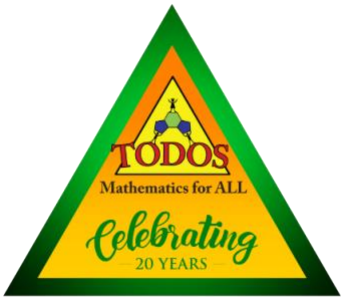

Honoring Identity and Building Community in the Mathematics Classroom

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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?

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Honoring Identity and Building Community in the Mathematics Classroom

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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