project, followed by an introduction to their family to situate the narratives. The heart of the booklet asked students to transform their Padlet stories into an extended narrative of at least ten pages, connecting family practices to broader historical mathematical concepts such as zero, symmetry, or Fibonacci's sequence. The final section, a three-page reflection, prompted students to articulate how

this project influenced their understanding of their family's mathematics history, their perception of global mathematical traditions beyond Eurocentric figures, and their development as future teachers (we discuss these reflections in the next section). In this way, the assignment served both as an academic synthesis and a professional identity-building exercise. The *cuentos* were shared aloud during the final session of the semester in a communal read-aloud, transforming the classroom into a collective storytelling space. This public sharing not only honored students' identities and families but also reinforced the central course message, that is, that mathematics is not only universal and abstract, but also lived, cultural, and deeply personal.

A central feature of the project was its bilingual requirement. Students had to present their *cuentos* in both English and Spanish, either by alternating languages across sections or pairing written text in one language with oral narration in the other. This translanguaging orientation positioned bilingualism not as a hurdle but as a resource for expressing mathematical ideas authentically, consistent with approaches that view multilingual students' full linguistic repertoires as resources for learning (García & Kleyn, 2016). In practice, students often wrote their narratives in English while presenting their read-aloud portions in Spanish, and vice versa, allowing them to honor their linguistic repertoires in creative ways (see Figure 3 for an example). Because this course had an official English–Spanish bilingual designation, students were expected to engage with the course, at least in part, in Spanish, making the Spanish requirement appropriate. In other contexts, instructors might adapt the assignment to incorporate students' different home languages (e.g., Spanish, Mandarin, or Hindi) in ways that align with their course goals and local setting.

Figure 3

Example of Translanguaging in a Cuento Matemático



To receive the highest points, students had to demonstrate deep connections between their family narratives and the historical mathematical concepts studied, effectively integrate both languages throughout, and present their story in a visually appealing, multimedia-rich format. Importantly, students also had to ensure the booklet flowed seamlessly, weaving family narratives, historical mathematics, and personal reflections into a single coherent story. In what follows, we highlight selected examples from the *cuentos* to show how the assignment created opportunities for students to connect mathematics with family knowledge, bilingual expression, cultural memory, and teacher identity. We use Marshall's (2023) dimensions as interpretive lenses rather than as formal coding categories, recognizing that any example could reasonably be read through more than one dimension.

Weaving Family Knowledge into Mathematical Storytelling

Several *cuentos* foregrounded the mathematical ingenuity embedded in students' family practices. One student, for instance, described how their grandmother would regularly create intricate patterns by waving different materials together (see Figure 4). Another highlighted a father's use of geometry and spatial reasoning in construction work, noting how he measured using "body mathematics" such as hand and arm spans to guide his projects (see Figure 4). Other *cuentos* connected mathematics to budgeting, cooking, celebration, dance, and family traditions, showing how students came to recognize mathematics as something already present in their homes and communities. These examples positioned family members not simply as sources of personal stories, but as people who used mathematical reasoning in practical, creative, and context-specific ways. Through Marshall's (2023) framework, these narratives can be understood as reflecting strength-based teaching because they foreground family knowledge as a mathematical resource. They also connect to identity affirmation because students were not only identifying mathematics in family practices but also seeing those practices as part of their own mathematical inheritance.

Using Bilingual and Bicultural Narratives to Broaden Mathematical Expression

The *cuentos* also created space for bilingual and bicultural storytelling. Students wrote and presented their projects in both English and Spanish, often shifting between the two as they narrated family histories, mathematical ideas, and personal reflections. The example in Figure 2 shows how a student alternated between English and Spanish when discussing how the Padlet activities connected to his family and culture, thereby positioning translanguaging as a meaningful part of mathematical expression rather than as a departure from academic work. This bilingual structure was important because it allowed students to communicate mathematical meaning through the languages connected to their homes, families, and identities. Through Marshall's (2023) framework, these moments can be read as anti-assimilationist because they resisted monolingual definitions of mathematical communication. They also reflected identity affirmation by affirming students' bilingual and bicultural identities, as well as strength-based teaching by positioning their full linguistic repertoires as resources for mathematical meaning-making.

Reconsidering Whose Mathematics Counts

Some *cuentos* invited students to reconsider whose mathematical knowledge is recognized as legitimate. Examples involving migration, labor, and access to education showed how mathematics intersected with students' family histories and with broader questions about schooling, recognition, and expertise. One student, for example, celebrated how her parents, even though they had only received a middle school education, regularly and productively used mathematics in their daily lives, offering a counternarrative to deficit-oriented assumptions about immigrants' educational experiences (see Figure 5). This example challenges narrow views of mathematical competence by showing that mathematical reasoning can exist outside formal schooling and academic recognition. Through Marshall's (2023) framework, this example can be interpreted as raising questions of power and justice because it asks whose knowledge is recognized as legitimate mathematics. At the same time, it also reflects strength-based teaching by valuing everyday mathematical practices, and identity affirmation by positioning the student's family as knowledgeable contributors to mathematical understanding.

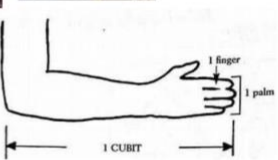
Figure 4

Examples of Cuentos Matemáticos with clear Mathematical Connections




Uno de los ultimos proyectos de mi Abuelito antes de fallecer.



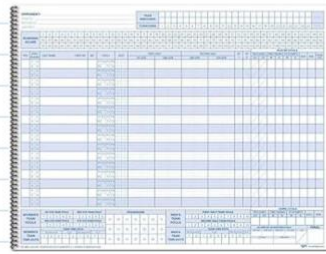


Padlet 2: Medir a Través de Generaciones

Aun así, de niño, mi padre estaba rodeado de familia y una de sus mas extranadas memorias es de el jugando canicas con sus primos. Medía "chemas" con sus manos para calcular la distancia al hoyo y poder ganar. Despues mi papa vio como mi abuelo materno tambien usaba sus manos para medir mientras construía. Esto me recuerda a los egipcios, quienes también usaban partes del cuerpo para medir al construir sus pirámides como el cúbito (la distancia del codo a la punta de los dedos). Estas conexiones muestran cómo las matemáticas siempre han estado presentes en la vida diaria, desde juegos hasta construcción.

Padlet 10: Intellectual Rivalries in FamilyHistory

There would be times with my sister that we would talk about sports and it would sometimes end up in an argument. My sister had always been "book smart". She can sit down and learn everything she reads. On the other hand, I'm "street smart" I have to be hands-on to be able to learn something. In high school, I was in sports and she was our bookkeeper and kept track of our stats. Our arguments would start when she would mention a play or a foul, and I could correct her. Although neither of us was wrong, we just learned things differently. She saw the play and learned from it, and I was playing sport and doing the play and learning from it.



Harmony and Mathematics



Both dancing and music have a lot of rhythm and movement that includes symmetrical patterns.

For example, the dancing we have includes repeated beats that are followed by repeated moves. This shows repetition. We have mirrored dance steps that have to be followed at a specific beat, or at a specific wave of sound. Some of them include taking for 360° turns and other songs and dances include having to do 90° turns.

padlet #11

Mi abuela era muy creativa pues ella podía crear cualquier cosa con lo que tenía a mano. Usaba hojas de palma para crear tapetes para su casa solo usando patrones que ella creaba y mucha repetición.



No solo las mujeres en nuestra casa son creativas ya que mis

Illustrative Student Reflections on Mathematics and Teacher Identity

As part of their *Cuentos Matemáticos*, students completed a three-page reflection. These reflections suggest that the course and project may have supported some students in reconsidering what counts as mathematics and how mathematics connects to their future teaching identities. Below, we discuss two recurring themes and provide illustrative student quotes.

Reframing What It Means to Know and Do Mathematics

Students' reflections suggest that the course was not only an academic exercise in learning mathematical history but also a deeply personal journey of recognition, connection, and pride. Across their *Cuentos Matemáticos*, some students emphasized how the assignments illuminated mathematics as an inseparable part of their families, cultures, and identities (see Figure 5 for examples). Carlos captured this realization vividly:

Este proyecto me abrió los ojos para darme cuenta de cuántas matemáticas hay realmente en nuestra vida cotidiana. Me dio oportunidad de tener varias conversaciones recordando la historia de mi familia. Junto con esto, todos pudimos ver cuándo teníamos matemáticas a nuestro alrededor sin siquiera darnos cuenta... Este proyecto hizo que las matemáticas se sintieran más personales y cercanas a mi vida.

Carlos's reflection suggests that the project may have helped him experience mathematics as more personal and connected to everyday life. The student's phrase "*más personales y cercanas*" suggests that mathematics was no longer something owned by textbooks or distant historical figures, but something already present in family life, waiting to be named and valued. Others highlighted how the assignments deepened their intergenerational connections. Raul noted:

A lo largo del semestre, he aprendido mucho sobre la historia de las matemáticas en mi familia... aprender sobre los diferentes métodos que usaba para contar fue una experiencia emocionante para mí... Aprender más sobre sus [mamá] números especiales y sus experiencias jugando con sus abuelos mientras crecía profundizó la conexión que tengo con ella.

Here, mathematics is presented as a bridge between generations, reframing grandparents' games and "special numbers" as legitimate mathematical practices. What might once have seemed like playful or idiosyncratic habits are reinterpreted as evidence of mathematical reasoning. This move reflects a core commitment of affirming heritage knowledge as intellectually rigorous.

Students also drew explicit parallels between cultural traditions and mathematical structures. For example, Andrea said:

El baile y la música siempre han sido parte de mi familia y mi cultura... al bailar y seguir el paso, he visto patrones de simetría y ritmo. Damos pasos y seguimos el paso para mantenernos conectados y sincronizados.

Dance here is not framed as "art versus math," but as a context where rhythm and symmetry make sense only because of their cultural embodiment. This recognition disrupts the false binary between mathematics and creativity, showing instead how cultural practices are mathematical and how mathematics is cultural. Other narratives revealed how everyday acts of making and building illustrated deep mathematical expertise, such as Sofia's:

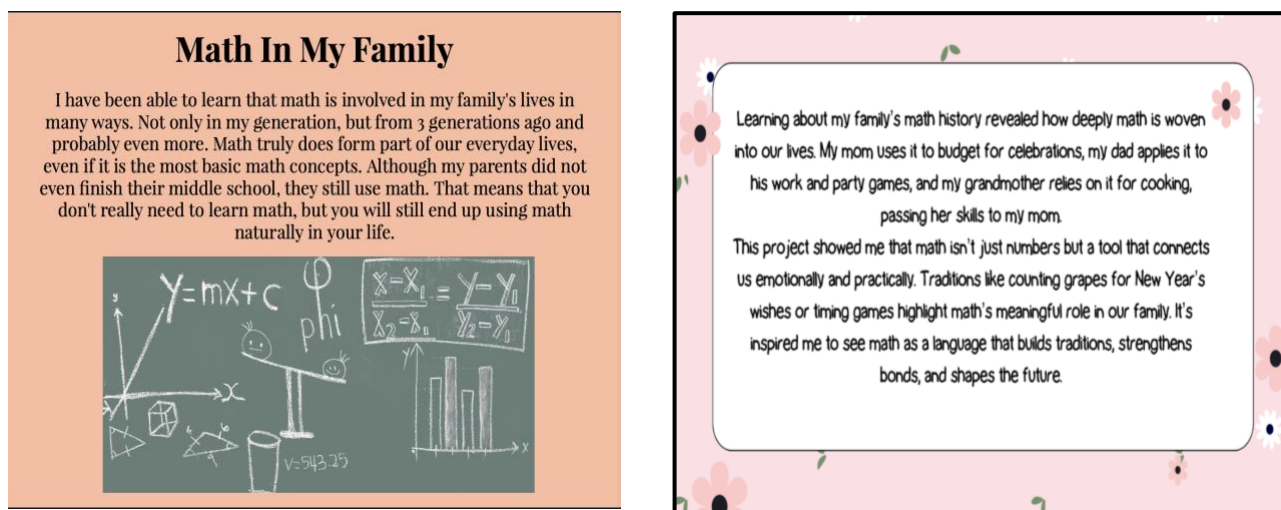
... mi papá también tenía una gran habilidad para las manualidades. Recuerdo que desmanteló un sillón viejo, lo deshizo por completo y luego lo rearmó cosiéndolo con ciertos patrones hasta hacer uno nuevo... un entendimiento profundo de la geometría, la simetría y la proporción.

This interpretation reframes manual labor and craft not as "non-academic" but as spaces where geometry, proportion, and design are constantly at play. By elevating such practices, students began to see their families' intellectual contributions as part of a broader mathematical heritage too often ignored in formal schooling.

Lastly, language emerged as another powerful theme. Students noted that using Spanish in class and in their projects allowed them to articulate ideas with greater clarity, especially when connecting to cultural or familial knowledge. Carlos explained, "Being able to express my thoughts in Spanish helped me a lot to get my point clear." Raul similarly shared that the class pushed him to develop his Spanish while connecting mathematics to "our own stories and to cultures around the world," while Carolina described feeling more comfortable using Spanish in an academic environment. These reflections suggest that, for some students, Spanish functioned not only as a language of translation, but as a language for mathematical meaning-making. This repositioning reflects anti-assimilationism by affirming bilingual repertoires rather than minimizing them.

Figure 5

Representative Excerpts from Student Reflections from Cuentos Matemáticos



Shaping Future Teacher Identity Through Affirming Practice

A second recurring theme was that some students began to reimagine mathematics teaching as a space where culture, language, and identity could be affirmed. Rather than viewing mathematics teaching as the neutral transfer of content, selected reflections suggested that students began to consider how they might create more affirming classrooms for their own future students. Andrea reflected:

El proyecto en sí no necesariamente aumentó mi sentido de identidad como maestro. Fue más bien la clase en su conjunto. Ahora entiendo mejor lo que significa apreciar los diferentes enfoques culturales que adoptamos para el aprendizaje las matemáticas no pueden tomarse como una especie de materia 'universal'. Es un concepto universal que puede ser comprendido por muchas culturas e idiomas diferentes de muchas maneras diferentes.

This reflection suggests that the course may have disrupted deficit-based notions of mathematics as abstract, culture-free, and detached. Mathematics became something to which students could claim belonging, and which they could invite their future students to belong to as well.

Others described how their perception of mathematics history itself shifted, moving beyond timelines and canonical figures, "Before this class, I saw math history as just dates and famous people. Now I see my own culture and language as part of that history, and I feel more confident about bringing that into my classroom." Here, history is reframed as a living narrative in which students' own communities and languages are protagonists. This shift may support teacher identity development by helping students imagine culture and language as resources for teaching.

For many, this course also marked the first time they had seen their cultural knowledge and bilingualism explicitly treated as assets within a mathematics setting. This recognition became a touchstone for how they imagined building their own classrooms, such as Raul: "This class helped me realize that my bilingualism is a strength in teaching mathematics. I now see how to use both languages to help students connect with the subject and feel represented." Similarly, Laura expressed: "*El impacto más grande que tuvo este curso en mí fue darme cuenta de que la historia de las matemáticas incluye a mi comunidad. Esto me dio orgullo y me hizo ver que puedo enseñar desde un lugar auténtico.*"

These reflections illustrate a core goal of culturally sustaining mathematics teaching, that is affirming students' linguistic repertoires and cultural knowledge as legitimate tools for intellectual work. By repositioning bilingualism as a strength and situating cultural traditions within the history of mathematics, the course offered students a model

for equity-oriented practice. Taken together, these examples suggest that the course created opportunities for mathematical reflection and identity work.

Conclusion: Reclaiming Mathematics

The goal of this paper was to illustrate how a History of Mathematics course, often taught through Eurocentric perspectives, can be redesigned as a culturally and linguistically rich learning space for bilingual and historically underrepresented students. Grounded in CFCP (Ramirez et al., 2024) and Marshall's (2023) framework for culturally sustaining mathematics teaching, the course offered one example of how mathematics teacher educators might reject deficit views, center students' strengths, situate mathematics within questions of power and justice, and affirm students' identities. Selected reflections suggest that some students began to see mathematics not only as abstract or historically distant, but as connected to their families, languages, communities, and future teaching identities.

This redesign contributes to scholarship on the role of history in preservice teacher education (e.g., Charalambous et al., 2009; Clark, 2012; Furinghetti, 2007; Galante, 2014) by foregrounding culture, language, family, and identity as central to mathematical meaning-making. Although our example comes from a History of Mathematics course, similar principles could inform other mathematics teacher preparation contexts. For instance, instructors might invite students to connect formal tools for counting or measuring with family and community practices, such as body-based measures, household systems, or culturally specific counting strategies. We hope this illustrative paper encourages mathematics teacher educators to design courses that connect personally to students while supporting rich mathematical learning.

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Discussion and Reflection Enhancement (DARE) Post-Reading Questions

1. How, if at all, did the reading shift your view of what “rigor” can look like in mathematics learning?
2. Which student or family narrative resonated with you, and what mathematical ideas do you now notice in that narrative that you might have missed before?
3. In what ways did the described practices appear to cultivate belonging and agency for future teachers?
4. How might you incorporate features of Community- and Family-Centered Pedagogy (CFCP; Ramirez et al., 2024) and Marshall’s (2023) framework for culturally sustaining mathematics teaching into your own mathematics instruction, especially in contexts outside of History of Mathematics courses?
5. What formative assessment would fairly capture cultural–mathematical thinking in your classroom, and what two criteria would make it rigorous?



***TEEM* Presidential Term Goals 2026-2028**

Dear *TEEM* readership, TODOS members, and future TODOS members,

I am honored to have been elected President of TODOS: Mathematics for ALL and excited to begin my term as president (May 1, 2026 to April 30, 2028). Thank you to the *TEEM* Editorial Team for the invitation and opportunity to contribute to this issue to share goals for 2026-2028. I share four goals below, which have been developed collectively with our amazing [Board Members and Committee Chairs](#)¹. And because our work is collective and responsive to our members, these goals may shift over time.

First, we aim to increase our advocacy work toward our mission: The mission of TODOS: Mathematics for ALL is to advocate for equity and high-quality mathematics education for all students, in particular, Latina/o/x students. We plan to increase our advocacy work through the topics and foci of our TODOS Live! Webinars, podcast, and “starter packs” with curated resources (coming soon). We also hope to procure a *TEEM* special issue with publications to support practitioners, families, and caregivers to advocate for equity and high-quality mathematics education for all students, in particular, Latina/o/x students. We have also increased our advocacy work through our new (2026) position statement [Centering Healing, Political Clarity, and Resistance Amidst Threats to Equity, Diversity, and Inclusion](#). In this statement, we name and denounce current threats to the lives, well-being, and education of marginalized individuals and communities, such as ICE raids and murders (which have particularly impacted the Latina/o/x community), disappearing marginalized communities, violence against the LGBTQ+ community, censorship, etc. We offer suggestions to support action, healing, and growth. The position statement and its [accompanying resource guide](#) are both ADA accessible and are available on our [website](#).

Second, we aim to foster greater communication for increased member engagement and increased impact of our work. We plan to increase our presence via emails and social media to share our publications, podcast episodes, resources, and events. We plan to create more opportunities for community building, such as through TODOS Live! webinars (with Zoom settings that allow discussion amongst members), workshops/working groups, social media chats, and opportunities for connection at conferences (e.g., TODOS, NCTM, etc.). We are also thinking through how to invite and connect members to serve as TODOS local liaisons throughout the country (and possibly internationally) to better communicate and learn from members’ needs, desires, and great ideas, including members who are educators, family members, and caregivers.

Third, we aim to grow our membership and community. Engaging in equity- and justice-oriented work toward our mission is incredibly challenging, especially when one feels isolated and alone. We need community and solidarity to create change in our schools, communities, and world. We aim to increase membership (e.g., membership drives, inviting members to gift memberships to others, etc.) by inviting more educators, families, caregivers, community members, and organizers to join TODOS. And we plan to strengthen our community by partnering with organizations, such as the Algebra Project, Benjamin Banneker Association, Association of Mathematics Teacher Educators, National Council of Supervisors of Mathematics, California Mathematics Council, and more, for TODOS Live! webinars, podcast episodes, publications, and so forth.

Fourth, we aim to raise funds and increase coherence across our committees to sustain the important work of TODOS. Achieving this fourth goal may not be as visible to members, but it is an important goal for us to sustain our work. TODOS is an all-volunteer organization (with the exception of a part-time Managing Director position), and we need financial support to sustain and increase our impact. We have done incredible work as a labor of love by TODOS founders, leaders, volunteers, and members, and we are strategically working toward securing various financial support streams (e.g., grants, fundraising, etc.) to support future work. Relatedly, we aim to increase

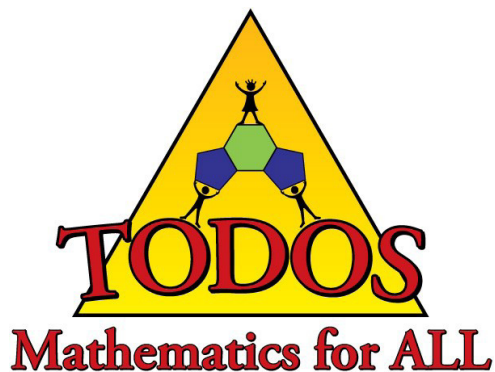
¹ Thank you to Rosa Chávez, Belin Tsinnajinnie, and Trevor Warburton for feedback on this document.

collaboration and coherence amongst our nine committees. The beginning of the 2026-2028 term is already off to a great start, as we have organized an amazing collective of [Board Members and Committee Chairs](#) with experience with culturally affirming/relevant/sustaining practices, social justice pedagogies, and strategies to support multilingual students (which ultimately support all students) who all hold a deep commitment to our mission. We are excited about and committed to the TODOS mission and goals, and we are working strategically to promote the longevity of TODOS to ultimately secure high-quality mathematics education for ALL students, in particular, Latina/o/x students.

I am honored to serve as President, and I am open to feedback and suggestions to ensure collaboration with members as we work collectively toward our mission and goals.

In solidarity,
Dr. Kari Kokka (she/her)
TODOS President 2026-2028





TEACHING FOR EXCELLENCE AND EQUITY IN MATHEMATICS

¡Atención, TODOS!

About *TEEM*

Teaching for Excellence and Equity in Mathematics (TEEM) is a refereed, Open Access journal published by **TODOS: Mathematics for ALL**. The intended audience of *TEEM* includes mathematics teachers, leaders, administrators, and mathematics teacher educators. The articles in *TEEM* must align with the mission of TODOS:

“To advocate for equity and high quality mathematics education for all students—in particular, Latina/o/x students.”

The journal aims to address topics involving excellence and equity (simultaneously) in the teaching and learning of mathematics, in a way that connects research to classroom practice and can directly inform practice. To this end, manuscripts are welcomed that relate to:

- ALL students learning mathematics as problem solvers beyond computational abilities;
- A vision of exemplary practices in the K-12 classroom and professional development;
- Attention to the roles that language and culture have in teaching and learning mathematics.

The journal defines equity broadly, including (but not limited to) issues of language, gender, ethnicity, and culture. *TEEM* welcomes manuscripts on issues of language, culture, access, equity, and quality from diverse viewpoints.

Call for Reviewers

Reviewing manuscripts for a journal is not only a valuable experience and service to the profession, but it is also an essential means to ensure that articles of high quality and relevance are published in a timely manner. Please consider becoming a reviewer for *TEEM* (*Teaching for Excellence and Equity in Mathematics*) (<https://www.todos-math.org/teem>), the official journal of **TODOS: Mathematics for All** (<http://www.todos-math.org/>). To be eligible to review (normally, only 1-2 manuscripts per year), we invite you to complete the New User/Role Request form (see QR code below) to be enrolled in our online journal system (OJS). Please add any relevant areas of expertise or interest to help guide our manuscript assignments.

Call for Papers

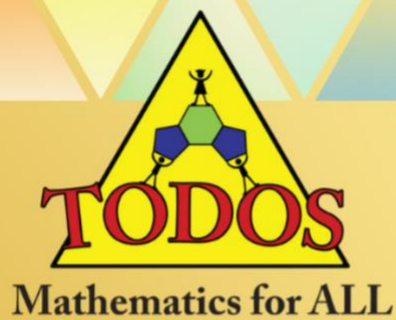
We encourage the submission of manuscripts, including applied or action research, literature surveys, thematic bibliographies, commentary on critical issues in the field, professional development strategies, and classroom activities and resources. Submissions are accepted in English or Spanish. *TEEM* Editors welcome query emails to teem@todos-math.org about the suitability of proposed topics or approaches.

For more detailed guidelines: <http://www.todos-math.org/teem>

To submit a paper, please complete the New User/Role Request form to be enrolled in our online journal system (OJS) using the QR code provided below.



New User & Role Request Form
Click or Scan!



Centering Healing, Political Clarity, and Resistance Amidst Threats to Equity, Diversity, and Inclusion

**A POSITION PAPER FROM
TODOS: Mathematics for ALL**



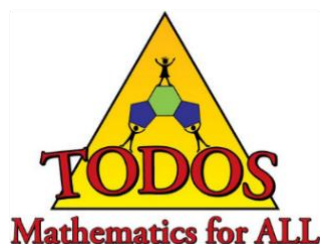
Proceedings of 2026 Conference of TODOS: Mathematics for All



**TODOS en Comunidad:
Rooting Mathematics in Humanity**

June 24-25, 2026 | Orange County, CA





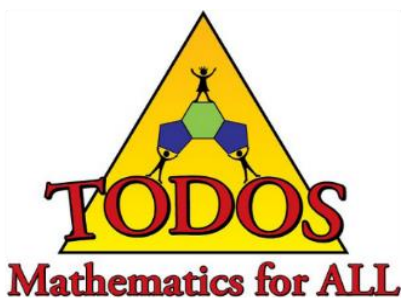
2026-2027

Elected Leadership

Kari Kokka President	University of Nevada, Las Vegas Las Vegas, NV
Marian Dingle Past President	Consultant Atlanta, GA
Trevor Warburton Vice President	Utah Valley University Orem, UT
Shakiyya Bland Director	Just Equations MD
Naehee Kwun Director	University of California Irvine, CA
Heather Lindfors-Navarro Director	Northern Arizona University Flagstaff, AZ
Celine Liu Director	English Learners Success Forum Denver, CO
Sara Rezvi Director	Dominican University Chicago, IL

Appointed Leadership

Belin Tsinnajinnie Managing Director	Santa Fe Community College Santa Fe, NM
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www.todos-math.org

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