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Teaching for Excellence and Equity in Mathematics

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TEACHING FOR EXCELLENCE AND EQUITY IN MATHEMATICS

IN THIS ISSUE

From the Editors

Greetings! The first 2024 issue of *TEEM* comes to you from a different editorial team. We are excited to welcome two new editors, Carlos Nicolas Gómez Marchant and José Martínez Hinestroza, who join Anthony Fernandes and Eugenia Vomvoridi-Ivanovic. Alejandra Sorto, who has been an Editorial Panelist then Editor since 2012; and Marta Civil, who started as an Editorial Panelist in 2011, became an Editor in 2012, and Editor-in-Chief in 2018, have stepped down, each after more than a decade of service to *TEEM*. They have mentored and supported authors and fellow editors over the years, and their contributions to *TEEM* are enormous and will be missed. Ksenija Simic-Muller is starting her term and this is her first issue as the new Editor-in-Chief.

We 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).

While we are continuing on the path forged by previous and current editors, there have been some changes in *TEEM* that our readers should be aware of. Most notably, we have fully transitioned to Open Journal Systems (OJS). There have been a few bumps along the way (we are grateful to reviewers who were patient with us when manuscripts were not being assigned and emails were not being sent), but we are excited that *TEEM* has joined the growing family of journals that use OJS, and believe it has improved our communication with authors and reviewers, streamlined the submission and reviewing process, and made the journal accessible to a wider audience. Another improvement you may see is that you can now download individual articles in addition to downloading entire issues. And as *TEEM* is no longer published in print, it is not in a two-column format anymore, which should make it easier to read online. You can find the current and previous issues at the *TEEM* homepage. Special thanks go to Journal Manager Jordan Register, who worked tirelessly to make the transition happen.

As always, we encourage you to consider submitting an article to and reviewing for *TEEM*. 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. Similarly, we have streamlined the form for reviewers and will soon be incorporating guidelines for reviewers generously shared with us by our colleagues from *The Mathematics Educator*.

We especially want to highlight that *TEEM* encourages submissions in the form of creative or art works (e.g., poetry or visual arts). You will find the poem named E(X) by our Associate Editor Lawrence M. Lesser, and a piece titled A Magical Moment Counting Tires: A Counterstory About Missed Opportunities by Carlos Nicolas Gómez Marchant, Alexandra R. Aguilar, Amy Rae Johnson, Gerardo Sánchez Gutiérrez, and Mona Baniahmadi. Note that the manuscript by Carlos Nicolas Gómez Marchant, a current editor of the journal, and colleagues went through double-blind review as all submissions do, but outside of OJS, to ensure reviewer anonymity. We hope to receive more submissions of this nature. Thanks to Beatriz Quintos for her help revising the reviewer rubric for creative submissions. If you are not sure that your idea for a submission will work, please contact us. More information about *TEEM* and the submission process are available on our website.

In addition to the two creative pieces, this issue contains three peer-reviewed articles. In the article, "Honoring Identity and Building Community in the Mathematics Classroom," Brinley Poulsen Stringer, Gabriela Maria Hernandez, and Mariah Gabriella Moschetti, synthesize the identity frameworks of figured worlds and rightful presence, to help educators challenge the status quo of what it means to teach mathematics and build towards a classroom community of empowered learners. They use vignettes and questions to help educators understand how the theory translates into practice.

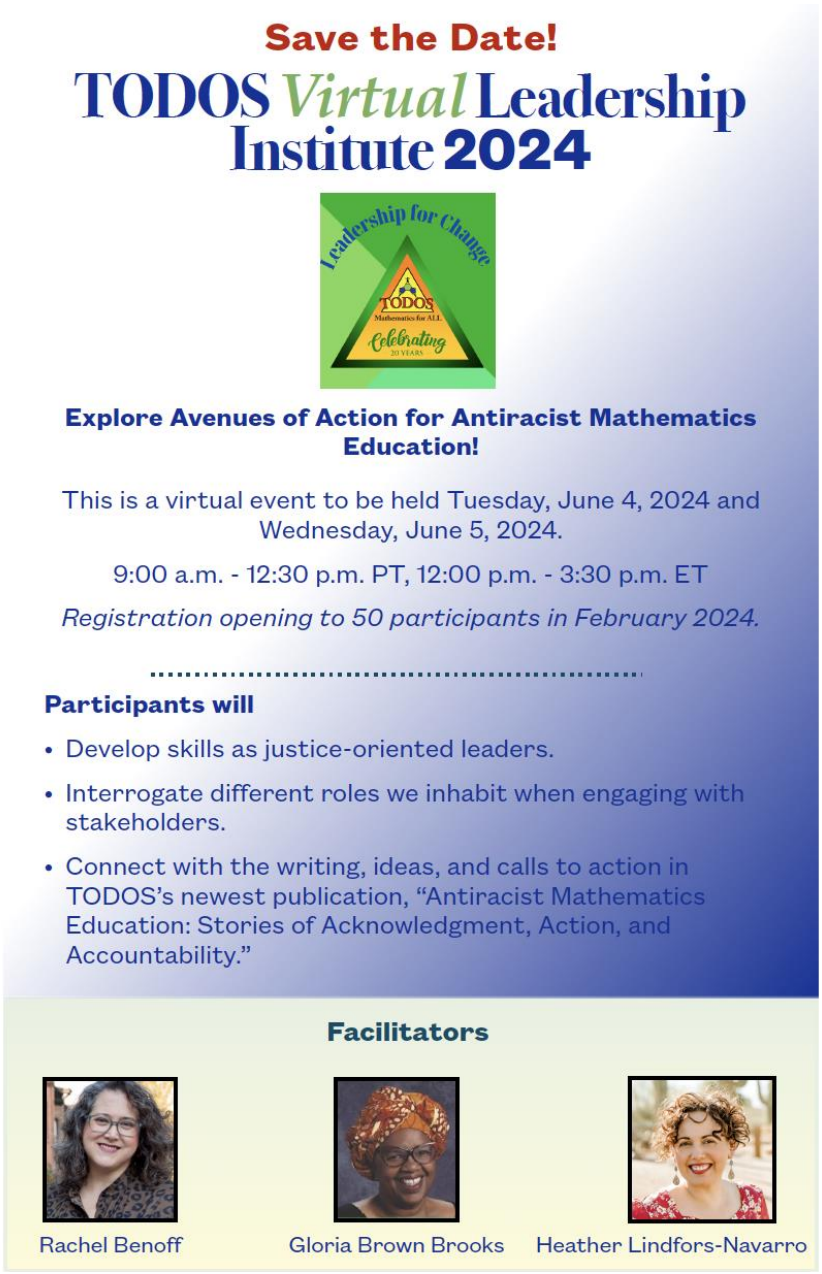
In the article entitled "Using a Two-Way Engagement Community- and Family-Centered Pedagogy to Prepare Pre-Service Mathematics Teachers in a Hispanic-Serving Institution," Mayra Ortiz Galarza, Olga Ramirez, and Luis Fernandez, describe how a two-way engagement Community- and Family-Centered Pedagogy was implemented in a mathematics content course at a Hispanic Serving Institution. The authors discuss the ways in which Latin* pre-service teachers enrolled in the course strengthened both their mathematical and pedagogical knowledge, and recognized their cultural wealth as a valuable educational resource.

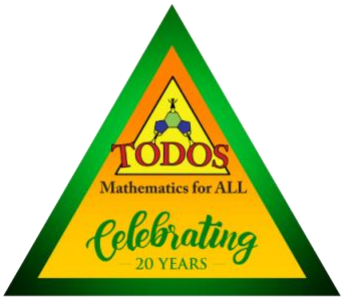
In the article, "An Investigation of How Humans are Portrayed in High School Mathematics Textbooks," Evelyn Pohle, Alison Marzocchi, Alexis Di Pasqua, and Emily Rumaldo, look at human representation and STEM careers in mathematics textbooks. Their analysis shows that people of color and women, and non-binary genders are underrepresented in contextual problems, and there are few examples of STEM careers showcased in problems. The

authors discuss how teachers can be mindful of representation and showcase examples of diverse STEM professionals in classroom materials.

As always, we are extremely grateful for the dedication and expertise of all our reviewers and authors. We are also very appreciative of the excellent editorial support provided by Associate Editor Lawrence M. Lesser and Layout Editor Susie W. Håkansson. *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.

Ksenija Simic-Muller, Anthony Fernandes, Carlos Nicolas Gómez Marchant, José Martínez Hinestroza, and Eugenia Vomvoridi-Ivanovic





Honoring Identity and Building Community in the Mathematics Classroom

Brinley Poulsen Stringer
University of California, San Diego
San Diego State University

Mariah Gabriella Moschetti
San Diego State University
University of California, San Diego

Gabriela Maria Hernandez
University of California, San Diego
San Diego State University

Abstract

Identity is a vital aspect of consideration within the mathematics classroom. This article describes the identity frameworks of figured worlds and rightful presence to help educators make sense of what identity looks like in the mathematics classroom, and how it can be utilized to improve the experience of mathematics learning for all students. By synthesizing these two frameworks, we propose a set of questions to help educators challenge the status quo of what mathematics teaching often is and build towards a classroom community of empowered learners.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. What are some common scenarios that you see in your classroom with respect to student participation?
2. How can teachers influence and impact the way that community is built in the classroom?
3. How could student empowerment bring meaningful changes into your classroom?

Brinley Poulsen Stringer (bstringer@ucsd.edu) is a Ph.D. candidate in Mathematics Education with the MSED joint doctoral program at the University of California San Diego and San Diego State University. Her research focuses on amplifying the perspectives of undergraduate near-peer mentors in mathematics departments. Brinley holds a master's degree in mathematics with an emphasis in mathematics education, and has previously taught mathematics at the secondary and college level.

Mariah Moschetti (mmoschetti1253@sdsu.edu) is a doctoral student specializing in Mathematics and Science Education at San Diego State University and the University of California, San Diego, where they have researched professional development focused on equity, inclusion, and implicit bias. Mariah is interested in researching the strategies and knowledge employed by math instructors to foster students' sense of self and belonging in mathematics and to support their success toward their academic goals, particularly in the context of community colleges.

Gabriela Maria Hernandez (gmhernandez@ucsd.edu) is a Ph.D. student in Mathematics Education with the MSED joint doctoral program at the University of California San Diego and San Diego State University. Gabriela holds a master's degree in mathematics with an interdisciplinary specialization in education and has experience teaching mathematics abroad and with professional development for graduate teaching assistants. Her ongoing research is centered on transforming mathematics education to foster more equitable learning spaces, focusing on the experiences of individuals with disabilities in both rock climbing and mathematical contexts.

Honoring Identity and Building Community in the Mathematics Classroom

Brinley Poulsen Stringer, Mariah Moschetti, and Gabriela Maria Hernandez

Introduction

Identity in the mathematics classroom– how we perceive ourselves and others as "math people"– is becoming an increasingly discussed topic within mathematics education (e.g., Ernest et al., 2019; Langer-Osuna, 2015; Young et al., 2019; Gutiérrez, 2017). As educators, we have the authority to position, or influence, the ways that students are perceived as having identities (e.g., smart, lazy, collaborative, independent, etc.) in the mathematics classroom. With this authority and understanding comes great responsibility. If we perceive our students from deficit perspectives, this will negatively influence how they see themselves as doers of mathematics in the classroom (Battey & Franke, 2015). Alternatively, by witnessing and validating our students 'identities in the mathematics classroom, we can empower our students to help them become contributing citizens both in and outside the classroom (Wilkes & Ball, 2020). Empowerment can be described as creating mathematics classrooms that have both "mirrors", where students can see themselves represented in mathematics they are doing, as well as "windows", where students can see opportunities for what they can become with mathematics (Gutiérrez, 2008; Styles, 1996). We can help our students recognize themselves in these mirrors and begin to realize what they see in these windows by leveraging their agency and identity in our classrooms.

A focus on identity within mathematics education can help us understand narratives commonly found within mathematics classrooms. These narratives influence how our students see themselves as "math people" or not, which intersect with other narratives that exist in society about various groups (e.g., race and gender) of people. If we do not consider these narratives in our classroom, they are most likely to negatively impact our students who are already marginalized in society, leading them away from interest in mathematics and other STEM fields (Miller-Cotto & Lewis, 2020; Nolan et al., 2011).

In this paper, we will discuss two identity frameworks: figured worlds (Holland et al., 1998; Urrieta, 2007) and rightful presence (Calabrese Barton & Tan, 2019; Squire & Darling, 2013). These frameworks together can help us to identify narratives in our classroom and build more inclusive communities that help our students to feel seen and empowered to engage in mathematics classrooms. In particular, we see these frameworks working in tandem to highlight how educators can leverage students' agency to cultivate communities where students are better able to access mathematics through access to their identities. We begin with a brief fictional vignette that illustrates a realistic mathematics classroom in the United States– a classroom where the instructor's efforts to facilitate the learning

process have positive impacts as well as room for growth. We will return to this vignette throughout the paper to illustrate ideas and discuss how educators can leverage students 'agency.

Vignette

Ms. Mahoney, a white woman, has been teaching for four years in a suburban high school in the Midwest. In this region, there is a fair amount of ethnic diversity due to the state's refugee policies that have allowed many cultures to flourish over the past few decades. In Ms. Mahoney's calculus class, most students are white, with about one third being students of color. At the beginning of class, Ms. Mahoney splits her students into groups of four. This is a routine that the students are familiar with, as Ms. Mahoney has been implementing this practice regularly in her class over the past two months as part of a professional development program. In these groups, students are asked to evaluate different limits; in particular, they are exploring indeterminate forms. Ms. Mahoney randomly assigns different roles to each student per group: facilitator (responsible for making sure everyone is participating), reporter (the voice for the group), recorder (responsible for writing down all ideas for the group), and resource manager (in charge of resources). Ms. Mahoney sends groups with their assigned roles off to work on the following problem:

Evaluate the following limit: $\lim_{x\to 3} \frac{x^2-9}{x-3}$.

In group three, Victor (Latino boy) is designated as facilitator, Maria (Black girl) as reporter, Charles (white boy) as recorder, and Laura as resource manager (white girl). Ms. Mahoney stops by this group to listen in for a moment:

Charles: *So this one is easy; when you plug in 3 into the function, you just get 0 over 0, which is 0.*
Laura: *Yeah, that makes sense. I guess we are done!*
Maria (after pulling up Desmos on the computer and looking at the function): *I just don't think that it's 0. It really looks like the limit as x approaches 3 is 6. See, it gets closer and closer to 6, not 0.*
Charles: *Yeah, but 0 over 0 is definitely 0, so I think you may have just graphed it wrong.*
Victor: *I think I remember Ms. Mahoney sayin' something about 0 over 0 being indeterminate and that you have to do more work before you can decide what the limit is…?*
Laura: *Oh yeah! I think that when we factor it, we will get 6 when we plug in 3 for x.*

Ms. Mahoney then left to observe the next group.

After five minutes, the class reconvenes, and the groups are asked to share their solutions and justifications with the rest of the class. In the whole-group discussion, Ms. Mahoney asks group three to share their answer for the problem given. Charles, assigned the role of the recorder, immediately responds:

Charles: *We got the answer is 0.*
Ms. Mahoney: *Can you please explain how you got 0?*
Charles: *Because 0 divided by 0 is 0.*
Maria: *Well… actually, we talked about how 0 over 0 is an indeterminate form.*
Ms. Mahoney: *So, if 0 over 0 is an indeterminate form, what does that mean? What do you have to do next?*
Maria: *It means we should probably factor.*
Charles: *Yeah, we need to factor and cancel out the terms so that it doesn't equal 0 divided by 0 anymore.*
Ms. Mahoney: *Yes, really good job, Charles!*

Background

Research shows that attending to the various aspects of students' identities can improve their learning opportunities and experiences (Gay, 2018). Students' identities in the mathematics classroom can include their cultural backgrounds, gender identities, socioeconomic status, perception of self as a doer of math, and so much more; thus, there are many ways that practitioners can attend to students' identity in the mathematics classroom. In this section,

we discuss the identity frameworks of figured worlds and rightful presence to help educators make sense of how mathematical identities show up and can be formed within the classroom.

Figured Worlds

Figured worlds are "socially and culturally constructed realms of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others" (Holland et al., 1998, p. 52). To unpack this, consider the setting of a fairy tale. A typical fairy tale might include a villain, a damsel in distress, a masculine hero, and goofy sidekicks who help the hero save the damsel. Each of these characters have expected characteristics and associated actions that one could anticipate. Until more recently, it might have been seen as odd to have a female protagonist and a mister in distress, as they do not fit the expected roles and characters of a common fairy tale. Figured worlds, which exist across society, from a family at home, to a gym group, to a school classroom, all have typical roles and actions like the example from a fairy tale that inform people in that group of what to expect from others and of the accepted behaviors in various settings.

As a framework, figured worlds help us understand what identities are considered valid in a particular context. Figured worlds exist wherever people are assigned roles that are only valid when they conform to valued actions and outcomes; thus, figured worlds can range from broad constructs like gender to more concrete spaces like a classroom. (Voigt et al., 2021; Urrieta, 2007). If we consider a traditional mathematics classroom in the US as a figured world, the characters within a traditional mathematics class are generally the teacher and students. The role that the teacher plays is often to disseminate knowledge, and the role of the student is to acquire this knowledge. The people that are valued within a traditional mathematics class are those who can do mathematics, such as the instructors and the students who raise their hand and give correct answers. The valued actions and outcomes are often providing correct answers and getting high grades on exams and homework. Considering the mathematics classroom as a figured world allows us the opportunity to consider, and perhaps even disrupt dominant narratives that are shaped by these interpretations of characters, actions, and values.

The vignette can be understood through the figured worlds framework. In the vignette, the classroom serves as a figured world, a socially constructed space with specific norms, roles, and practices. Ms. Mahoney creates a specific figured world by dividing students into groups and assigning them roles, which encourages collaboration and engagement. The interaction among students in group three illustrates the negotiation of roles and identities within the figured world. Each student takes on their assigned role and contributes to the group's understanding of the problem, and there is also deviation from assigned roles. These alignments and departures from roles contribute to the way that students learn mathematics in the classroom.

During the whole-group discussion, Ms. Mahoney reinforces the norms and practices of the figured world by asking group three to share their answer and encouraging them to explain their reasoning. She also ignores a norm when she engages with Charles 'comment even though Charles is responsible for recording the group's ideas and Maria is assigned as the reporter. This suggests that Charles is taking the lead in the group, even though Maria was the one who raised important points about the indeterminate form and used technology to support her argument. It is possible that Ms. Mahoney may have unintentionally reinforced this power dynamic by addressing Charles first and then praising him for his contribution to the group's success. This vignette reinforces the idea that figured worlds are socially constructed and can be disrupted and changed through collaborative effort.

Rightful Presence

Rightful presence is an identity framework focused on building community in a way that empowers people who are traditionally disempowered. This framework was first applied to the concept of sanctuary cities serving refugees (Calabrese Barton & Tan, 2019; Squire & Darling, 2013). In these cities, refugees are often viewed as guests and pre-existing citizens as hosts. Hosts traditionally *extend rights* to guests– the refugees– by giving them opportunities to

assimilate into the city and culture which they are now living in. This guest-host power dynamic does not empower the refugees to change or influence anything about the city in which they now live, which can create a dynamic of second-class citizens for those refugees who choose to honor their own culture and way of living (i.e., their identities) rather than assimilating.

Rightful presence challenges this notion of *extended rights*, whereby refugees gain access to rights in a sanctuary city only by assimilating to the culture of the guest (Calabrese Barton & Tan, 2019; Squire & Darling, 2013). The rightful presence framework seeks for people to *reauthor* their rights within a space, meaning that all guest and host citizens in a society come together as equals to build a community that honors the characters, cultures, and values of all within the group. Such reauthoring creates a community culture where each member's presence and personal identity is rightfully observed, allowing for *rightful presence*. There are three tenets to the rightful presence framework: 1) hosts must engage as allies to help reauthor rights, 2) challenges and unfairness within the community must be brought to light, and 3) rightful presence is a shared burden between guests and hosts.

In a mathematics classroom, reauthoring rights might look like altering what is considered valued participation. The first tenet of rightful presence highlights that if allies, like teachers, are not engaged in these change efforts, it is difficult for certain student actions to gain legitimacy in the classroom (Calabrese Barton & Tan, 2019). The second tenet highlights the importance of understanding problematic dynamics in the classroom, particularly injustices that exist. Recognizing these dynamics can help highlight voices that otherwise go unheard and point towards holistic solutions that allow for the rightful presence of all student identities in the classroom. Lastly, the third tenet states that rights are not reauthored with top-down approaches from teachers to students, but rather by the whole classroom community working together to reauthor what participation and meaningful learning in the mathematics classroom can look like.

In the vignette, Ms. Mahoney is engaged in some change efforts in how she structures her class, highlighting the first tenet. By assigning group roles, Ms. Mahoney can help certain students' actions gain legitimacy. For instance, assigning a female student the role of reporter creates an opportunity to highlight female voices in the classroom. However, in the vignette, the injustice of Charles taking credit for Maria's contribution went unacknowledged, highlighting room for improvement and growth in utilizing the second tenet of rightful presence. While Victor supported Maria's idea in the small group, because the classroom community– students and teacher alike –did not enforce the group roles in the whole-class discussion, the class did not support Maria's rightful presence to uphold her right as reporter. This highlights an opportunity for growth with the third tenet.

Synthesis and Discussion

We now introduce a set of questions to help practitioners utilize the synthesis of figured worlds and rightful presence with the goal of improving the classroom community. We want to emphasize the fact that figured worlds and rightful presence, in tandem, promote a *community effort* for change and improvement, not one merely by the educator. As practitioners consider how their students can be more involved as agents of change in the classroom, we believe this focus on collaborative community building is how meaningful change in the classroom will occur. Such an emphasis on community-centered efforts where student input is valued creates more opportunities to center student identity and ensure that a space is being created where students are best able to learn and succeed.

We believe, and research supports, that by creating a more safe and open learning environment, students will have a space in which they can more fully bring their identities into the classroom, allowing each individual better learning opportunities (Calabrese Barton & Tan, 2019; Esmonde & Langer-Osuna, 2013; Gay, 2018). These questions are designed to help educators reflect on the current situation in their classrooms (i.e., attending to the figured worlds in our classrooms). When these questions and reflection are then paired with making action steps for how we as educators can make changes, and involve our students in that process, we are paving a path for rightful presence in our classrooms, allowing our students' full selves to shine in the classroom. We structure this section by first

expounding on the questions, followed by reflections to the questions that might occur in Ms. Mahoney's classroom based on the vignette. Lastly, we discuss action steps that might emerge from these reflections.

1. What are the current roles and actions in your classroom?

Our classrooms function as figured worlds, which means that all members of the classroom likely fit into certain roles and fulfill certain actions, as established by the existing classroom social norms. While some of these roles and actions may not have been intentionally created, they still inform students about the types of identities that are encouraged or discouraged to emerge in the classroom. Thus, identifying what these roles and actions are is a way to start making sense of the dynamics of the classroom community. Further, through the enactment of rightful presence, educators can challenge and reshape these existing roles and actions to create a more equitable classroom environment. The rightful presence framework aims to empower individuals to reauthor their rights within a particular environment and entails collaboration in the reauthoring of both guests and hosts in society.

2. Which students have clout? Which students are undervalued?

By identifying the existing roles and actions in the figured world of the classroom, we can consider more carefully which are valued and undervalued. Assigning value to certain roles and actions creates power structures (e.g., some students have clout), so identifying these can enable us to begin to identify what power structures are at play. In recognizing the power dynamics in the classroom, we can also further recognize the types of authority and influence that we have as teachers. Doing so can help us to begin to find greater awareness of student identity in the classroom and places where it is allowed to show up in the classroom, as well as places where it is discouraged. As we recognize these things, we can start to consider alternative ways of being valued in the classroom that can allow for a greater diversity of student identities to emerge.

3. How do these roles, actions, and values impact the whole class community?

As we become aware of the dynamics in our classroom and how they impact students, we can also become more aware of how these dynamics impact our class. We might notice that the way that some role, action, or value impacts one student might also impact other students in the classroom as they observe what happens during class. In doing this we are beginning to look at figured worlds at play in our classrooms, allowing us to identify challenges in the community that can be improved. Finding ways to attend to these challenges is a way to enact rightful presence.

Reflection

Looking at the vignette, Ms. Mahoney has created a figured world where the students are split into groups and assigned specific roles to complete a task. The roles assigned by Ms. Mahoney (the facilitator, reporter, recorder, and resource manager) help facilitate group work and ensure that each student has a specific and important responsibility to contribute to the group's success. In the small group discussion, the students seemed to take up their assigned roles. However, these roles are not maintained or reinforced in the whole-group discussion. In the whole-group discussion, Charles speaks over Maria and receives credit for arriving at the correct solution. Ms. Mahoney seems to be reinforcing the idea that the student who speaks the loudest gets heard. Ms. Mahoney might reflect on the current roles and actions that are valued in the classroom. That is, by taking a critical lens to the established norms and actively promoting a supportive and safe classroom culture, Ms. Mahoney can create an environment where all students feel empowered to contribute and participate in a way that feels comfortable for them. In other words, practitioners like Ms. Mahoney can challenge the existing norms in their classroom and strive to create improved ones that foster a more inclusive and collaborative learning environment.

Attending to which students are valued, we see that during the small-group interaction, Maria appears to have some clout because Victor and Laura acknowledge and agree with her. However, when Ms. Mahoney reconvenes the class, possible gender and racial power dynamics seem to appear. Ms. Mahoney acknowledges only Charles' contribution. By creating group roles, Ms. Mahoney may be attempting to raise the voices of certain students. However, she could reflect on how these group roles might create power dynamics and the influence she has on those dynamics. For example, how often does Ms. Mahoney switch group roles? If Maria has not often taken on the role of reporter, she may not readily step into it and some students like Charles may not value her voice. Ms. Mahoney's role as an authority in the classroom could support students in taking up new roles. However, by not enforcing group roles, Ms. Mahoney may be perpetuating biases by not acknowledging a competent female student of color while acknowledging a white male student instead. Practitioners like Ms. Mahoney can reflect on which students are participating, how, and why, in order to critically evaluate the power dynamics in the classroom to affirm the rightful presence of all students.

In Ms. Mahoney's classroom, Maria's voice was overlooked during the whole-class discussion as attention went towards Charles. While Ms. Mahoney may not have intentionally done this, it also creates an opportunity for her to reflect on the message this might send to other girls in the classroom who are assigned as the reporter– do they feel that their voices will be heard in their roles? Will they see themselves as capable mathematics students and valuable contributors to the class if these trends continue? The whole-class discussion might be another opportunity for reflection. Ms. Mahoney structured the whole-class discussion such that student ideas were shared and discussed through her as opposed to one another. This also establishes class norms of how students are being taught to interact (or not) with one another's mathematical ideas. Practitioners like Ms. Mahoney might reflect on the opportunities students have to leverage their agency with one another and engage in mathematics discussions as a whole class.

Action

Ms. Mahoney and her students can begin reauthoring rights through creating norms together in the classroom. For example, on the first day of class, Ms. Mahoney and her class might collectively brainstorm and decide on the expectations and values that will shape their mathematics learning environment. This process allows students to feel a sense of ownership and agency in creating a classroom culture that embodies the principles of rightful presence. The class could co-create norms for group work and whole-class discussions, such as the expectations for each within-group role, for how often to change groups and roles, for working together, and for sharing ideas. These norms can manifest as viewing mistakes as opportunities, justifying or explaining full or partial solutions, valuing multiple solution paths, and practicing mutual respect by refraining from talking over one another. Through the community development and implementation of these norms, students are afforded the opportunity to develop productive mathematical identities and participate in a way that feels good for them. Indeed, practitioners can start to consider alternative perspectives and norms that can allow for a greater diversity of student identities to emerge in the classroom community.

Furthermore, increasing awareness of which students are not valued in the classroom presents us with the opportunity to act as an ally to affirm the rightful presence of these students. For instance, during the small-group interaction, Charles openly disagreed with Maria even though the other group members did not. Ms. Mahoney could have taken this opportunity to elevate Maria's contribution as legitimate and valuable. For instance, while she was near the group, she may have told the group that Maria had an explanation for her idea that they should consider, reminding them that the group might be asked to justify their answer, or she may have explicitly encouraged Charles to listen to what Maria was saying because she was making some good points. She also may have asked Maria if she could be ready to present her ideas and called on her as the group reporter during the whole-class discussion. During the whole-class discussion, Ms. Mahoney may have asked Maria how she knew factoring was required. Asking Maria for an explanation could help disrupt the expectation that the loudest students are those who will be heard, further

placing value on Maria's knowledge, and helping her to take up her rightful presence in the classroom. By performing similar reflections in their classrooms, practitioners can begin to take steps to affirm students' value and challenge dynamics that position only certain students as valuable members of the classroom community.

As practitioners reflect on their classrooms throughout the school year, they might begin to realize opportunities where they can change some of their own practices and elicit the students to help bring positive changes to the classroom as a community. For example, Ms. Mahoney might have a chat with the class, asking students what are helpful and productive ways to discuss mathematics together. In this process, the class might construct new norms for whole-class discussions so that students can engage in one another's ideas while Ms. Mahoney helps facilitate these discussions between students. Perhaps the class can also discuss what to do when norms are broken, and how to get back on track. Part of this discussion might be bringing awareness to how these broken norms could impact different students, helping students to foster empathy for one another and build community rapport.

Conclusion

In this paper, we have synthesized the theoretical frameworks of figured worlds and rightful presence to think about identity and thus enact change in the classroom. To make these frameworks more tangible in our own classrooms, we have provided some questions to help us reflect and begin taking action steps to better support our students. While we presented an example of how Ms. Mahoney might work through this framework of questions while focusing on a few students, there are other places in Ms. Mahoney's class, as well as each of ours, that also deserve thought and attention. We have provided one example that demonstrates the importance of identity in the mathematics classroom and how we can empower students to bring their identities more fully with them. Our hope is that this is an ongoing effort in our classrooms.

By considering the roles, actions, and values which form the figured worlds of our classrooms, we can become aware of meaningful changes that need to occur. By understanding what needs to change, rightful presence encourages us to collaborate as a classroom community to reauthor what mathematics learning can look like. When we create mathematics classrooms that do not require students to leave their identities behind, they can better learn and use mathematics in ways that serve them. More importantly, when our students can bring their whole selves into the classroom, we can help students embody their rightful presence as doers and users of mathematics so they can use mathematics to empower themselves and become agents of change in their communities.

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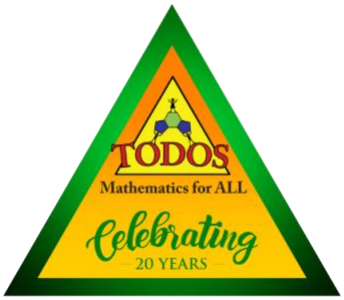
Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. Model a figured world in your classroom that you are a part of. What are some of the roles, actions, and values that dictate how that figured world functions?
   Roles:
   Actions:
   Values:

2. Which characters have clout? Which characters are overlooked within this figured world? What are some of the challenging power dynamics that exist because of these characters?
   Characters with clout:
   Overlooked characters:
   Challenging dynamics:

3. What are some potential ways to engage with students to help build towards rightful presence in the classroom community, especially for overlooked students?
   Potential activities, assignments, etc.:

4. Read and discuss these for further consideration on figured worlds and rightful presence:
   a. From Getting "Fired" to Becoming a Collaborator: A Case of the Coconstruction of Identity and Engagement in a Project-Based Mathematics Classroom. https://www.tandfonline.com/doi/full/10.1080/10508406.2014.944643
   b. Beyond Equity as Inclusion: A Framework of "Rightful Presence" for Guiding Justice-Oriented Studies in Teaching and Learning. https://journals.sagepub.com/doi/10.3102/0013189X20927363



Using a Two-Way Engagement Community- and Family-Centered Pedagogy to Prepare Pre-Service Mathematics Teachers in a Hispanic-Serving Institution

Olga Ramirez
The University of Texas Rio Grande Valley

Mayra Ortiz Galarza
The University of Texas Rio Grande Valley

Luis M. Fernández
The University of Texas Rio Grande Valley

Abstract

Research on effective methods to prepare pre-service teachers (PSTs) in teaching mathematics to K-12 Latin* students has been gaining significant momentum. These efforts have focused, in part, on promoting pedagogical practices that recognize and incorporate the culture and language that K-12 Latin* students and their communities share. As teacher educators, we argue that if we are to further prepare PSTs to serve the needs of such increasingly diversifying K-12 student population, the same pedagogical focus on the learner's cultural wealth should also be applied to the preparation of PSTs themselves, especially among Latin* PSTs in Hispanic-Serving Institutions (HSI) like ours. This paper documents how a university faculty prepared a cohort of Latin* PSTs using a Two-Way Engagement Community- and Family-Centered Pedagogy (CFCP) in a mathematics content course at an HSI. Twenty-four PSTs completed a semester-long mathematics project that involved interviewing local Latin* business owners or managers, interacting with family leaders from the community, and presenting their projects at a local symposium. PSTs' experiences showed that the implementation of the Two-Way CFCP in the mathematics classroom not only strengthened their mathematical content and pedagogy preparation but also helped them to recognize their cultural wealth as a valuable educational resource.

Note: In recent years, the term Latinx has become the de facto term to denote individuals from Hispanic, Latino/a, and other similar race/ethnic groups. However, the term Latinx has also been criticized for neutralizing gender, sexual identity, language, and ethnicity rather than achieving its original goal of inclusivity (Salinas, 2020). The term Latin* (pronounced Latin), on the contrary, "can go beyond a word; it can be used as a space holder for people to reclaim their identities in the complexity of layers of Latin American origin and descent" (Salinas, 2020, p. 164). Therefore, we opted for the term Latin* as an attempt to represent such identity complexity.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. What are ways you have implemented (or thought about implementing) connections to the culture of the students in your school/community?

2. What are ways you have implemented (or thought about implementing) connections to the language of the students in your school/community?

3. What are ways you have implemented (or thought about implementing) connections in your teaching to your local community?

Olga Ramirez (olga.ramirez@utrgv.edu) is a Professor of Mathematics Education at the University of Texas Rio Grande Valley. Dr. Ramirez's interests focus on the investigation of mathematics factors related to Hispanic students' work with family math learning events and culturally relevant mathematics. Interested in best teaching practices, she incorporates instructional activities in teaching that both motivate and challenge students while concurrently meeting their learning needs.

Mayra Ortiz Galarza (mayra.ortizgalarza@utrgv.edu) is an Assistant Professor of Mathematics Education at the University of Texas Rio Grande Valley. Dr. Galarza's teaching and research interests focus on improving the participation and experiences of minority and underserved students in STEM. She also investigates the impact of effective teaching practices, inquiry-based environments and student learning.

Luis M. Fernández (luis.fernandez01@utrgv.edu) is an Assistant Professor of Mathematics Education at the University of Texas Rio Grande Valley. Dr. Fernández has an interest in working to identify instructional practices that increase the quality of mathematics education for Emergent Bilingual (EB) students. Specifically, he is interested in providing professional development opportunities for educators to help them use EB strategies to promote English acquisition and content understanding, simultaneously.

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Using a Two-Way Engagement Community- and Family-Centered Pedagogy to Prepare Pre-Service Mathematics Teachers in a Hispanic-Serving Institution

Olga Ramirez, Mayra Ortiz Galarza, and Luis M. Fernández

Our nation's growing reliance on scientific and mathematical advances accompanied by a growing Latin* population (Bauman & Murray, 2017) call for new, creative, and effective methods to prepare Latin* mathematics pre-service teachers (PSTs) in ways that promote their STEM capacities while simultaneously recognizing their culture and language as valuable educational resources. Indeed, it has long been documented that tapping into the learners' funds of knowledge (Moll et al., 1992), including the shared knowledge and assets within the learners' communities and families (Anhalt et al., 2018; Civil, 2002, 2007), allow for the learning process of mathematics to become more relevant and attainable for learners, particularly among Latin* students and other underserved populations (e.g., Celedón-Pattichis et al., 2010; González et al., 2001; Williams et al., 2020). Incorporating such community and familial knowledge and assets into teacher preparation programs has also shown to help shape PSTs' future role as facilitators that bridge their students' culture, communities, and families to classroom instruction (Kelley, 2020; Burton & Williams, 2021; Monárrez et al., 2021; Saathoff, 2015). Collectively, these efforts could have the capacity to strengthen the mathematics preparation of every cohort of Latin* educators to come.

Such need for more culturally inclusive pedagogies is essential at universities like ours that prepare a preponderance of Latin* PSTs who, once in the teaching profession, will also need to know how to engage with and incorporate their K-12 Latin* students' community and familial assets into their mathematics classrooms (Gomez, Jones, & Tanck, 2020; Krause & Colegrove, 2020). However, this creates a significant challenge as many teacher preparation programs are still underprepared in training PSTs to meet the needs of our growing culturally and linguistically diverse population (Ostorga & Farruggio, 2020; Lehman, 2017; Canales-Vela, 2017), not to mention the unpreparedness shared by many universities in meeting the needs of Latin* college students, in general (e.g., Fernández, et al., 2019; Maestas et al., 2007; Ojeda et al., 2014; Otero et al., 2007). It becomes clear, then, that if we want to address the need for better qualified and well-prepared K-12 Latin* mathematics educators, we must continue to advocate for teacher preparation programs that build upon Latin* PSTs' cultural assets, such as the funds of knowledge that is embedded within their communities and families.

It is worth mentioning that all three authors recognize the intersectionality that their identities have with their roles as mathematics educators. Even though they all identify as being part of the Latin* community, they hold different insider and outsider perspectives, as well. The first author identifies as bilingual, bicultural, first college generation Latin* woman with expertise in mathematics education, culturally relevant mathematics, and teacher preparation. The second author identifies as a bilingual, bicultural, first college generation Latin* woman with expertise in mathematics education, STEM education, teacher preparation, and relevant experience in bilingual mathematical contexts. Lastly, the third author, who identifies as a Latin* man, not only brings with him his expertise in the mathematics education of the Latin* K-16 student population, but he also brings his personal experience growing up as a former English Learner (EL)-labelled student throughout his elementary education in the United States.

Through these lenses, we present our initial experiences in adopting a Two-Way Engagement Community- and Family-Centered Pedagogy (CFCP), a developing framework where universities engage families and businesses from the community as partners and recognize their capacity to contribute to the academic and professional preparation of its Latin* PSTs. As such, we implemented a Two-Way Engagement CFCP with 24 Latin* PSTs enrolled in a mathematics content course at a Hispanic-Serving Institution's (HSI's) teacher preparation program with the intentions of strengthening the PSTs' mathematical proficiency and, ultimately, to inform educational policies in ways that enable more robust teacher preparation programs.

Developing the Two-Way Engagement CFCP

Throughout the years, there has been a gradual shift in how we think about the education of underserved populations (Denton et al., 2020). Rather than focusing solely on the challenges and disadvantages underserved students face, this shift calls for the adoption of an asset-based perspective that recognizes them as possessors of cultural capital (Yosso, 2005). Thus, it is by engaging with, and learning from, such students' funds of knowledge that an array of knowledge, skills, and abilities exist and that, when incorporated into the education of underserved populations, not only lead to higher academic achievements but are even powerful enough to be used against macro- and micro-forms of oppression (Freire, 1973).

Efforts of integrating students' funds of knowledge into teacher preparation programs underscore its significance in promoting equity, inclusivity, and academic success among underserved students, including the PSTs themselves. This approach involves recognizing and incorporating the diverse backgrounds, experiences, and knowledge that students bring from their homes and communities into the teaching practice. It is through efforts like these that teacher preparation programs can continue to further develop culturally competent educators who can effectively connect curriculum content with their future students' lived experiences, especially when their future students come from culturally and linguistically diverse backgrounds (e.g., Espinoza, Nuñez, & Degollado, 2021; Johnson & Newcomer, 2020; Stoehr & Civil, 2022; Williams et al., 2020). Stoehr and Civil (2022), for example, explored how PSTs' interactions with Latina mothers from the local community helped them to think of ways to make meaningful connections between the students' home experiences and their future mathematics teaching practices. These PSTs also developed an awareness of the importance of building relationships with their future students' families, as well as recognizing the expertise that was shared by the Latina mothers that often gets overlooked in academic settings.

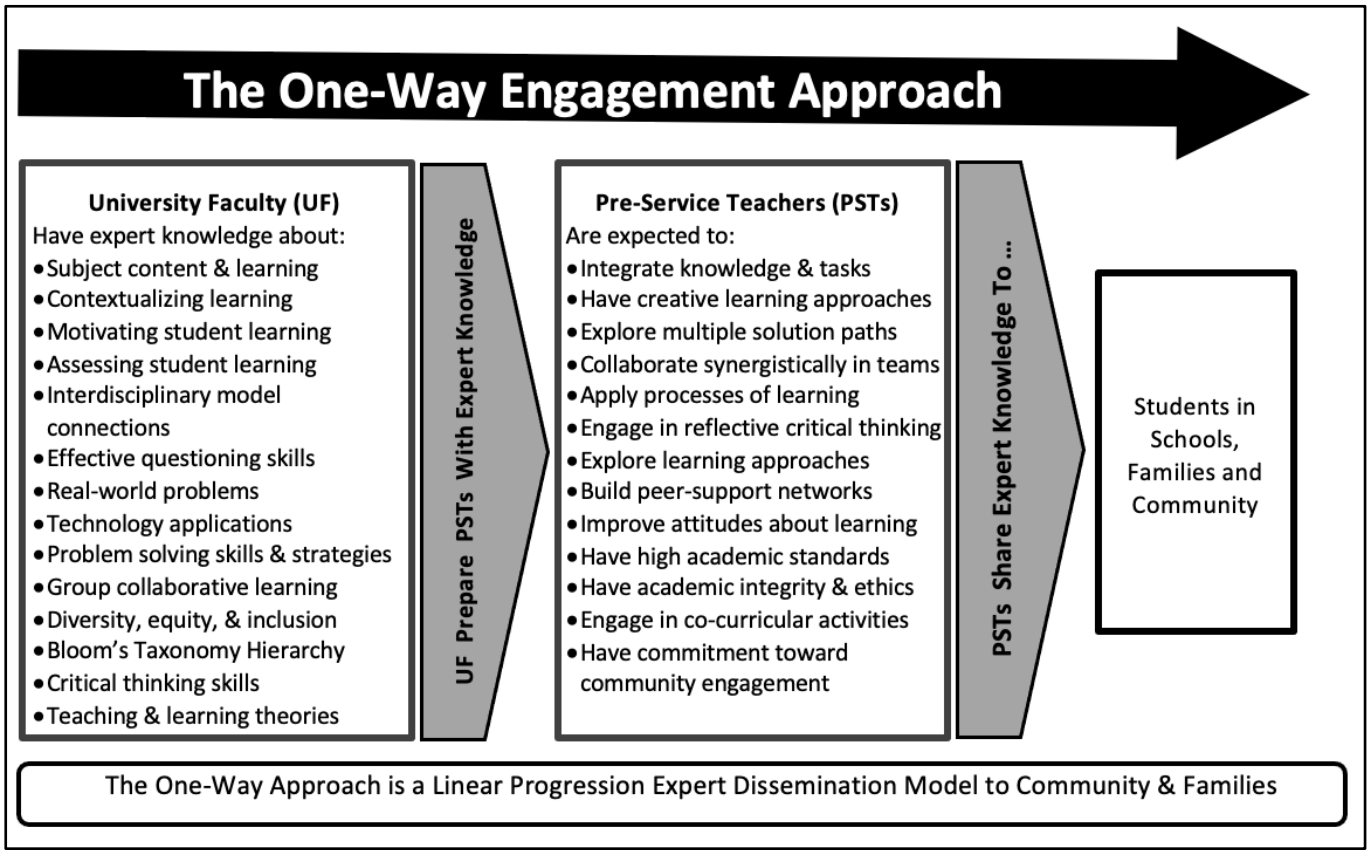
In a similar note, Espinoza and colleagues (2021) tasked a group of bilingual (English – Spanish) PSTs with creating lesson plans that supported and sustained their students' "communities' cultural practices and ways of being" (p. 5). In that study, PSTs were conducting an internship experience with actual students and were asked to visit their local community establishments, such as a *restaurante* and *panadería*, speak to community leaders and members, and collect artifacts, all in an effort to create genuine community-based lessons for their students. As a result, the PSTs experienced a deeper awareness and connection to their students and their communities which translated to a higher engagement and participation during the teaching of such lessons. Furthermore, the PSTs recognized the community members as possessors and creators of knowledge, and therefore "disrupting the privileging of the school's official standards-based curriculum that traditionally ignores local resources" (p. 10). Such studies serve to highlight the engagement efforts that are required between teacher preparation programs and its surrounding communities to gain a deeper understanding of the community's cultural assets.

On the other hand, Grains and colleagues (2019) raise awareness to potential issues embedded within community engagement efforts, particularly on those where their tendency is to adopt a unidirectional, or One-Way Engagement Approach, in which the parties of power tend to be the main benefactors from such interactions. This is typically employed by universities delivering knowledge and expertise primarily to rather than also from the public sector (Roper & Hirth, 2005; Weerts & Sandmann, 2008).

As seen in Figure 1, the One-Way Engagement Approach positions university faculty as the knowledge authorities who either 1) share expertise with communities or 2) will prepare PSTs with specific expert knowledge that they will then share with their future students, community, and families. As a result, the One-Way Engagement Approach can be described as a linear progression dissemination model with expert knowledge that goes solely from university experts (faculty and prepared students) to community and family members.

Figure 1

The One-Way Engagement Approach (composed by Ramirez and Ortiz)

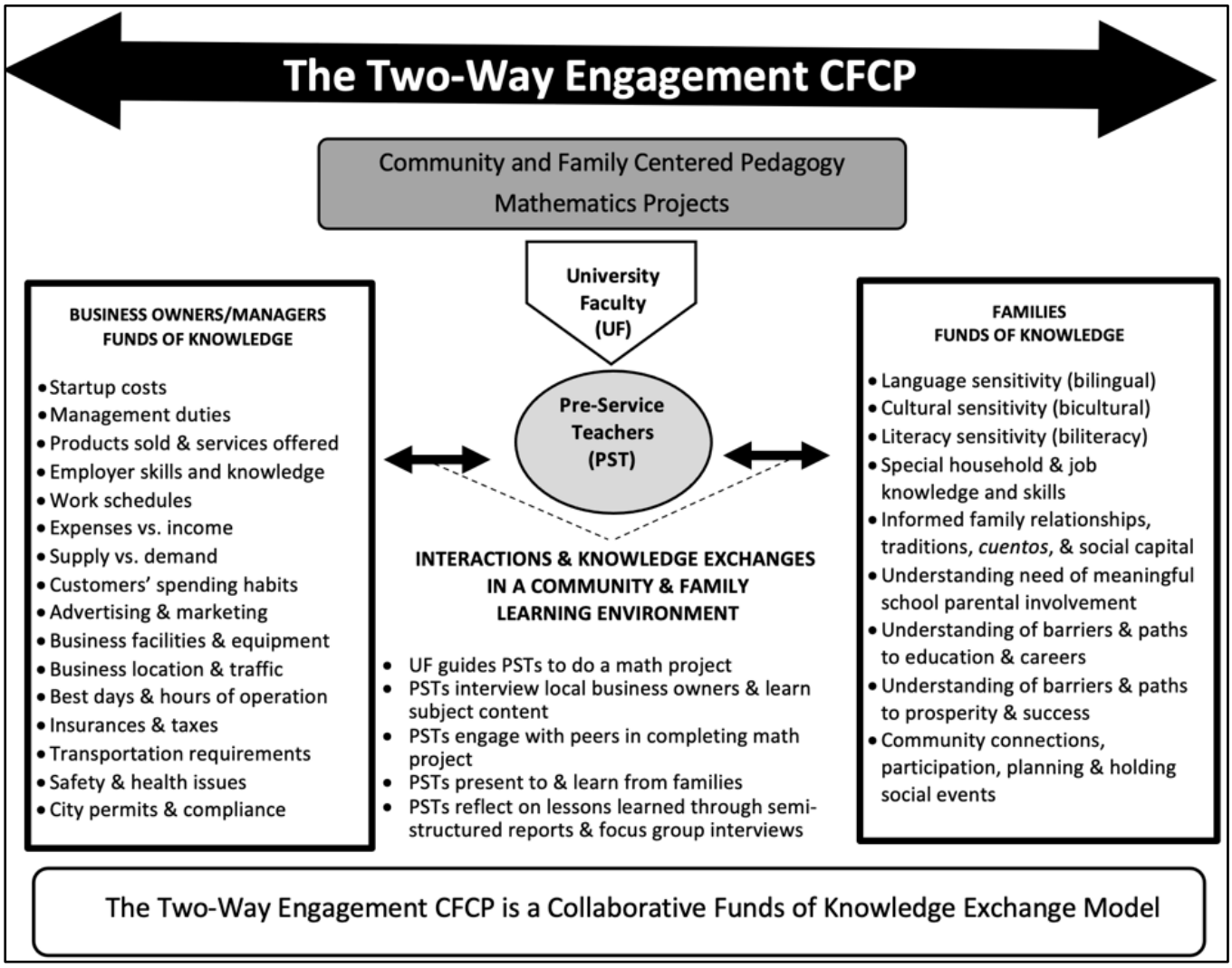


In order to create a more equitable learning environment for *all* parties involved, we adopted a Two-Way Engagement CFCP (see Figure 2), a developing framework that values, incorporates, and reciprocates the funds of knowledge generated by community partners in the preparation of Latin* PSTs. There were two types of community partners working with our PSTs. One group consisted of the business owners (volunteers) whom our PSTs selected to interview based on the business they chose to study, and the second group consisted of Latin* (mainly Spanish-speaking) family leaders from the community that partner with our university to expand community and family engagement, inclusive of family-centered pedagogy. The Two-Way Engagement CFCP was designed to engage with these two groups from the local community.

Furthermore, the Two-Way Engagement CFCP recognizes the cultural and cognitive resources that exist within the PSTs' communities and families as funds of knowledge with a great potential utility for classroom mathematics instruction (Moll et al., 1992). In other words, the Two-Way Engagement CFCP is a collaborative model in which all members are recognized as valid sources of knowledge, including the PSTs' families and community partners (Fitzgerald et al., 2012; Weerts & Sandmann, 2008). Furthermore, business owners, students' family members, family leaders from the community, university faculty, and PSTs exchange and gain knowledge from these valid sources. This engagement model allows for knowledge to adopt a bidirectional nature, growing and evolving as it goes from one member to another within the university-community-family context (Boyer, 1996).

Figure 2

The Two-Way Engagement CFCP (composed by Ramirez and Ortiz)



Using the Two-Way Engagement CFCP in a Mathematics Course

A cohort of 24 PSTs participated in this project. All PSTs identified as Mexican or Mexican-American. Among them, 20 identified as female and the rest identified as males; with all but two PSTs demonstrating various degrees of bilingualism in English and Spanish. Approximately 70% of the participants were also identified as first-generation college students from low socio-economic backgrounds. They were all enrolled in a foundational mathematics content course designed for students seeking general teacher certification, that is students pursuing a teaching degree at the elementary level. Additionally, the topics taught in this course did not deviate from the already-established curriculum, including set theory, numeration systems, and the development of special number sets with an emphasis on problem solving and the use of manipulatives.

The biggest challenge encountered by the course instructor during the implementation of the CFCP in the mathematics course was finding how to keep the PSTs on task with the weekly project assignments. To address this, first, the PSTs were placed in groups depending on their mathematics project focus to help and support each other. Forming the groups turned out to be very beneficial for the PSTs who needed more direction. By helping each other, the PSTs would input their individual work on a OneDrive folder that was accessible to the group and to a graduate

assistant that offered them help, along with the course instructor. This facilitated dialogue about the projects within the groups and helped keep the students on task. The course instructor and graduate assistant would review weekly the work submitted on the OneDrive folder by each group and promptly responded on whether or not they had met the week's project assignment objective.

The weekly list of assignments developed by the course instructor and a mathematics education colleague included having each student: (1) Choose a business; (2) Write a justification for why this business is important to the community and families; (3) Conduct research on historical and current events about the selected math business topic; (4) Submit at least five questions, with answers, based on the history or current events regarding the selected math business topic; (5) Create a list of twelve or more open-ended questions applicable and related to the specific business that you will use to interview the business owner/manager; (6) Make an appointment to interview the business owner/manager; (7) Interview the business owner or manager, in English, Spanish, or both languages; (8) Summarize, organize, and analyze data from the interview of the business owner/manager; (9) Complete a tri-fold poster to present the math project to family leaders; business owner/manager can be invited; (10) Create at least five math questions, with answers, related to the selected business; (11) On the tri-fold poster, include some interview questions, history and math questions, and specific findings about the business; (12) Do a presentation to community and family leaders who will engage with you & provide feedback, in English, Spanish, or both languages; (13) Improve the tri-fold poster by incorporating feedback; (14) Present the revised and improved math project in a symposium, three weeks later; (15) Complete a semi-structured report including lessons learned from doing the community and family-centered math project with recommendation for future research; (16) Attend and participate in focus groups with questions about this math project. This weekly list of assignments used to operationalize the mathematics project proved to be effective in keeping the students on task and in having them work in support groups. It also reduced the time needed to explain the mathematics project during class because the PSTs became fully aware of what to do each week. For their semester-long project, the PSTs were asked to use the Two-Way Engagement CFCP to research, study, learn, apply, and connect the mathematics embedded in Latin* local businesses to the mathematics topics discussed in class. Furthermore, PSTs were expected to work closely with family leaders from the community through classroom visits in the development of their mathematics projects, discussed in detail in the following section. Overall, the mathematics project counted for 20% of the course grade.

Adopting the Two-Way Engagement CFCP for the PSTs' Mathematics Projects

Based on the Two-Way Engagement CFCP, the PSTs were assigned to interview (sometimes in Spanish) local Latin* business owners or managers to understand the history and mathematical connections related to their business. For this, the course instructor provided PSTs with sample interview questions and other guidelines that supported the interviewing processes. Then the PSTs developed their interview protocols that included questions about the history of the selected business, history of the business sector or product, and mathematical connections to the business selected. Artifacts, pictures, and other math-related information were also collected from the businesses by the PSTs as part of their assignments. There were nine overarching types of businesses (i.e., *tamalerías*, snack shops, *pizzerías*, *panaderías*, *taquerías*, nail and hair salons, *carnicerías*, and real estate agencies) that PSTs included in their projects. All businesses were either owned or managed by Mexican or Mexican-American community members. Figure 3 illustrates some sample projects, interview questions, history questions, and mathematics questions.

Additionally, visits to the mathematics classroom were scheduled for the PSTs to interact with the aforementioned Latin* family leaders from the community. Approximately 20 family leaders visited the mathematics classroom three weeks prior to the end of the semester where they engaged with the PSTs over their "nearly completed" mathematics projects. The family leaders participated in discussions with the PSTs over their presentations and the content on their projects' tri-fold posters. During this visit, family leaders provided feedback to the PSTs on how to improve their mathematics' projects from a family perspective which the PSTs would present once again three weeks later at a

symposium to a larger audience. Notably, the family leaders reciprocated their own funds of knowledge about the mathematical topics at hand by sharing their at-home knowledge and perspectives, including their knowledge on the Latin* culture, language(s), and informed traditions, as well as special household and job skills (Moll et al., 2001). As an effect, the family leaders not only served as an audience for the PSTs to practice their presentations with, but they also adopted an important role in which they shared practical knowledge and skills with cultural and Spanish language connections that they shared with the PSTs.

Figure 3

Two-Way Engagement CFCP PSTs' Sample Mathematics Projects

Delia's Tamales

PST Comment: I wanted to focus on the success of this business because it is fascinating how a small Mexican-American business owner that started from a small, at home, business is slowly branching out throughout some regions of Texas.

Sample Interview Questions

A. How did the idea of opening your business come to mind?
B. How is mathematics related to your business?
C. What are some of your expenses?

Nana's Taquería

PST Comment: Nana's Taqueria brings Mexico's culture and atmosphere experience to the United States. Nana's Taqueria has been recognized as one of the "120 Tacos you must eat before you die" in Texas.

Sample History Question [Correct Answer is A]

Tacos originated in Mexico. How did they come to the United States?

A. Tacos came through migrants that traveled to Los Angeles in the early 1900s
B. In the early 1900s the Aztecs were able to cross tacos into the United States.
C. In the early 1900s the Spaniards were able to cross tacos into United States.

Natalie's Beauticity Nail Salon

PST Comment: I discovered Natalie's amazing nail art two years ago and ever since she is the only one I let work on my nails. This business serves the RGV community and families and it is a self-operated bilingual business within Natalie's own home.

Sample Mathematical Question [Correct Answer is D]

How much money can be made per month if overall expenses cost a total of $2,000 monthly and this business does 100 sets of nails monthly priced at $45 each?

A. $1500 B. $2220 C. $2000 D. $2500

Aguilar's Meat Market

PST Comment: Aguilars Meat Market is a family-owned meat market that started from humble beginnings and now has expanded to various parts of the Rio Grande Valley. They have made a name for themselves as one of the best meat markets in the Rio Grande Valley.

Sample Mathematical Question [Correct Answer is B]

If Aguilars need to buy a bandsaw for $10,000 and Fajitas (a type of meat) costs $10 per pound. How many pounds of Fajitas does Aguilars's Meat Market need to sell to be able to purchase a bandsaw?

A. 900 B.1000 C.1200

The mathematics project experience culminated at the end of the semester with the PSTs presenting their mathematics projects at a symposium. It was during this education- and community-oriented event where the PSTs showcased their finalized mathematics projects to approximately 150 attendees, including some members of the students' own families, families from the community, mathematics and science students, graduate research assistants, faculty, and university administrators. For this final stage, all PSTs were encouraged to speak English, Spanish, or both languages with the intentions of not only facilitating communication among all attendees, but to also empower the PSTs' usage of linguistic practices that are typically not valued in academia.

A Sample Two-Way Engagement CFCP Mathematics Project

As part of the project assignments, PST Emma selected "Delia's Tamales," a Latin* family-owned chain of restaurants specializing in *tamales*. For this, Emma had to approach the business manager to introduce herself, state the purpose for her visit, and to secure a collaborative agreement for an interview. Simultaneously, as part of the project requirements, Emma developed a semi-structured interview protocol based on course expectations. The protocol included questions in three different categories: 1) History of the business sector/product; 2) History of the selected business; and 3) Mathematical connections to the business selected. The development of the interview protocol was comprised of multiple stages, such as brainstorming several questions for each category, refining the questions through peer-collaboration and discussion, selecting the most appropriate questions for the interview, and preparing follow up questions. Additionally, as part of the interview preparations, Emma organized the logistics to conduct a successful interview (i.e., learning how to build rapport, preparing the interview protocols, practicing interview rehearsals in advance, getting her equipment and materials ready for the interview, etc.). Emma's investigation not only highlighted important facts about tamales and their role in Mexican or Mexican-American family traditions, but also culturally relevant mathematical connections embedded to the business about tamales.

Presenting the Mathematics Projects in a Local Symposium

Participating in the end-of-semester symposium represented an opportunity for Emma and other PSTs to connect with their community. Emma not only presented the connections between mathematics and Delia's Tamales but also described important connections of this business with the culture and language of her Latin* community. Conducting a mathematics project guided by the Two-Way Engagement CFCP empowered Emma and other PSTs to gain confidence and abilities. For example, because of her interactions with a business manager and the families from the community, Emma reported that she lost her fear of public speaking, improved her written and oral communication skills, and that she even lost her fear of mathematics, realizing that mathematics is everywhere and that it is a way of life with interesting and meaningful culturally relevant applications. Furthermore, she valued the interactions with the family leaders and the feedback given to her. She stated that the mathematics project was a very interesting experience and she, as well as her current classroom peers, highly recommended that her peers in future classes do this mathematics project. As a result, Emma's adoption of the Two-Way Engagement CFCP culminated in an intricate collection, and flow, of funds of knowledge that highlighted the content and cultural wealth that lies within her community (see Figure 4).

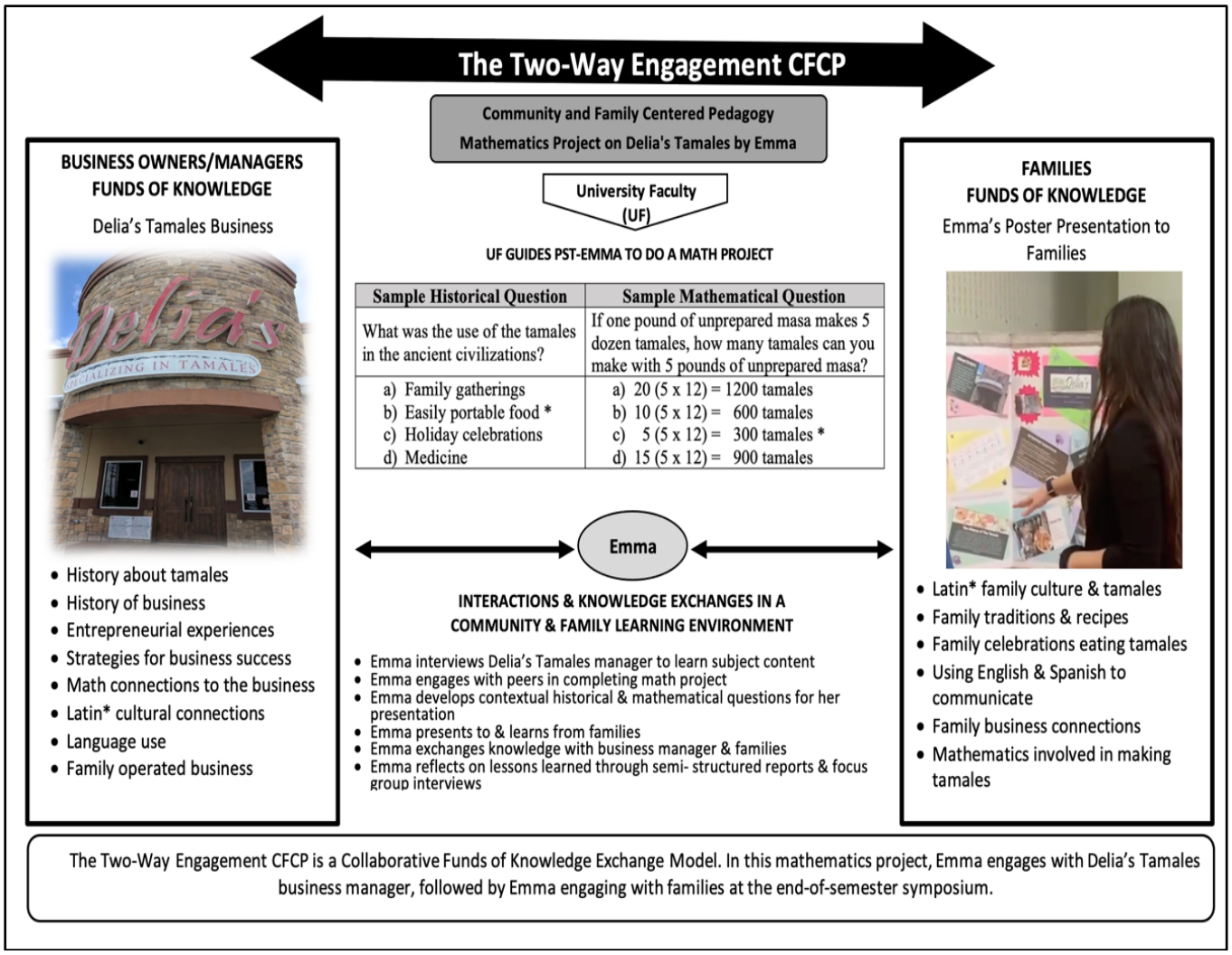
Takeaways of Conducting a Mathematics Project Using the Two-Way Engagement CFCP

Preparing a new generation of PSTs that will effectively impact their communities calls for a more holistic curriculum where PSTs should not only master the course content but also develop productive mathematical identities with the set of skills that will help them understand, connect, and better serve their students and communities (Gibbons et al., 2018). Even though a full empirical study is beyond the scope of this paper, we still believe it is worth sharing evidence of PSTs' identity development. In the next section, we share their perspectives about the mathematics

project derived from participating, at the end of the semester, in focus groups led by another mathematics educator that was not the instructor and by submitting written reflections. The three overall themes that emerged from the focus groups are summarized in what follows.

Figure 4

Emma's Adoption of the Two-Way Engagement CFCP for Her Math Project



Preparing Better Mathematics PSTs via the Two-Way Engagement CFCP

A notable impact described by the PSTs in this Two-Way Engagement CFCP mathematics project was that they truly felt encouraged and mentored by their professor to engage with the local community, something no other professor was doing or has done in their classes. For instance, Julia shared that "Dr. [M] has been the only professor to care about my development as a math student by conducting this project and allowing us to become more involved [with the community]." Similarly, Miriam pointed out that "while I don't think all my professors encouraged me to connect with local families, the fundamentals of mathematics class staff did encourage me… [They] cared about how I developed as a math student."

Similarly, participants referenced and appreciated the professor's efforts to support the PSTs throughout the project. Ana said that "... definitely Dr. [M] was there to help us and cared about us." At the same time, PSTs were also introduced to educational research where they learned to extract, summarize, and organize the most important

data and ideas. They also stated that they had improved their oral, written, social, and organizational communication skills. For instance, as Brianna said "… I really enjoyed doing the poster, interviewing, and researching on bakeries because I was able to practice my oral, researching, and presenting skills. I'm glad we were given the project." Other PSTs also mentioned that they learned how to connect real life mathematical applications to the businesses they interviewed and researched. They admitted that it was the first time they had to create mathematics problems with solutions for a mathematics project (rather than selecting them from a textbook), but that it was not difficult to do because there were ample ways of connecting mathematics to the business products, prices, recipes, measurements, taxes, giving change, etc. The PSTs stated that this experience caused them to realize that they can do similar history and mathematics projects with their future students, and that they became more open-minded to the unlimited connections they can share with their future students about mathematical applications.

This led to PSTs realizing the importance of connecting with their communities and families, especially because they will be teachers who will need to do this as part of their profession (Gibbons et al., 2018). As noted by Daniel, "Doing a math project for families is important because we get to experience in meeting the future parents of our students." The PSTs also reported on having learned many different academic, historical, communication, and mathematical ideas that will help them both as students in other courses, as well as in their teaching careers. They admitted that having learned how to conduct research on their own will help them to do research for their classes when they become teachers, and they mentioned that they would also have their students do similar mathematics projects.

Connecting Mathematics with a Local Business via the Two-Way Engagement CFCP

In order to address the mathematics connections to the selected businesses, PSTs had to investigate and make sense of the specialized knowledge required to understand how mathematics affects the business finances and operations. Therefore, when presenting their projects to the families and other attendants at the symposium, PSTs addressed the funds of knowledge and intellectual capital wealth business owners possess. This led to many PSTs seeing the important connections and applications of mathematics to different businesses, something they had never thought about before. As stated by Fernanda, "It was a nice experience. I learned a lot about my community and about business[es], also about how math is applied in the business." Likewise, Whitney mentioned that she "was also able to see how mathematics is used in local businesses which is something [she] never thought of doing." In a similar note, Alissa pointed out that "math is essential in everyone's daily life, but especially in businesses. It is the foundation on which they built their business and continue to keep running. They are used in calculating things like expenses and profits."

As a result, not only did the PSTs appreciate the mathematics embedded within typical businesses, but they also had the opportunity to learn about what it takes to establish a business and to develop empathy and appreciation for their communities. For instance, when completing and presenting their mathematics projects, the PSTs proudly mentioned their appreciation for the Latin* culture, the work ethic of the owners, and what the businesses offered to their communities. As mentioned by Jessica, "The businesses contribute to our community by expanding the economy, giving us family-oriented places, and by showing people that anything can be done despite the challenges." PSTs admired the hard work, dedication, and passion the business owners had for their businesses, employees, products, and services, and they valued their personal stories about how they got started. For example, Daniel pointed out that business owners "can succeed in business if they dedicate themselves 100% with hard work." PSTs recognized not only how unusual it is for mathematics college students to conduct research about a business; but also, for business owners to collaborate with and feel appreciated by mathematics college students. As stated by Raquel, "Not many people know what it takes to start a business so by doing research and presenting the business, I know I gave them a sense of pride in their work. The business owner feels more valued."

Connecting with Families via the Two-Way Engagement CFCP

Being able to connect with families from their communities by conducting a Two-Way Engagement CFCP mathematics project represented an unusual yet meaningful experience for PSTs. For instance, when involved in interactions with the family leaders from the community partner, the PSTs were very complimentary of them because the families truly showed interest in their mathematics projects and in their deep commitment to pre-K to university education and to their community. As mentioned by Miguel, "[The families] spoke to us about the importance of doing this project. How it really brings the community together and how it will help us in the future. They made me feel proud that I finished the project." In addition, Alissa said that "doing the math project for families is important because it demonstrates the appreciation that we have not only for them but for the community."

The PSTs appreciated and incorporated the community partners' feedback to improve their projects as much as possible, and they admitted that interacting with family leaders from the community also prepared them to communicate with parents like those of their future students by learning about their backgrounds, language, culture, and interests. For instance, Ana mentioned that interacting with the families "will help me interact with the parents later on when I become a teacher on my ways of socializing more, … so both of us can work as a team and help the student."

Another important note is that for those PSTs that plan to stay in their communities, it is very critical to understand their community and families to better serve their students. As described by Jessica, "It is important with my career because I plan to live and work here so understanding how families here work and think helps me with communication in my career."

In terms of language, some PSTs admitted to feeling proud to speak their own native language, Spanish, in their communications with the families. However, they realized that to better serve their communities, some of them need to work on their Spanish. For instance, Raquel mentioned that "Communicating with families allows me to prepare myself to communicate with parents. It has made me realize that I need to work more on my Spanish, especially because I may have parents or students that only communicate in Spanish."

Discussion, Implications, and Recommendations

There is a wealth of literature delineating the advantages of connecting students' funds of knowledge to their academic growth (González et al., 2006; Kelley, 2020; Monárrez et al., 2021; Saathoff, 2015; Williams et al., 2020). We argue that this must also include engaging Latin* PSTs with their communities, local leaders, and families as a means to further develop support programs at HSIs that are culturally relevant (Herrera & Sánchez, 2022). Because of this, the Two-Way Engagement CFCP was implemented in a mathematics content course serving Latin* PSTs. This allowed for the creation of a learning environment in which all PSTs completed assignments designed to guide them through self-reflections for them to recognize and value their community's linguistic and cultural wealth in context with their mathematics projects while simultaneously enhancing their overall mathematics proficiency. The Two-Way Engagement CFCP led to an empowerment of PSTs that translated to a stronger understanding of the role that mathematics plays within their community and themselves, especially as future educators of Latin* bilingual and bicultural students like themselves. The participants' voices help us to confirm that creating opportunities where PSTs can connect to their communities is beneficial for both the university and the members of the community.

Recognizing and appreciating the knowledge and contributions of local businesses and families positively impacts the professional preparation of PSTs. Furthermore, awareness of the implementation of the Two-Way Engagement CFCP project is creating interest from faculty participants and University administrators to consider proposing enhanced educational policies that reward faculty that embed CFCP in their mathematics courses. Therefore, we ask scholars to continue developing their efforts to enhance the mathematics preparation of Latin* PSTs and other underserved student populations. Further studies should also explore the effects that a Two-Way Engagement CFCP has on Latin* PSTs' mathematical and cultural identity development and how this is reflected in

their mastery of the mathematical content that they are supposed to teach. Lastly, it is worth investigating if there is an enactment of the Two-Way Engagement CFCP, or other similar pedagogies, by PSTs once they have completed their teacher preparation program and have begun teaching.

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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. What do you see as the biggest benefits or reasons for applying focus on learners' cultural wealth to the preparation of PSTs themselves? What is a challenge and how might you address it?

2. What is the main difference between a one-way and a two-way approach to engagement and why does that matter?

3. Describe any examples of a two-way approach you have seen in your community.

4. Collaborate with a fellow local educator to brainstorm a list of local business owners that might be wonderful for PSTs to interview. Reflect on your process or criteria for whom you selected.

POETRY CORNER

Lawrence Lesser (The University of Texas at El Paso) is often inspired to write songs or poems related to mathematics education topics. Such creative work can communicate important points with more efficiency and emotion for broader audiences, and *TEEM* readers are invited to explore this as well. In this mathematical poem, he explores expected value and the mean in the context of social media.

E(X)

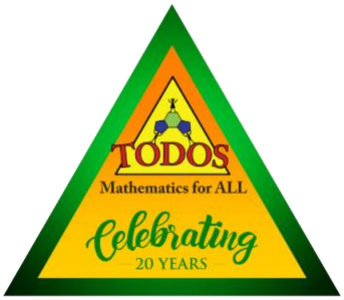
Let's call X the platform
where the expected value of a post
is mean lifespan,
spread rate, or number of

hearts. Or just what's expected
when algorithms center
negative,
people being mean.

The mean is a levelling value
as if X lets all voices
signal virtue
in the noise.

And it's a shaky point
of balance how posts lie,
swayed by extremes
(always both sides?)

like theft
of an election
or indigenous
land.



A Magical Moment Counting Tires: A Counterstory About Missed Opportunities

Carlos Nicolas Gómez Marchant
The University of Texas at Austin

Alexandra R. Aguilar
The University of Texas at Austin

Amy Rae Johnson
The University of Texas at Austin

Gerardo Sánchez Gutiérrez
The University of Texas at Austin

Mona Baniahmadi
The University of Texas at Austin

Carlos Nicolas Gómez Marchant (nico.gomez@utexas.edu) is an assistant professor of STEM education at the University of Texas at Austin. His research centers Latine learners' mathematics and navigation of white institutional spaces.

Alexandra R. Aguilar (a.aguilar@utexas.edu) is a graduate student in STEM education at the University of Texas at Austin. Her work explores how learners resist the dominance of school mathematics within and outside the classroom.

Amy Rae Johnson (arjohnson@utexas.edu) is a STEM education PhD student at the University of Texas at Austin. Her research centers on the intersection of therapeutic play and math and making math a playful and joyful experience for elementary students and teachers.

Gerardo Sánchez Gutiérrez (gerardo.sanchez@utexas.edu) is a doctoral student in STEM Education at the University of Texas at Austin. His research focuses on the intersection of formal and informal STEM education and the roles that families play in mediating STEM learning across these boundaries.

Mona Baniahmadi (mbaniahmadi@tacc.utexas.edu) is a Research Associate at the University of Texas Austin's Texas Advanced Computing Center with over ten years of experience in supervising and evaluating STEM education research projects to assess the impact of various programs across K-12 and college settings.

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A Magical Moment Counting Tires: A Counterstory About Missed Opportunities[1]

Carlos Nicolas Gómez Marchant, Alexandra R. Aguilar, Amy Rae Johnson, Gerardo Sánchez Gutiérrez, & Mona Baniahmadi

Anabel sighed as she turned the page of the test review Ms. Hidalgo passed out to the class. She read the problem to herself:

> *John was counting tires in the parking lot. There were 5 cars and 4 motorcycles. How many tires did John count in total?*

Anabel paused and read the question again silently mouthing the words. She put her pencil down and thrust her hand in the air. She needed to know why John is counting tires. She pumped her arm in the air again, staring at Ms. Hidalgo. Trying one more time, she stretched her arm straight up, tiptoeing, lifting off her seat to raise her hand a little higher, and using her trick of not blinking until Ms. Hidalgo notices her.

"Ana, I'll be right there. Remember that I expect to see some work on your paper before I help you."

Anabel sank in her seat. She thought of all the old tires at her parents' *taller*. She recalled how last weekend she was playing with her brother around the towers of two, three, and four tires. Her hands tingled remembering the feel of the smooth rubber as she counted in a singsong way: *tres*, *siete*, ten, twelve, *trece*. Her brother closely behind echoing the counts. *Tres, siete*, ten, twelve, *trece*.

"*Por dios,* Anabel. *¡Tu vestido!*" Her mother yelled.

Anabel knew she was in trouble when her mother did her *pequeña oración.*

"*Anda a lavarte las manos*."

Anabel recalled the grime from the tires on her hands and how pretty the streaks of black were on her dress.

Anabel recollected the cars she passed heading to her father's office. A green car with one tire, the one missing a door with two back tires, the tiny white car with no tires her father insists he will fix one day. Then there was *Allende*, the purple car named after her mother's favorite author. The car shines with four flat tires. Her father promised *Allende* will be fixed for her by the time she goes to college, "*porque la educación abre las puertas*." Anabel walked by her father under a car with three tires. "*Todo bien mija?*" Anabel could feel his voice tickle her feet. She loved how his voice softly shakes the earth.

Anabel bent over as far as she could, but only her father's boots could be seen like the Wicked Witch of the East under Dorothy's house. She was home, though. "*Si todo bien*, just need to wash my hands."

Anabel's dad clicked his boots together as he spoke. "*Bien. La puerta está abierta.*" Laughing, Anabel skipped on. Anabel's father felt the breeze that came with Anabel's laugh.

"I'm not seeing any work Ana." Ms. Hidalgo's voice interrupted Anabel's memory.

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[1] This counterstory (Delgado, 1989; Martinez, 2020) is based on field notes (Oct. 19 & Nov. 1, 2022) from our collective's ethnographic project working with upper elementary Latiné learners and their transition to middle school mathematics. We see counterstories as a creative endeavor helping us in exploring the experiences of Latiné learners' mathematics and our own narratives of navigating the whiteness of schools (see e.g., Cordero-Siy & Gómez Marchant, 2023; Gómez Marchant & Cordero-Siy, 2022). This counterstory highlights the brilliance of Anabel (a composite character) and the missed opportunity there was to learn about her life and mathematics. The actions of silencing shown in the counterstory promote an assimilative education (Urrieta, 2004) or subtractive schooling (Valenzuela, 1999) where mathematics is emotionless and ahistorical. Consequently, the education system maintains the whiteness of mathematics (Battey & Leyva, 2016; Martin, 2020). Counterstories help us in acknowledging how whiteness is part of learning mathematics, but also push us to reflect and reimagine possible actions and futures in our mathematics classrooms.

"Yeah um why is John counting tires? How do I know how many tires the cars have?"
Ms. Hidalgo closed her eyes while rubbing the bridge of her nose. "Ana. It doesn't matter. All cars have four tires. It's practice for your upcoming STAAR test[2]. You know what they want. What, Miguel?"
Anabel picked up her pencil and wrote 5 x 4 + 4 x 2.
"Don't forget your parenthesis." Ms. Hidalgo said to Miguel.
Anabel squeezed in her parentheses between her already written numbers.
(5 x 4) + (4 x 2)
20 + 8
28

Anabel turned the page.

A seamstress used 9 buttons for one pair of jeans and 5 buttons on a shirt. If they made 3 shirts and 1 pair of jeans, how many buttons would they use in total?

Anabel thought of *Abuelita's* graceful hands sewing the buttons on her nighttime bunny. Abuelita would learn nursery rhymes while sewing from her *Abuelita* and was now teaching Anabel.

Los pollitos dicen pio, pio, pio
Cuando tienen hambre, cuando tienen frío.
La gallina busca—
"No." Anabel stopped herself. "They don't want my memories. I know what they want."
9x1 + 5x3
Don't forget your parentheses.
(9x1) + (5x3)
9 + 15
24
Turn the page.
7x4 + 3x2
Don't forget your parentheses
(7x4) + (3x2)
28+6
33
Turn the page.
6x8 + 10x3
Parentheses
(6x8) + (10x3)
48+30
78
Turn the page.

Authors' Note

The conversations leading to the construction of this story had us reflecting on word problems and the various ways they may contradict or overly simplify our lived experiences for the sake of completing computations. We hope this piece helps you reflect on word problems, the ways learners' worlds are reflected in them, and how to embrace instances learners bring in their lived experiences and the nuances those experiences add to traditional school mathematics. When students like Anabel bravely choose to introduce their stories into the "hierarchical and value-laden" (Pais, 2011, p. 227) mathematics classroom, that bravery deserves to be honored. In all, we hope this counterstory "can open new windows into reality, showing us that there are possibilities for life other than the ones we live" (Delgado, 1989, p. 2414). We ask you to take a moment to reflect on what you notice, wonder, feel, reimagine, and choose to act on (see Rubel et al., 2022) after reading the counterstory.

[2] State of Texas Assessment of Academic Readiness (STAAR)

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https://www.todos-math.org/todosblog

An Investigation of How Humans Are Portrayed in High School Mathematics Textbooks

Evelyn Pohle
California State University, Fullerton

Emily Rumaldo
California State University, Fullerton

Alexis Di Pasqua
California State University, Fullerton

Alison S. Marzocchi
California State University, Fullerton

Abstract

Mathematics textbooks convey messages to students about people in mathematics. Unfortunately, past research has shown that mathematics textbooks generally provide few examples of people of color, women, non-binary genders, and STEM careers. Further, textbooks have been found to perpetuate problematic stereotypes. Given these findings, textbooks could be running counter to efforts attending to diversity, equity, inclusion, and belonging in mathematics. We present our investigation of how humans are portrayed in high school mathematics textbooks and encourage teachers to investigate their own materials. Our findings confirmed a low human presence as well as few named characters, non-inclusive gender identities, and few examples of STEM careers. Teachers can be mindful of representation within their materials and can foster an inclusive classroom by deliberately showcasing examples of diverse professionals in STEM careers.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

1. What ideas do you have for helping each individual student to feel included in mathematics classes?

2. How big of a role do your textbook or curriculum materials play in your mathematics classroom? Do you use the textbook or curriculum problems verbatim or do you make modifications?

3. Based on interactions you've had with your textbook or curriculum materials, what examples of humans doing mathematics, if any, do you recall? What do you recall about the diversity of the humans being portrayed in the materials? Do you recall any examples of STEM careers?

4. Now, begin to leaf through your textbook or other curriculum materials while paying attention to the human presence. What do you notice? How are humans portrayed? How are they using mathematics? How, if at all, do your materials showcase people from diverse backgrounds using mathematics? How, if at all, do they showcase people in STEM careers?

Evelyn Pohle (pohleevelyn@gmail.com) graduated from California State University, Fullerton with her bachelor's degree in mathematics. She is currently teaching at a high school in Orange County. She brings her knowledge and the experience she gained from research into her classroom today.

Alison Marzocchi (amarzocchi@fullerton.edu) is an associate professor in the mathematics department at California State University, Fullerton where she researches equity-minded and active mathematics teaching practices. She has 19 years of mathematics and computer science teaching experience with students from first grade through graduate school.

Emily Rumaldo (Emilyrumaldo16@gmail.com) graduated from California State University, Fullerton with a bachelor's in Public Health and a minor in Math Education. She is currently teaching middle school in her first year of teaching.

Alexis Di Pasqua (alexis.dipasqua@yahoo.com) graduated from California State University, Fullerton with her bachelor's degree in mathematics. She then became a high school teacher and is now in her second year of teaching.

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An Investigation of How Humans Are Portrayed in High School Mathematics Textbooks

Evelyn Pohle, Alison Marzocchi, Emily Rumaldo, and Alexis Di Pasqua

Introduction

Mathematics textbooks provide information to students on how mathematics is applied. Textbooks usually contain sets of exercises, some computational and some contextual. The contextual exercises may show examples of humans using mathematics. The authors of mathematics textbooks have an opportunity to promote diversity and inclusion in science, technology, engineering, and mathematics (STEM) careers. Thus, it is important to consider representation among the humans who are showcased within textbook exercises, as well as the variety of contexts and careers within.

However, it is not enough to simply promote more STEM careers within textbooks; we must also address problematic stereotypes that continue to be perpetuated in the media and larger society by considering whether textbooks also reinforce these stereotypes (Hottinger, 2016; Simpson et al., 2021). Ideally, textbooks should show students examples of diverse professionals, such as women and people of color, utilizing mathematics in career contexts (Marzocchi et al., 2023; Piatek-Jimenez et al., 2014; Simpson et al., 2021). After observing a lack of racial/ethnic and gender diversity in mathematical spaces, such as academic conferences, we sought to research representation of these dimensions of diversity in textbooks. However, we note that other important dimensions of diversity—including religion, disability status, linguistic repertoire, national origin, and immigration status—are likely absent in textbooks as well. This is important to consider because students who identify with groups that have been historically marginalized in STEM may have fewer mentors and role models from their communities (Simpson et al., 2021).

Unfortunately, past researchers have found stereotypes promoted in mathematics textbooks such as women frequently being portrayed as nurturing caretakers while men were often portrayed as active, confident, and career-driven individuals (Piatek-Jimenez et al., 2014). There is a lack of representation of non-binary genders and non-heteronormative roles. Instead, textbooks could provide a venue for students to see examples of diverse STEM professionals (Marzocchi et al., 2023; Simpson et al., 2021).

This article aims to increase mathematics teacher awareness of how humans are portrayed in high school mathematics textbooks. To do so, we share what we learned from past research on this topic, followed by findings from our own investigation. We include recommendations for teachers to support students from diverse backgrounds in mathematics.

What We Know From Past Research

Inspired by Gutiérrez's (2016) call to rehumanize mathematics, we explored how to enact creative insubordination by questioning how mathematics is being presented to students, especially those from historically marginalized groups. Our review of past research on representation in textbooks started in alignment with the Piatek-Jimenez et al. (2014) suggestion that:

> if we can create ways to gain and keep the interest of women and certain minorities in mathematics and help individuals in these groups feel confident about their capabilities in the field, then we can gradually change the face of STEM (p. 72).

We wondered about the role that textbooks played in either dismantling or reinforcing pervasive equity issues in mathematics education. After all, mathematics textbooks are an important part of the STEM curriculum and characteristics of the humans present in textbook exercises communicate information to students about who belongs (Simpson et al., 2021). McBride's (1989) foundational textbook research indicates that textbooks do not contribute to students' understanding of the interconnection of culture, language, and thought.

The following subsections will provide teachers with the background information we learned on mathematics textbook research. We summarize past research that examined contexts of exercises in mathematics textbooks and the characteristics of humans found in textbook exercises with context. We share findings on gender representation, race/ethnicity representation, and career representation. We recognize that other dimensions of diversity, such as religion, disability status, linguistic repertoire, national origin, and immigration status, are underrepresented in textbook research. With awareness of past research on mathematics textbooks, teachers will be positioned to notice representation in their own curriculum materials.

Context in Past Research

When examining *contexts*, we consider exercises which contain a real-world situation. A context could help shift an exercise to be more than just computational (Damarin, 2010). If students are not given examples with context, it may be harder for them to relate to the material, which could, in turn, lead to "mathephobia" (Damarin, 2010, p. 75). This further impedes students from being able to effectively translate mathematics across other disciplines (Kastberg et al., 2005). Lubienski (2000) specifically found benefits of using problems with contexts for students from low-income backgrounds. When exercises had contexts, these students were more likely to use language and common-sense reasoning as they were problem solving. Exercises with context may or may not have a human present.

Human Presence in Past Research

Several studies have examined human presence in STEM curricular materials (e.g., Bright, 2017; Clarkson, 1993; Di Pasqua et al., 2021; Esmonde, 2011; Garcia et al., 1990; Marzocchi et al., 2023; Piatek-Jimenez et al.,

2014; Simpson et al., 2021; Sleeter & Grant, 2011; Tang et al., 2010). Human presence in textbooks has been generally low, with far more computational exercises than contextual, and scant human presence among the contextual exercises (Marzocchi et al., 2023). When humans are present in the exercises, research has considered characteristics of the humans such as gender (Clarkson, 1993; Damarian 2010; Di Pasqua et al., 2021; Esmonde, 2011; Garcia et al., 1990; Marzocchi et al., 2023; Simpson et al., 2021; Sleeter & Grant, 2011; Yeh, 2017), race/ethnicity (Bright, 2017; Civil, 2016; Garcia et al., 1990; Gutstein, 2016; Sleeter & Grant, 2011; Yeh, 2017), and career (Di Pasqua et al., 2021; Marzocchi et al., 2023; Piatek-Jimenez et al., 2014; Tang et al., 2010). This is important because course materials, whether intentionally or not, shape student perceptions about what a STEM professional looks like (Simpson et al., 2021).

Gender representation in past research. There are many studies that researched gender representation in STEM textbooks (Clarkson, 1993; Damarian 2010; Di Pasqua et al., 2021; Esmonde, 2011; Garcia et al., 1990; Marzocchi et al., 2023; Rubel, 2016; Simpson et al., 2021; Sleeter & Grant, 2011; Yeh, 2017). A common finding across most studies of gender is an overrepresentation of men among the characters in the exercises. Simpson et al. (2021) state that research on common introductory biology textbooks found that "textbooks highlighted only one woman scientist for every seven men, even though 60% of students awarded undergraduate biology degrees are women" (p. 6). There is also a lack of gender non-binary characters with textbooks showcasing only women and men and no overt exercises containing characters with other gender identities. Marzocchi (2019) warns that "considering gender as binary or all relationships as heterosexual is tempting for some mathematicians. However, people do not fit into exclusively boy/girl categories, and we may be further alienating already-marginalized students by ignoring the full gender spectrum" (p. 14).

Further problematic is the reinforcement of gender stereotypes in textbook exercises (Hottinger, 2016; Yeh, 2017). For instance, Yeh (2017) found that:

> Contexts related to looking pretty, being helpful, and being a homemaker were attached to problems with girls' names; problems with boys' names reinforced athleticism, competition, and masculinity. Any one of these scenarios are unproblematic of and by themselves, but when looking at patterns across several problems, we see a consistent message about gender normativity—the idea that there is only one way to be a boy and another, different way to be a girl. (p. 1)

Related, Hottinger (2016) notes many instances where boys were shown as "active mathematical knowers" while girls were seen as needing help from other characters or the reader (p. 164). Reinforcement of gender stereotypes in textbook exercises could further marginalize students and turn them away from STEM.

Race/ethnicity representation in past research. Race/ethnicity representation has also been examined in multiple studies (Bright, 2017; Civil, 2016; Garcia et al., 1990; Gutstein, 2016; Sleeter & Grant, 2011; Yeh, 2017). The Simpson et al. (2021) research on science textbooks revealed that not only were people of color underrepresented (with only 6.67% of total showcased textbook scientists being people of color despite a 35% representation of students of color in biology bachelor's degree programs) but that when people of color were included in textbooks, their roles were generally unrelated to scientific contributions. To create a more diverse STEM field, we must improve representation of people of diverse races/ethnicities in mathematics textbooks in general, and in scientific roles in particular. Garcia et al. (1990) suggest that "providing minorities with role models and instilling...an interest in mathematics is fundamental in altering students' perceptions and attitudes toward the discipline" (p. 9). Without examples of people like themselves, students of diverse races and ethnicities may feel that they do not belong in STEM (Simpson et al., 2021).

In one instance, researchers found race/ethnicity representation that was more diverse than that of the general population according to Census data (Sleeter & Grant, 2011). However, deeper analysis of the contexts of the exercises showed reinforcement of stereotypes across races and ethnicities. As publishers update their textbooks,

it is important to create a world within the textbook that has fair representation for people of varying races and ethnicities, without the reinforcement of stereotypes.

Career representation in past research. Career representation has also been examined in past studies (Di Pasqua et al., 2021; Marzocchi et al., 2023; Piatek-Jimenez et al., 2014; Tang et al., 2010). Unfortunately, research shows that gender and career representation intersect problematically in mathematics textbooks. For example, Piatek-Jimenez et al. (2014) indicate that men in textbooks are more often shown in professional roles than women and that twice as many men are shown as having careers than women. This finding is worrisome because students may internalize the stereotype that men should have more professional roles than women.

With these potentially problematic findings from past research in mind, we encourage teachers to be mindful of how humans are portrayed in their own curriculum materials. Below, we detail a framework for considering representation in textbooks and share the findings from our own investigation of high school textbooks used in a local school district.

A Procedure for Investigating Human Presence in Textbooks

Our research investigated the human presence in high school mathematics textbooks. We encourage teachers to begin noticing how humans are portrayed in their own curriculum materials. In the subsections that follow, we share our framework for analyzing textbooks. Though we do not expect most teachers to do a formal research study of their curriculum, we believe our process of analyzing textbooks can assist teachers with noticing the messages that their materials are portraying to students. In what follows, we present our method for acquiring the data set, coding, and analyzing the data. Although our investigation focused on name, gender, and career, teachers could also consider other dimensions of diversity such as religion, disability status, linguistic repertoire, national origin, and immigration status.

Selection of Textbooks

To start our investigation, we selected a local school district. The selected district, located in the southwestern United States, is attended by approximately 25,000 students in approximately 35 schools, approximately 10 of which are high schools. According to 2018 data from *U.S. News and World Report*, minority enrollment is approximately 70% of students and economically disadvantaged students comprise approximately 25%.

Our set of textbooks included the textbook used for the highest level of mathematics offered within each grade level including geometry (primarily 9th-grade), algebra 2 (primarily 10th-grade), precalculus (primarily 11th-grade), and calculus (primarily 12th-grade) courses. Although we do not advocate for tracking students, and we hope that every student will have the opportunity to see examples of diverse professionals in STEM careers within their mathematics textbooks, we selected the textbook used for the highest-level course for each grade level because we conjectured that these books would be more likely to showcase professionals in STEM careers. If so, this would provide more data for us to analyze in terms of characteristics of the portrayed STEM professionals. Because we were primarily interested in uncovering STEM career representation alongside names and genders of characters, we sought books that we conjectured would provide the largest sample to analyze. With this data, we can advise textbook publishers and teachers on how to provide every student with examples of diverse professionals in STEM careers through their textbooks. To obtain the list of books, our research team contacted teachers, administrators, and/or support staff. Appendix A lists the books included in our sample.

Selection of Exercises

We chose to focus our investigation on all individual numbered textbook problems, which most textbooks labeled as "exercises," at the end of each section within each chapter. For instance, we included the numbered exercises at the end of section 1.1, the end of section 1.2, the end of section 1.3, and so on until the last section of the last chapter. These exercises are typically intended to be done by students as homework. Each numbered exercise was considered one unit of analysis, even if it had multiple parts. Practice exams, quizzes, and end-of-chapter review sets were not included in our data set because pilot data found many redundancies between end-of-section and end-of-chapter exercises. We also did not include unnumbered problems interspersed throughout the instructional portion of textbook sections, typically used by teachers to develop their lessons (often called "practice" problems).

Coding and Analysis

We built on the methods developed by other members of our research team, which involves using a coding flowchart (see Appendix B) to capture the human presence in textbook exercises (Marzocchi et al., 2023). We applied the previously-developed framework to a new sample of textbooks; our previous study researched human presence in precalculus textbooks across an entire county whereas this study focused on four sequential textbooks used in a single district. Unlike our previous study, this study allows us to understand the experience of a single student in a single district. The coding procedure, including the training and reliability process, is described in greater detail in the previous study (Marzocchi et al., 2023).

Under our method, each exercise is coded for context, human presence, name, gender, and hobby/career (STEM or non-STEM). We go exercise-by-exercise and execute the following procedure (readers are encouraged to view the flowchart in Appendix B alongside reading this procedure):

- Determine whether the exercise has a context or not, based on whether it contains a real-world situation as opposed to a purely computational exercise. We used a spreadsheet to enter 1 for context of 0 for no context. If the exercise does not have a context, move on to the next exercise. If the exercise has a context, continue coding.
- If the exercise has a context, determine whether it has a human present (coded as 1) or not (coded as 0), based on whether there is at least one human portrayed in the exercise. If the exercise does not have a human present, move on to the next exercise. If there is a human present, continue coding.
- If the exercise has a human present, determine the name, gender, and hobby/career by doing the following:
    - Determine whether the human is named (coded as 1) or not (coded as 0). If named, record the name.
    - Regardless of whether the human is named, code for gender based on pronouns, gendered nouns, or an empirically gendered name (we used W for woman, M for man, and I for indiscernible if the exercise did not provide any gender clues; note we did not encounter any examples of humans with discernible non-binary genders).
    - Regardless of whether the human is named or gendered, record the hobby/career of the portrayed human (we recorded the hobby/career or used I for indiscernible). If a career is given, determine whether it is a STEM career (coded as 1) or not (coded as 0).
- Move on to the next exercise and repeat the process.

Once a textbook is fully coded, percentages were used to measure several constructs including context, human presence, and gender representation. Frequency counts were used for names and STEM careers.

Results of Our Investigation of Human Presence in High School Mathematics Textbooks

Below we share our findings from investigating high school mathematics textbooks. We report on context, human presence generally, gender representation, career representation, and names.

Context in Sampled Exercises

Recall that we consider a mathematics exercise with a *context* to be one that contains a real-world situation. On the other hand, a mathematics exercise without a context is one that does not contain a real-world situation and is likely entirely computational. Table 1 provides one example of an exercise with context from each textbook. When being mindful of representation in their own materials, teachers should first note exercises with context as these would provide opportunity for human presence. In our sample, the percentage of total exercises with context is 15% in the 9th (total of 3268 exercises with context) and 10th (total 3714) grade textbooks, 14% in the 11th-grade (total 6621) textbook, and 10% in the 12th-grade (total 5358) textbook. This is important for teachers to consider because a low number of exercises with context means limited opportunity to showcase diversity in STEM careers within the textbooks.

Table 1

An example exercise with context from each grade's textbook

Grade	Example Exercise with Context
9th	Section 1.1 #47. Explain why a four-legged chair may rock from side to side even if the floor is level. Would a three-legged chair on the same level floor rock from side to side? Why or why not?
10th	Section 4.2 #15. During a recent period of time, the numbers (in thousands) of males M and females F that attend degree-granting institutions in the United States can be modeled by $M = 19.7t^2 + 310.5t + 7539.6$ and $F = 28t^2 + 368t + 10127.8$ where t is time in years. Write a polynomial to model the total number of people attending degree-granting institutions. Interpret its constant term.
11th	Section 7.4 #58. When light passes from a more-dense to a less-dense medium--from glass to air, for example--the angle of refraction predicted by Snell's Law (see Exercise 57) can be 90° or larger. In this case the light beam is actually reflected back into the denser medium. This phenomenon, called total internal reflection, is the principle behind fiber optics. Set $\theta_2 = 90°$ in Snell's Law, and solve for θ_1, to determine the critical angle of incidence at which total internal reflection begins to occur when light passes from glass to air. (Note that the index of refraction from glass to air is the reciprocal of the index from air to glass.)
12th	Section 15.1 #6: A 20-ft-by-30-ft swimming pool is filled with water. The depth is measured at 5-ft intervals, starting at one corner of the pool, and the values are recorded in the table. Estimate the volume of water in the pool.

	0	5	10	15	20	25	30
0	2	3	4	6	7	8	8
5	2	3	4	7	8	10	8
10	2	4	6	8	10	12	10
15	2	3	4	5	6	8	7
20	2	2	2	2	3	4	4

Human Presence in Sampled Exercises

Next, we ask teachers to consider the exercises with context within their textbooks and to notice whether humans are presented within those exercises. Table 2 provides one example of an exercise with a human present from each textbook. Among our sample, Figure 1 shows the percentage of mathematics exercises with a context that have a human present for each of the sampled textbooks. The percentage of exercises with context that have a human present range from approximately 13% to approximately 51%. The human presence in the sampled mathematics textbooks is especially low when also considering the large number of exercises without context, and therefore without a human present. Teachers should note that a limited number of exercises with a human present again means diminished opportunity for students to see examples of diverse professionals in STEM careers within their textbooks.

Table 2

An example exercise with human presence from each textbook

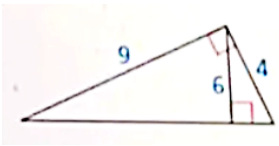
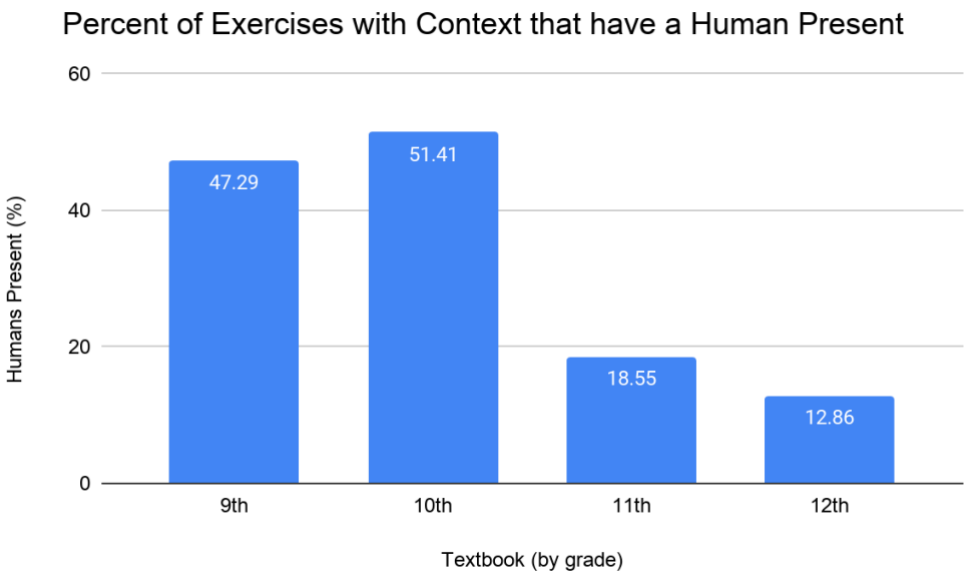
Textbook	Example Exercise with Human Presence
9th	Section 9.3 #40. Your friend claims the geometric mean of 4 and 9 is 6, and then labels the triangle as shown. Is your friend correct? Explain your reasoning. 
10th	Section 8.3 #57. You are buying a new car. You take out a 5-year loan for $15,000. The annual interest rate of the loan is 4%. Calculate the monthly payment.
11th	Section 5.4 #62. On a day when the sun passes directly overhead at noon, a 6-ft-tall man casts a shadow of length $S(t) = 6\|cot\frac{\pi}{12}t\|$ where S is measured in feet and t is the number of hours since 6 A.M. (a) Find the length of the shadow at 8:00 A.M., noon, 2:00 P.M., and 5:45 P.M. (b) Sketch a graph of the function S for $0 < 1 < 12$. (c) From the graph, determine the values of t at which the length of the shadow equals the man's height. To what time of day does each of these values correspond? (d) Explain what happens to the shadow as the time approaches 6 p.m. (that is, as $t \rightarrow 12$).
12th	Section 12.2 #31. A woman walks due west on the deck of a ship at 3 mi/h. The ship is moving north at a speed of 22 mi/h. Find the speed and direction of the women relative to the surface of the water.

Figure 1

Percent of exercises with context that have a human present for each textbook. Total number of exercises with context – 480 (9th-grade), 566 (10th), 926 (11th), and 560 (12th)



Gender Representation in Sampled Exercises

For exercises with a human present, teachers can consider the gender of the characters. Our research coded a character's gender as woman, man, or indiscernible. We did not encounter any characters with discernible non-binary, genderqueer, or non-conforming genders so these codes were not included in our study. Gender was coded as indiscernible if the exercise did not contain gendered pronouns, gendered nouns, or an empirically gendered name. Table 3 provides one example of an exercise with a discernible gendered character from each textbook.

Based on our research, alongside past research cited above, it is possible teachers will notice a gender imbalance in their textbooks with an overrepresentation of men. This was true for three of the four textbooks in our study. Figure 2 shows the percentage of characters with gender coded as indiscernible, woman, and man for each textbook. Indiscernible gender had the highest number of instances across all textbooks. Considering gender representation among characters with a discernible gender of woman or man, men were represented at least twice as often as women in all but one book. Although the percentages are low, we note an exception in the 9th-grade textbook where representation of women is greater than that of men. It is important for teachers to consider gender representation in their textbooks because it is possible women are being underrepresented and non-binary genders are being ignored. Textbooks may be perpetuating gender imbalances in STEM.

Career Representation in Sampled Exercises

Teachers can also keep an eye towards whether and how STEM careers are presented within their textbooks. This is important because textbooks have an opportunity to showcase STEM careers to students. Our research tracked the number of exercises in each book that contained a STEM career, shown in Figure **3**. In the case of STEM careers, we report the total number, as opposed to a percentage, to capture the number of distinct STEM careers a student could be exposed to through their use of the textbook. To determine whether a career was a

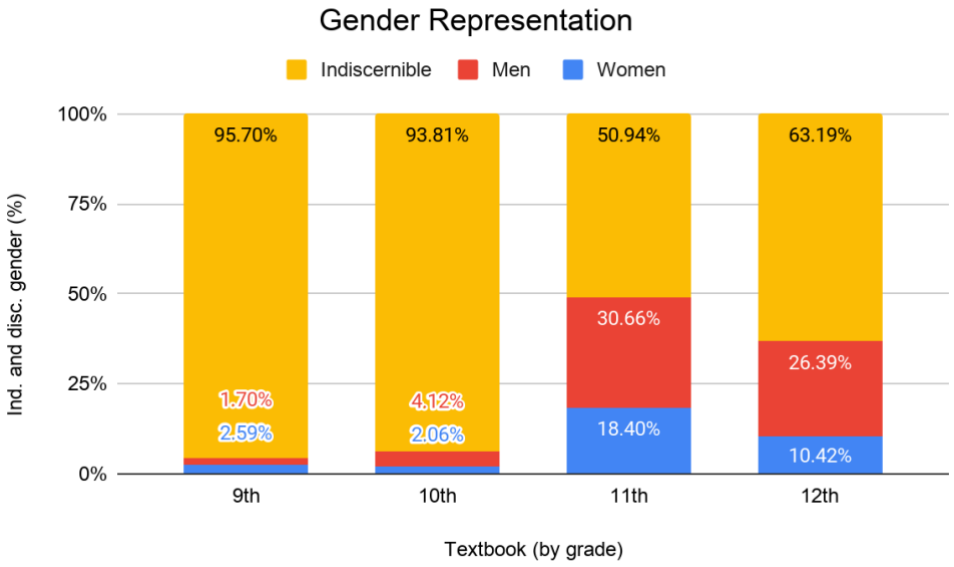
Table 3

An example exercise with a discernible gendered character from each grade's textbook

Grade	Example Exercise with a Discernible Gendered Character
9th	Section 2.3 #31. Decide whether inductive reasoning or deductive reasoning is used to reach the conclusion. Explain your reasoning. Each time your mother goes to the store, she buys milk. So, the next time your mom goes to the store, she will buy milk.
10th	Section 9.3 #35. At what speed must the in-line skater launch himself off the ramp in order to land on the other side of the ramp? 
11th	Section 14.7 #17. An experiment is described. (a) Describe some possible confounding variable(s) in the experiment. (b) Suggest an experimental design that would eliminate the confounding variable(s). Identify the type of design you are suggesting. To determine whether exercise helps to prevent cancer, a medical professor selects 60 sedentary students from his class and 35 people who exercise regularly at the gym in his uncle's retirement home. He then tracks their medical history for a 5-year period, recording the number of cancer cases that arise.
12th	Section 4.7 #9. A farmer wants to fence an area of 1.5 million square feet in a rectangular field and then divide it in half with a fence parallel to one of the sides of the rectangle. How can he do this so as to minimize the cost of the fence?

Figure 2

Percentage of characters in each gender category in each textbook. Exercises by grade with human present – 227 (9th-grade), 291 (10th), 172 (11th), and 72 (12th)



STEM career, we noted every instance of a hobby or occupation during the first round of coding. Once all the hobbies and occupations were documented, we looked at the entire set of occupations together to determine whether or not each one was a STEM career. We drew upon the meaning of the acronym STEM--science, technology, engineering, and mathematics--to categorize careers as STEM or non-STEM. For instance, careers such as biologist, engineer, or mathematician were coded as STEM careers. Other examples of STEM careers are pilots, professors that teach a STEM subject, architects, and surveyors. If the character included a student, teacher, or professor but did not specify the discipline, we did not classify this as a STEM career. Once we coded for STEM careers, we checked our codes against past research documenting career representation in textbooks, namely Piatek-Jimenez, Madison, and Przybyla-Kuchek (2014) and Tang, Chen, and Zhang (2010).

Across all textbooks, the representation of STEM careers was consistently low, with the lowest number of STEM careers being twelve in the 9th-grade mathematics textbook and the highest number of careers being 34 in the 11th-grade textbook. Table 4 provides one example of an exercise with a STEM career from each textbook. Overall, the books contained surprisingly low instances of STEM careers. If teachers notice this trend within their own textbooks, they may choose to showcase STEM careers in their classrooms in other ways. This can be achieved by hanging posters of diverse professionals in STEM careers, by inviting guest speakers from diverse backgrounds who work in STEM careers, or by assigning projects where students profile diverse STEM professionals.

Figure 3

Number of distinct STEM careers present in each textbook. Total number of exercises with context – 480 (9th-grade), 566 (10th), 926 (11th), and 560 (12th). Percent of exercises with context that contain a STEM career – 2.5 (9th-grade), 4.2 (10th), 3.7 (11th), and 2.9 (12th)

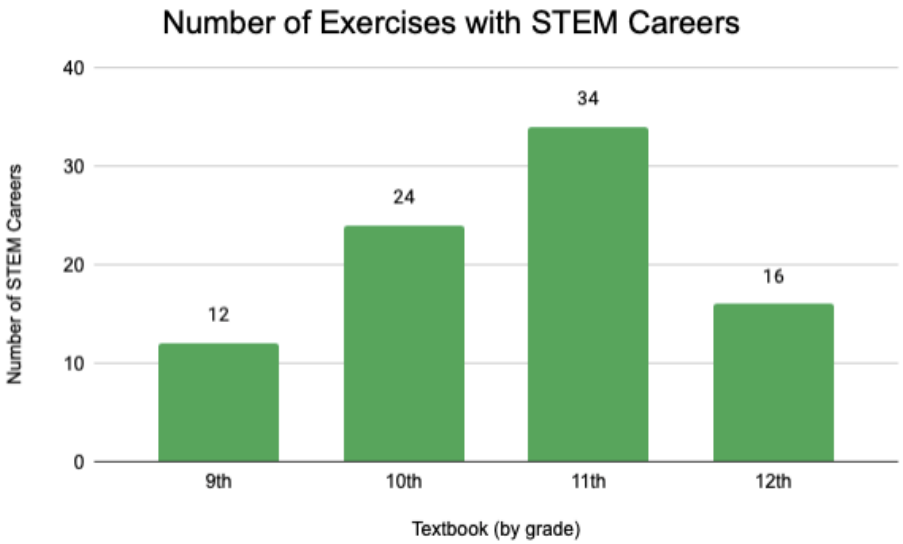
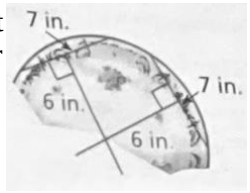


Table 4

An example exercise with STEM career from each textbook

Textbook	Example Exercise with STEM Career
9th	Section 10.3 #17. An archaeologist finds part of a circular plate. What is the diameter of the plate to the nearest tenth of an inch? Justify your answer. 
10th	Section 3.1 # 60. According to legend, in 1589 the Italian scientist Galileo Galilei dropped rocks of different weights from the top of the leaning tower of Pisa to prove his conjecture that the rocks would hit the ground at the same time. The height h (in feet) of a rock after t seconds can be modeled by $h(t) = 196 - 16t^2$...
11th	Section 14.3 #39. The participants at a mathematics conference are housed dormitory-style, five to a room...It turns out that 30% [of attendees] are smokers. Find the probability that Fred, a nonsmoking conference participant, will be housed with: (a) Exactly one smoker. (b) One or more smokers.
12th	Section 6.2 #69. Some of the pioneers of calculus, such as Kepler and Newton, were inspired by the problem of finding the volumes of wine barrels...A barrel with height h and maximum radius R is constructed by rotating about the x-axis the parabola $y = R - cx^2$ ...where c is a positive constant. Show that the radius of each end of the barrel is $r = R - d$, where $d = ch^2/4$...

Named Characters in Sampled Exercises

Lastly, teachers can turn their attention towards the names of the characters within their textbooks. This is important because names can provide a way for students to connect to the exercises. Table 5 provides one example of an exercise with a named character from each textbook. Our research tracked the number of named characters contained within the exercises in each textbook, displayed in Figure 4. Overall, there were three textbooks that had a substantially low number of named characters within the exercises with both the 9th and 10th-grade textbook containing only five names in the entire sample and the 12th-grade book containing sixteen. Although the 11th-grade textbook, with 89 named characters within the exercises, appears to have many named characters compared to the other textbooks, it is still quite low considering there were over 6,500 exercises coded in that book. Overall, we see that there is a very low number of named characters within our sample. If teachers notice a similar lack of named characters within their textbooks, they may intentionally incorporate names during classwork or assessments. Teachers might survey students on their interests and aspirations and create tasks showcasing their students' names in contexts that align with their survey responses.

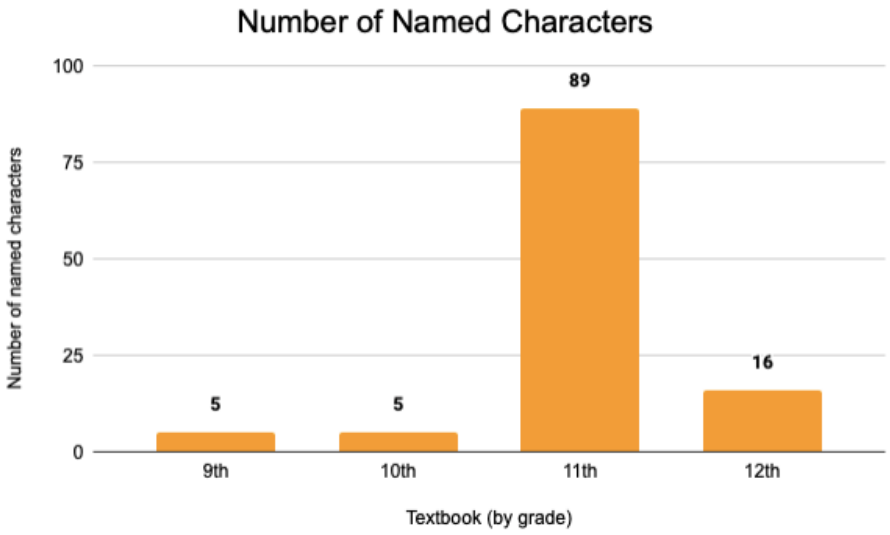
Table 5

From each grade's textbook, an example exercise with a named character

Textbook	Example Exercise with Named Character
9th	Section 2.1 #50. Rewrite the conditional statement in if-then form. Then underline the hypothesis and circle the conclusion. "You have to expect things of yourself before you can do them."--Michael Jordan.
10th	Section 3.1 #60. According to legend, in 1589, the Italian scientist Galileo Galilei dropped rocks of different weights from the top of the Leaning Tower of Pisa to prove his conjecture that the rocks would hit the ground at the same time. The height *h* (in feet) of a rock after *t* seconds can be modeled by $h(t) = 196 - 16t^2$. a. Find and interpret the zeros of the function. Then use the zeros to sketch the graph. b. What do the domain and range of the function represent in this situation? 
11th	Section 4.4 #73. Vilfredo Pareto (1848-1923) observed that most of the wealth of a country is owned by a few members of the population. **Pareto's Principle** is $\log P = \log c - k \log W$ where W is the wealth level (how much money a person has) and P is the number of people in the population having that much money. (a) Solve the equation for P. (b) Assume that $k = 2.1$ and $c = 8000$, and that W is measured in millions of dollars. Use part (a) to find the number of people who have \$2 million or more. How many people have \$10 million or more?
12th	Section 7.4 #55. The German mathematician Karl Weierstrass (1815-1897) noticed that the substitution $t = \tan\left(\frac{x}{2}\right)$ will convert any rational function of sin *x* and cos *x* into an ordinary rational function of *t*. (a) If $t = \tan\left(\frac{x}{2}\right), -\pi < x < \pi$, sketch a right triangle or use trigonometric identities to show that $\cos\left(\frac{x}{2}\right) = \frac{1}{\sqrt{1+t^2}}$ and $sin\left(\frac{x}{2}\right) = \frac{t}{\sqrt{1+t^2}}$ (b) Show that $\cos x = \frac{1-t^2}{1+t^2}$ and $\sin x = \frac{2t}{1+t^2}$ (c) Show that $dx = \frac{2}{1+t^2}dt$.

Figure 4

Number of distinct named characters within each textbook.



Recommendations for Teachers

Upholding the results of past textbook studies, the four textbooks we researched showed similarly low human presence, few named characters, no instances of discernibly non-binary gender identities, and few examples of STEM careers. We worry that textbooks authors are perpetuating pervasive inequities in mathematics education, rather than dismantling them. We encourage teachers to begin noticing representation in their own curriculum materials. Teachers can go beyond the dimensions of diversity investigated in our research by also considering religion, disability status, linguistic repertoire, national origin, and immigration status. When considering diversity among their own materials, teachers likely notice a need to find alternative ways to foster inclusivity in their classrooms.

Of course, a long-term goal is to see textbooks improve. Districts can also consider diversity when selecting new textbooks. We note that the 12th-grade book used in this study is over twenty years old. When time for replacement, the district could consider the representation among characters within the book options. However, we recognize that it will take time for the textbooks to improve, and even more time for school districts to adopt improved textbooks. Further, we recognize that many teachers do not have control over textbook selection. Thus, we believe there are actions teachers can take in the meantime to promote inclusivity. Gutiérrez (2016) notes that we must often find ways to navigate the education system using administration's rules and regulations, while striving to put students at the forefront of their learning. Simpson et al. (2021) recommend several short-term actions including enriching existing course materials with supplemental readings, recommending websites highlighting diversity, and asking students to analyze real-world data on racial disparities. They also recommend that teachers humanize scientists and avoid reinforcing stereotypes of scientists.

In the meantime, teachers can modify existing textbook exercises to be more inclusive. We provide recommendations for this in more detail elsewhere (Di Pasqua et al., 2021). As mentioned earlier, teachers might survey their students at the beginning of the year to determine their interests and aspirations. Teachers can modify textbook exercises, while preserving the mathematics content, by incorporating the names and interests of their own students. This ensures that the modifications are accurate representations of students and their communities, as opposed to superficial or stereotypes. Teachers might include names of community leaders or local heroes. If using fictional names to humanize textbook exercises, teachers should intentionally select names from diverse cultures. If teachers would benefit from assistance with finding names, they could consult databases of diverse STEM professionals such as *Living Proof: Stories of Resilience Along the Mathematical Journey* or *I Am a Scientist*.

While modifying existing exercises, attention should be paid to the genders of the characters with a specific eye towards counteracting the overrepresentation of men. Teachers could also include characters with non-binary gender identities. Teachers could use gender-ambiguous names such as Alex or Sam, and/or non-binary pronouns like they/them. Further, modified exercises could feature characters in non-stereotypical gender roles such as a woman who is coaching or a man who is making school lunches. Teachers could also modify exercises to push back on the heteronormativity and mononormativity currently reinforced in textbooks.

Furthermore, we recommend an increased number of STEM careers showcased in the textbook exercises. Students frequently ask teachers, "When are we going to use this?" and textbooks may be doing little to help answer this important question. A number of sources exist which feature diverse STEM professionals, including 500 Queer Scientists, Lathisms, and Mathematically Gifted and Black, to name a few. Teachers can use these resources to feature authentic examples of STEM professionals.

While efforts are underway to diversify STEM professions, textbook authors may be hindering these efforts. To counter a textbook lacking diversity, teachers can deliberately showcase a variety of STEM professionals. Though this might seem as if it is a daunting task and more work on the teacher, Gutiérrez (2016) also emphasizes the importance of having colleagues that are committed to the same work. Teachers can work

together to make modifications to existing materials and create a library of inclusive mathematics tasks. District colleagues could also work together to invite inspiring guest speakers to campus or to acquire posters of diverse STEM professionals to hang around the school. Many such posters already exist, such as the SACNAS Biography Project.

Conclusion

It will take time for publishers to diversify textbook exercises. In the meantime, teachers can counteract issues in textbooks by showcasing diverse STEM professionals in their classrooms in other ways. Teachers can rewrite textbook exercises to include diverse names, diverse genders, a variety of races, ethnicities, and cultures, and a multitude of STEM careers (Di Pasqua et al., 2021). They can have guest speakers from diverse backgrounds visit their classes and/or highlight news articles featuring the accomplishments of diverse STEM professionals. By taking actions such as these, teachers can reinforce that every student can pursue a career in STEM. Gutiérrez (2016) encourages us to ask ourselves questions such as *Am I inviting all students into the curriculum? Am I actively showcasing a different vision of STEM? If not, what will I do on my part to change this?* By making these adjustments, we expand the vision of what is considered the face of STEM (Piatek-Jimenez et al., 2014).

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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

1. How would you summarize the main ideas of this article to a colleague who did not read it?

2. Come up with a few questions or activities you could use to learn information about your students' interests, backgrounds, and future goals that can be used to modify textbook exercises to be more inclusive.

3. Choose a set of exercises from your textbook or curriculum materials and consider the set with respect to the coding hierarchy in this article. Do any exercises contain contexts? Are there humans present? What are the characteristics of the humans in terms of name, gender, and career? What are the intersections between gender and career?

4. Look through your textbook or curriculum materials and find an exercise that could be modified to be more inclusive. How could you modify the exercise?

5. What, if anything, do you plan on doing differently in your classroom after reading this article?

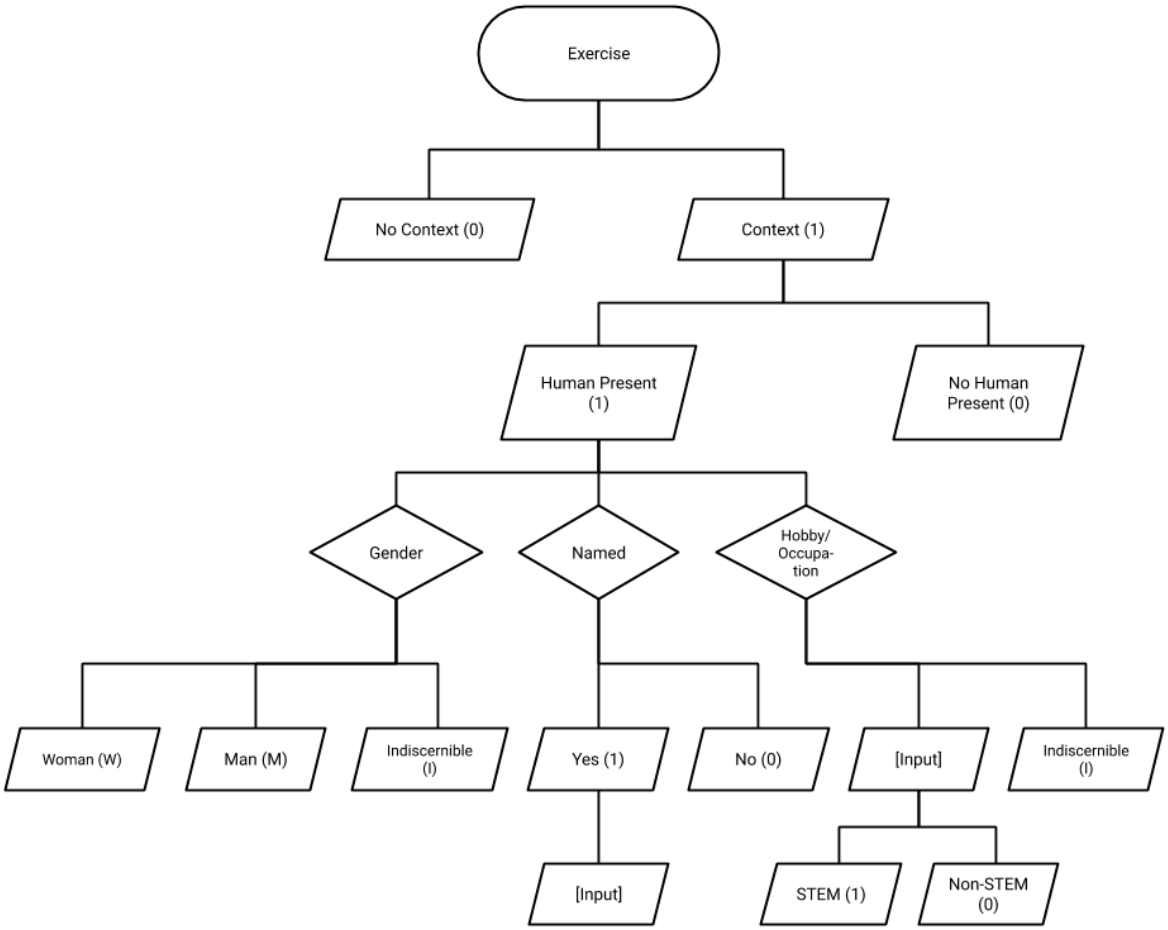
Appendix A

Set of textbooks included in this study

Grade	Topic	Citation
9	Geometry	Larson, R. (2015). *Big ideas math geometry: Common Core* (1st ed.). Houghton Mifflin Harcourt.
10	Algebra 2	Larson, R. (2015). *Big ideas math algebra 2: Common Core* (1st ed.). Houghton Mifflin Harcourt.
11	Precalculus	Stewart, J., Redlin, L., & Watson, S. (2015). *Precalculus: Mathematics for calculus* (7th ed.). Cengage Learning.
12	Calculus	Stewart, J. (2002). *Calculus: Early transcendentals* (5th ed.). Brooks Cole.

Appendix B

Flowchart of codes



Civil Service: A Note of Gratitude to the Outgoing Editor-in-Chief

We take this opportunity to thank Marta Civil for her service and unwavering dedication to *TEEM* since 2011, in roles that included Editorial Panelist, Editor, and Editor-in-Chief. She co-edited, with Julia Aguirre, the first *TEEM* special issue (on social justice, published in 2016). Marta served as Editor-in-Chief between 2018 and 2023, during which time she oversaw the publication of 10 issues of *TEEM*. Many *TEEM* milestones happened on Marta's watch, including: four special issues, the first issues with "creative" pieces (e.g., poetry), the first years with multiple issues (even during the pandemic!), the first issue with an article in Spanish, and joining OJS.

No less vital to the growth of *TEEM*, however, was the grace with which she worked with others involved with *TEEM*. Founding co-Editor Larry Lesser is especially grateful that she was willing to help him and Cynthia Anhalt in terms of actual workload (there was no Editorial Panel during the first three years) for the 4th and 5th issues when they struggled to give *TEEM* the continuity of timely attention it deserves due to other obligations. After overlapping with them for those two issues, Marta gained enough of a feel for how to keep things going that Larry and Cynthia were happily able to step down to a more limited (Associate Editor) level, a level that Larry has been able to maintain now for a decade thanks to how well Marta has steered the ship and how collegially she has valued his input within his revised scope of involvement.

The breadth and impact of Marta's publication record is as impressive as her kindness, approachability, and generosity. Her willingness to engage in conversation and listen (really listen) set an example of the humanizing interactions that academia could benefit from. As Editor-in-Chief, Marta trusted editors with handling manuscripts, but gave generous advice when needed. She always encouraged the editorial team to work with the authors to maximize the opportunity for eventual acceptance, another example of a humanizing practice. This seamless way of combining scholarly rigor and personal warmth is particularly clear in her work as *TEEM*'s Editor-in-Chief, as the journal continues to be a welcoming and intellectually engaging space for new and established mathematics educators.

We have all thoroughly enjoyed (and learned from) working with Marta. We will miss her involvement with *TEEM*, but are excited to continue along the path she and others have forged for the journal.

Photo courtesy of Chris Richards/University of Arizona

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

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

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.

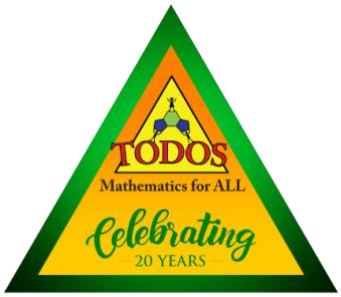
3. To generate and disseminate knowledge about equitable and high quality mathematics education.

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.

TODOS Live!

TODOS Live! began with funds obtained through a NCTM Mathematics Education Trust grant. Through the years TODOS Live! has had many excellent sessions and presenters. These sessions are generally an hour in length and occur in the late afternoon when classroom teachers can participate. A list of previous recordings and upcoming sessions can be found by scanning the QR Code below.



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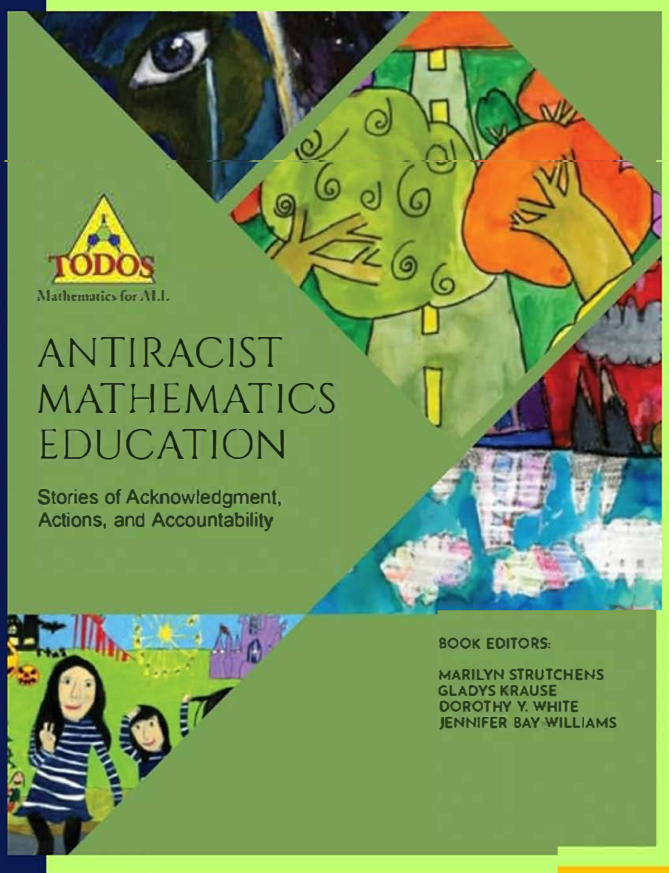

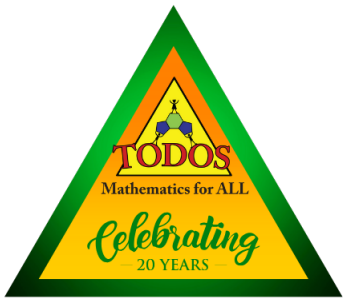

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