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Conceptualizing political knowledges needed to teach inclusive mathematics: theorizing through counterstories

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Abstract

How do teachers develop and use political knowledge to create equitable and inclusive conditions for and with disabled students, particularly disabled students of color? In this essay, we build on concepts of political teacher knowledge in mathematics education, critical inclusive mathematics education and disability studies to explore teacher knowledges that support disabled students' mathematical learning. We focus on four aspects of political knowledge for teaching mathematics: (1) knowledge as relational and unfolding over time, (2) understanding and negotiating the political contexts in which we teach mathematics, (3) deconstructing deficit discourses about marginalized students, and (4) learning to creatively resist the systems for and with our students. To develop our theoretical analysis, we use a counterstory of a middle school Latino student named Luis and his Latina mathematics teacher, Ms. Marquez. Our aim is to open up discussions in mathematics teacher educational research about the politics at play in teaching inclusive mathematics.

Keywords Mathematics education · Teacher education · Knowledge for teaching mathematics · Disability studies · Special education

1 Introduction

Across the globe, educators and disability rights activists have been organizing towards inclusive schooling. The Salamanca Statement (UNESCO, 1994) aimed to “promote the approach of inclusive education, enabling schools to serve all children, particularly those with special educational needs” (Tomlinson, 2017, p. 3). This statement led to the Convention on the Rights of Persons with Disabilities

(CRPD), which advocated for the principles of dignity, full and effective participation and inclusion in society, as well as education (Broderick, 2018).

These global movements towards full participation of students with disabilities¹ in educational systems impact mathematics education. Mathematics teachers support disabled students across the world even as disabilities such as autism, dyslexia, dyscalculia, anxiety, visual impairments, and so forth are differently defined across contexts. Disability is a broad phenomenon, showcasing different kinds of minds and bodies. In addition, systems for organizing the education of disabled students are different across the world, creating a political context for teachers' work. Considering that complexity, how do mathematics teachers understand students with disabilities in their classrooms, specifically in terms of teaching mathematics within existing systems of schooling? How might including disability in political knowledge for teaching mathematics create equitable and inclusive conditions for and with disabled students, particularly disabled students of color?

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¹ We acknowledge different preferences when it comes to person-first (a person with a disability) or identity-first (a disabled person) language around disability by those who experience disabilities. We use both in this article.

Our paper addresses these questions using concepts of equitable mathematics, disability, and political teacher knowledges. We center the concept of *political conocimiento* (Gutiérrez et al., 2023), a framework to understand emergent political knowledge of mathematics teachers. This is a theoretical essay that uses a counterstory to explore theory through the experiences of a real teacher and student. Counterstory is a methodology developed in critical race theory to disrupt binaries between empirical and theoretical work by grounding theory in embodied experience (Morga, 2011). Through the story of this teacher and student, we shed light on teachers' knowledge of the political context of their work, particularly in relationship to disabled students of color who face marginalization within the systems of education throughout the globe.

2 Conceptual framework

We begin with a description of political knowledges for teaching mathematics, specifically political *conocimiento* (Gutiérrez et al., 2023). Next, we explore critical approaches to disability to move beyond understanding disability from a medical, or deficit, model. We describe intersections between critical mathematics education and inclusive mathematics education research internationally. Finally, we explore the use of counterstories as methodology.

2.1 Political knowledges for teaching mathematics

Theorizing knowledges mathematics teachers need to successfully teach mathematics has been an important project in mathematics education. Drawing on the work of Shulman (1986), Hill and colleagues differentiated between content knowledge and pedagogical content knowledge (Hill et al., 2005). The first is knowing the mathematics one is teaching, while the second is knowing that content for teaching. Other scholars such as Howard and Milner (2021) have proposed a third set of knowledges, namely cultural and racial.

Through its sociopolitical turn (Gutiérrez, 2013; Planas & Valero, 2016; Skovsmose, 2004; Valero, 2004), mathematics education has more broadly questioned the nature of mathematical knowledge itself, exploring how mathematics is not a non-political and objective entity, but contextual, cultural, and political. The dominant mathematics is not neutral and value-free, but imposes a particular set of assumptions about what mathematics can be and who can do mathematics. Teachers are faced with the task of developing their understanding of the impacts of their own teaching, including how these conceptions of dominant mathematics, and assumptions about who is capable of it, affect their students.

Teachers may wish to move towards greater equity for their students, but different definitions of equity may be in tension. Gutiérrez (2007) described two axes of equity. The first, the dominant, focuses on achievement and access, such as test scores and access to high-quality instruction. The critical axis looks at identity and power. Do students feel empowered and agentic as they learn mathematics? Does the mathematics they are doing feel connected to their community and culture? Gutiérrez (2007) notes that these different ways of understanding equity can be in tension in teachers' work.

Teaching mathematics while being mindful of these various complex layers is an intricate task. Abtahi (2022) describes her reflections on the ethical tensions that emerged as she taught dominant mathematics to a group of Indigenous mathematics teachers. Abtahi forwards the concept of "interrelationship epistemology," in which knowledge is understood as relational, and embedded in a web of relationships, and is further connected to students' cultures and languages. This way of knowing stresses the process through which mathematics teachers come to know their students, and to engage in reflection about the act of teaching mathematics. In this case, Abtahi reflects on the tensions between teaching a dominant, abstract mathematics to a group of teachers who also have other ways of engaging in mathematics. It becomes clear how complex it is to work towards equity in mathematics education.

These developments in socio-political understandings of mathematics have resulted in new concepts of teacher knowledge that explored developing political knowledge. In tackling this question, Gutiérrez studied mathematics teachers who were successful at creating departments and schools in which students developed strong identities as mathematical thinkers as well as ones in which systems and policies worked for student growth (Gutiérrez, 1999). She worked to expand ideas of teacher knowledge for mathematics to explore how prospective mathematics teachers developed knowledges that allow for radical action for students. She developed the concept of *political conocimiento* for teaching mathematics, or a principled stance on teaching mathematics in solidarity with students (Gutiérrez, 2012; Gutiérrez et al., 2023). Political *conocimiento* "highlight[s] ways mathematics, pedagogies, students, and politics entangle to produce a particular kind of knowing that teachers need to carry and perform their everyday work [...] especially with historically minoritized students." (Gutiérrez et al., 2023, p. 3). Political *conocimiento* posits that teacher knowledge develops over time, is a complicated process, and is deeply felt and embodied.

In using the word "conocimiento", Gutiérrez draws on the work of Anzaldúa (1987), who defined the word in terms of added epistemological complexity in Spanish,

where there are two verbs that translate to the English verb to know: “saber” and “conocer.” “Saber “is knowledge of facts. Conocimiento builds upon the Spanish verb “conocer”, which is a knowing through experience, becoming familiar with (Gutiérrez, 2012). This distinction is critical for how Gutiérrez situates this kind of knowledge: as an in-between kind of knowledge, non-essentialist, and developed through experiences moving between different contexts. Political conocimiento may involve: (1) understanding and negotiating how systems in education operate in ways that can be oppressive to students, (2) questioning the deficit constructions of certain kinds of students, (3) negotiating institutional demands such as high-stakes testing, and (4) resisting the status quo to support students (Gutiérrez et al., 2023).

Connected to this idea of conocimiento as a subjective knowledge, this kind of knowledge is closely tied to emotion and relationships. We do not learn about our students in an abstract way, but over time better understand them through our interactions. We come to learn through relationships, a process that takes time. This is embodied knowledge, not separate from our bodies, minds, and identities. Coming to know the political systems and institutions that also shape our work as mathematics teachers is also an ongoing process, complex, and filled with tensions. Better understanding our students and the political and social contexts in which they learn can and should lead to teachers working to shift the systems and to advocate for and with students. Gutiérrez presents the concept of creative insubordination as a way for helping teachers frame their own resistance to oppressive systems (Gutiérrez, 2016).

As we explore using political conocimiento for mathematics to understand how teachers learn about disability, we note several connections. First, special education services, while varying across countries, are always systemic in nature. Mathematics teachers need to develop understandings of these systems, and how they intersect with other systems, such as how students are placed into mathematics classrooms. Second, Gutiérrez highlights teachers learning how to question deficit framing of students. Teachers using deficit framing of disabled students is a fundamental issue for teaching this group of students (Watson, 2021). Disabled students are complex, and may require more time and investment to get to know, providing teachers in return with very rich and unique funds of knowledge and relational experiences. This understanding of developing knowledge of students over time, and through relationship is promising and profoundly transformational. Finally, in both of these areas (understanding systems and students), the knowledge required is often complex, considering different ideas in tension such as constructions of disability (e.g., as deficit v. as source of knowledge).

2.2 Theories of disability

Disability is an extremely broad category of difference, encompassing those with sensory impairments, emotional disabilities, as well as neurodiversity. Students with disabilities are diverse in terms of race, class, ethnicity, gender, sexual orientation, and languages. Some disabled students excel in school mathematics, others may have particular challenges.

Disability Studies is an academic field developed from the activism of disabled people worldwide, although it was initially dominated by white male scholars and activists (Schalk, 2022), a very small subset of a larger global group. This movement challenged the medical model of disability which sees disability as individual, as deficit, and as something to be fixed. Instead, it advocated for the social model of disability (Oliver, 1990), in which disability is socially constructed. The social model separates impairment, or the actual physical difference that creates disability, from the disabling effects of society. The social model has inspired activism and a reframing of the “problem” to schools and systems, rather than within a disabled child (Erevelles et al., 2006).

Critical intersectionality approaches to disability have sought to center Black and Latinx² experiences and theories. Disability Critical Race Studies (Dis/Crit) (Annamma et al., 2013) theorizes disability as interconnected with race. Drawing on intersectionality, a term coined by Crenshaw (1989), Dis/Crit views individuals as complex and multi-dimensional, since people cannot be reduced to a single aspect of their identity such as race, gender or disability. Dis/Crit “focuses on ways that the forces of racism and ableism circulate interdependently, often in neutralized and invisible ways, to uphold notions of normalcy” (Annamma et al., 2013, p. 11). One normalized discourse is that of test scores as a mechanism to create equity in terms of race and disability. Integrating the tradition of Latinx critical theory, LatDisCrit (Padilla, 2021) adds to these theories by formulating a vision of what we hope to provide disabled children in schools: opportunity for emancipatory learning and radical agency, as well as radical solidarity between educators and students.

There are theoretical challenges to the social model of disability. The social model separates impairment, or the physical manifestation of disability, from disability, creating a binary. When disability is only seen as outside the body, as socially constructed, then there is no space for the physical and emotional experience of disability. This critique comes

² Throughout this essay we move between using the terms Latinx and Latino/a to reflect the diversity of perspectives and preferences associated with how individuals self-identify or identify others using these terms. For more context, see Mora et al. (2022).

from feminist perspectives, as well as from those who have quite different embodied experiences of disability, particularly illness and chronic pain (Wendell, 1996). Other models of disability have emerged that allow for analysis of the embodied experience of disability as well as how social conditions create disability. For example, influenced by feminist and queer studies, the political/relational model of disability (Kafer, 2013) views disability as a site of shifting definitions that is always embodied, as well as operating in relation with others. Particularly important is how disabled bodyminds are constantly compared to ideas of “normalcy.”

2.3 Research on inclusive mathematics teaching

Historically, research on the mathematical learning of students with disabilities was situated within special education, which has developed from a behaviorist view of learning (Woodward, 2004). As a separate field of research, mathematics educational scholarship did not often include students with disabilities (Tan et al., 2022). In many countries, special educators are prepared separately than mathematics educators, creating problems in communication and collaboration when teaching together (Boyd & Bargerhuff, 2009; Baraldi et al., 2019).

Investigations into inclusive mathematics, defined as including disabled students in mathematics classrooms rather than separating these learners into segregated classrooms, have slowly grown in number over the last twenty years within mathematics education, with an international scope. Roos (2019) found two strands in this literature. One strand included theoretical investigations into inclusion defined broadly (including race, gender, gifted education and disability), but rarely included analysis of classroom practice. A second strand was focused on classroom practice, and did not theoretically explore inclusion. Roos notes this disconnect between actual mathematical teaching practice and theories of inclusion is problematic.

Some of the research explored how disability and/or mathematical difficulties are socially constructed. In Sweden, Magne (2001) began a discussion about how “low achievement” in mathematics is defined, and how different visions of mathematics are at play in these definitions. Heyd-Metzuyanim (2013) described how a student was constructed as having a mathematical difficulty through interactions with the teacher, situating an identity as a low achiever in mathematics as co-constructed within interaction.

Other works have explored the mathematical strengths and potential of students with a variety of disabilities. Researchers in mathematics have investigated including students with intellectual disabilities such as Down Syndrome in meaningful mathematics in Australia (Faragher & Clark, 2020). Fernandes and Healy (2013) described how

two blind learners in Brazil construct multi-modal meaning, and how this could offer new insights to mathematics education in multi-modal learning. Finesilver (2017) approached a design study on multiplicative thinking with UK students with the lens of neurodiversity, acknowledging both strengths and challenges.

Other research utilized participatory methods where those with lived experience with the disability are co-researchers. In the US, Lewis and Lynn (2018) coauthored a study on dyscalculia that centered the experiences of a woman with dyscalculia (Lynn) who graduated with a degree in statistics. Harriss, a dyslexic mathematician and artist, co-led a research project with Lambert (Lambert & Harriss, 2022) exploring the experiences and mathematical thinking of dyslexic mathematicians.

A recent volume on inclusive mathematics education encompassed many essays situated in both Brazil and Germany (Kollosche et al., 2019). This collection is particularly useful in relation to political knowledges needed to teach inclusive mathematics because there is attention to the different systems in each country for special education, and how inclusive education is conceived and enacted.

Across these scholarly works, we notice attention to including disabled students in meaningful mathematical inquiry; these are not about rote memorization, but about how teachers engage students with a range of disabilities in authentic and rigorous mathematics centered on problem solving, or landscapes of investigation (Skovsmose, 2019). There is attention to the identities constructed in these classrooms (Heyd-Metzuyanim, 2013). Disability is understood as socially constructed, but also embodied.

In 2022, we published a systematic literature review taking stock of the knowledge base of mathematics teacher education research through an analysis of 61 articles across ten years from across the globe that involved educators, disabilities, and mathematics (Tan et al., 2022). Our purpose was to suggest directions for humanizing research and practice in mathematics. We understood humanizing approaches as seeking to affirm and cultivate disabled students in mathematics, including understanding the gifts these students bring to mathematics classrooms; while dehumanizing practices to be those which understand children through deficits, limiting their engagement in meaningful mathematics. Despite the continuing use of deficit framing of students, we found research in mathematics education with a humanizing approach to disabled students and their teachers. However, only a few articles considered the intersections of disability, race, ethnicity, and/or language.

While disability is increasingly included in discussions of equity in mathematics, at times that simply involves a nominal inclusion of disability without any specific analysis of how disability transforms mathematics and mathematics

teaching (Nieminen & Lahdenperä, 2021). A dearth of research includes meaningful analysis of the complexities of disabled students. There may be attention to disability, or race, or language, but few studies help us understand the majority of the world's population of disabled youth, who are non-white.

3 Methodologies of counterstory

One central tool of critical race theory is the counterstory, or testimonio (Yosso, 2006). Counterstories are stories of everyday experience that illuminate new ways of thinking about both our own experiences and those of others (Moraga, 2011). Counterstories are told from the perspective of marginalized actors, and provide a counter to dominant narratives (Solórzano & Yosso, 2002). Counterstories can be autobiographical, or reconstructed from interview or ethnographic data. Unlike traditional ways to present data from research, a counterstory can be a narrative retelling, or even creating fictional dialogue between characters. The purpose of the storytelling within research is to provide counter narratives, and to center the experience of marginalized actors within the system. Thus, the counterstory should be presented as a complete narrative so that readers can experience the narrative along with its theoretical and disruptive connotations, rather than selected parts as is common in qualitative research.

Counterstories purposefully are neither merely empirical data, nor abstract theory. Instead, they are both, where theory creation is embedded within embodied experience. They allow for what Fals Borda (2016) calls *sentipensante* ways of knowing, which underscores the connection between emotion and thinking. Counterstories are useful for theoretical explorations because stories are central to how we communicate as humans, and allow us to feel the peculiarities of experience, allowing us to theorize from lived experience. Thus, counterstories are “theory in the flesh” (Moraga, 2011), closely connecting theory and experience. The mechanism through which counterstories can be used to create theory is through reflection, particularly critical conversations that explore the structures and systems underneath counterstories (Miller et al., 2020). The ultimate goal is for counterstories not only to create theory, but action towards ending oppression.

While uncommon in mathematics educational research, counterstories are a well-established methodology in the fields of critical race theory, LatCrit and Chicana feminist epistemologies where it has been used in educational research for decades (Solórzano & Yosso, 2002; Miller et al., 2020). This essay contributes to the theoretical discussions of teachers developing knowledge around equity by

using counterstory as a methodology which both illustrates and extends our theoretical frameworks.

The counterstory of Ms. Marquez and Luis is a shortened narrative description of events that occurred during a research project of the second author (Lambert, 2015, 2017, 2019). The first author, Rachel spent two years with a group of students, writing field notes and interviewing students and one teacher, Ms. Marquez, multiple times. While there is another teacher mentioned in the narrative, Ms. Alton, she was only interviewed once and thus we focus on the perspective of Ms. Marquez.

Counterstories are created multiple ways. Here, we describe the reflective conversations which elevated this particular narrative into a counterstory. First, years after collecting this data, Rachel engaged in a series of critical, reflective conversations with Kimberly, fourth author and a scholar of teacher education who focuses on equity and race. Through these conversations, we explored how Ms. Marquez faced systemic pressures that affected her teaching, including competing definitions of equity. In this context, we focused on the perspective of the teacher, a woman of color teaching mathematics in an urban setting. Rachel subsequently brought this story of Ms. Marquez and Luis to another research group with Alexis and Paulo, first and third authors, as we worked on a paper about research on teaching mathematics to and with disabled students. In both contexts, the story was brought up again and again as an example of the complexity of teacher practice. In our conversations at both time points, we explored what theories of teacher knowledge in mathematics helped us better understand this counterstory, and what theories needed to be developed to better understand the dynamics it highlights. Insights from our conversations are included in the [Commentary](#) section.

These collaborative conversations were fruitful because of our diverse perspectives, both in terms of our own lived experience, as well as our academic expertise. We recognize the central role of identity in knowledge production (Boveda & Annamma, 2023) and their importance in the field of mathematics education (D'Ambrosio et al., 2013). Thus, we provide a brief description of our positionalities: The first author is a disabled brown Latinx male independent scholar born and raised in the global south, the geographical spaces that during the cold war were designated as the third world and whose epistemological constructs are still deemed as inferior in global north academic contexts (Santos & Meneses, 2020). The second author is a white, middle-class female who worked as a public-school special education teacher and grew up in a neurodiverse family. The third author is a Chinese-American, first-generation immigrant, multilingual learner, cisgender male, and parent of a disabled person. He is an urban teacher educator and scholar and was formerly a public-school mathematics teacher. The

fourth author, a former public-school teacher and mother of a child with a learning disability, is a Black, middle-class woman from a working-class background. Our academic fields include teacher education, mathematics education, disability studies, and critical theory.

4 Counterstory

This counterstory centers on Ms. Marquez, a seventh-grade mathematics teacher in a large city in the United States, and her student, Luis. We present the counterstory in three phases: (1) the first half of Luis's seventh grade year, (2) the second half of Luis's seventh grade year, and (3) the end of eighth grade.

4.1 The first half of seventh grade

The mathematics teacher, Ms. Marquez, was in her ninth year of teaching. She grew up in this large city in the US, with family from both the Dominican Republic and Ecuador. She is bilingual in Spanish and English. The students in her class were all Latino/a, with most students identifying as Dominican-American. Many students also identified as bilingual. She taught at a middle school (ages 11–13). Students who qualified for special education services were placed in an inclusive classroom with both a mathematics teacher and a special educator. In the year Luis was in seventh grade, the administration could not find a special educator. For the first half of that year, Ms. Marquez taught this class without a coteacher.

Multiple students described Ms. Marquez as “strict” with a tone of appreciation. She was praised by students for being a teacher who would “never give up on us”, and as a teacher who knows how to give “respect” to all students, which one student attributed to their shared cultural heritage. Ms. Marquez was a leader in the math department at her school and had recently led a successful initiative to de-track mathematics³ in the entire school.

Ms. Marquez described using two different mathematical pedagogies, one she called, “critical-thinkingish,” or a discussion-based pedagogy, and the other she described as “state-examish” or a procedural pedagogy. Discussion-based pedagogies were characterized by extended open-ended problem solving and discussion. Procedural pedagogy was characterized by a single strategy for each kind of problem which Ms. Marquez would model.

Ms. Marquez differentiated these two types of pedagogy based on their purpose. She described discussion-based

pedagogy as important to developing students’ “voice in mathematics,” which she defined as engagement in mathematical problem solving and discussion. Ms. Marquez believed that her students needed opportunities to engage in discussion-based pedagogy so they could see themselves as mathematical thinkers. She described the importance of this engagement for all students, but particularly students of color such as those she taught. Ms. Marquez was an excellent facilitator of mathematical discourse, working to get all students engaged and pressing for more details of their thinking.

Preparing students for high-stakes testing was also an equity concern for Ms. Marquez, as students’ test scores had implications for their high school placements in the large urban system in which she worked. In the first half of that year, she included both kinds of mathematical activities in her class. Class generally began with a warm-up, which was a short review of previous topics. Then she would present an open-ended mathematical task which students would solve collaboratively and then discuss in the whole group. The last 30 min of class, students were broken into heterogeneous groups that did lessons from the textbook.

Described as a “top student” by Ms. Marquez, Luis thrived whenever the class worked on problem solving. Ms. Marquez would call on Luis every time he raised his hand; his comments often lifted the quality of the mathematical discussion. One day they were working on a problem about finding the Least Common Multiple, using the situation of hotdogs which come in packs of 8 and hot dog buns which come in packs of 6. Ms. Marquez was about to move on from the discussion when Luis raised his hand. He asked if this pattern of numbers would continue into infinity and if they could prove it. Ms. Marquez smiled, extending the discussion.

When the classwork focused on memorization of procedures, Luis resisted. He hid the open-ended problems under his textbook and worked on them secretly when asked to do exercises in the textbook. Luis was monolingual in English, and described himself as Latino. He received special education services for a learning disability primarily in the area of reading, or dyslexia. Luis told me about the difference between “problems which give you problems,” which he loved, and “worksheets, which are nothing.”

One area that Ms. Marquez focused on was student’s conceptual understanding of operations with integers. One model was the number line for addition and subtraction of positive and negative numbers. One day as I sat with Luis, he showed me a number line he had drawn to solve some problems, and told me he thinks of the number line like the border between Mexico and the US. Another day, they were using the chips model, where students were using round discs that were yellow on one side, red on the other. They

³ In the US, tracking is the practice of sorting students into mathematics classes based on students’ mathematics ability, typically determined by test scores. Thus, de-tracking is the practice of not sorting students.

were using yellow as positive, red as negative, and solving problems by comparing the quantities. Luis told me he was thinking of the positive and negative values as a war between White and Black people. Luis was both a political and a mathematical thinker, indeed seemed to conceptualize them as connected.

4.2 The second half of seventh grade

Three changes happened in this class halfway through the year. First, because of the upcoming test, Ms. Marquez shifted instruction to focus on procedures. There were no longer either open-ended tasks nor discussion. Instead, students practiced particular procedures or test preparation questions in packets of worksheets.

Second, the administration hired a special education coteacher (Ms. Alton) to work with Ms. Marquez. The third change was a shift from heterogeneous groups that changed each class to three groups that were fixed, with the same students in each group every day. One group, led by Ms. Alton, included all the students receiving special education services and a few who were being assessed for special education. A second group included some students receiving special education who did well with memorizing mathematical procedures. A third group had no students receiving special education services and also included the students who were seen as very strong in mathematics. Ms. Marquez worked with the second and third groups. The students called these groups, respectively: “Ms. Alton’s group”, “the middle group”, and “the independent group.” Students generally saw them as leveled by ability.

In Ms. Alton’s group, students were expected to move along at the teacher-directed pace through the worksheets, using teacher-determined methods. Luis rejected this participation structure. He insisted on working either alone, or with a friend, as he had done in the first semester. Ms. Alton reprimanded Luis for this behavior multiple times by sending him out of the class for talking about mathematics without permission.

Ms. Marquez had written up a set of rules for the students to follow when doing operations with integers. I observed several times when Luis had trouble solving problems using these rules. At a subsequent class, I saw him solving these problems with apparent ease. When I asked how he was doing it, he whispered, “I am using the giant number line in my head.” He gave a giant grin as he shared his secret.

Near the end of the school year, I mentioned to Ms. Marquez how Luis described rich problems as “problems that give me problems,” and how much he loved that kind of problem. Hearing this, Ms. Marquez started to cry. Ms. Marquez then spoke at length, passionately, about how

dissatisfied she was with her class. She shared how conflicted she was with her shift to memorization of procedures, particularly its effects on students like Luis. She specifically blamed test publishers for narrowly written problems on the test, which forced her to specify procedures, to the general stranglehold that standardized tests had on her work, to the profits that she imagined motivated those who created the tests.

In the last month of the school year, Ms. Marquez learned that the eighth-grade teachers had decided to return to tracked mathematics classrooms. In an interview with both teachers, Ms. Marquez described how upset she was when she learned that the students receiving special education services like Luis would be automatically placed in the lower skill level class. In contrast, Ms. Alton stated that only in that lower class would students with disabilities get the specialized support they needed. Ms. Marquez was clearly frustrated during this interview. She began talking about how the whole approach to mathematics was not working for students. She envisioned a new kind of mathematics class that would connect students’ passion for social justice to inquiry in mathematics, specifically naming Luis as a student who belonged in such a class.

4.3 The end of eighth grade

A year later Ms. Marquez was demonstrably upset about the tracking of eighth grade after the students left her class. She was particularly upset about Luis’ trajectory, who had been cast as a behavioral difficulty in his eighth-grade mathematics classroom, difficulties that Ms. Marquez attributed to the procedural mathematics of the classroom. It was now clear that Luis would not be recommended for an upper-level placement in ninth-grade mathematics. Ms. Marquez spoke at length about this problem, describing what she called a “funnel” at the school that pulled in students like Luis, limiting their intellectual growth and setting them on a trajectory through lower status academic tracks. She was specific in connecting this “funnel” to both Luis’s race, gender and his disability classification. If he wasn’t Latino, and a boy, and in special education, she reasoned, he would not face the same exclusion from mathematics. As she explained it, his disability was used as the logical reason for his exclusion. She said that she had not done any fixed groups that year in her class, and was continuing to argue against tracking at the middle school. Luis, in a separate meeting, was asked how he felt about math now? He grinned, and said, “I still love it.”

5 Commentary

For this paper, we have presented a counterstory to engage readers in understanding how mathematics teachers develop knowledge about the students with disabilities in their classes. The counterstory of Ms. Marquez and Luis offers us a specific example to help us understand the complex work of teachers. We begin with a commentary on our first research question: how do mathematics teachers understand students with disabilities in their classrooms, specifically in terms of teaching mathematics within existing systems of schooling? In this section we address four aspects of political *conocimiento* (Gutiérrez et al., 2023): (1) knowledge as relational and unfolding over time, (2) understanding and negotiating the political contexts in which we teach mathematics, (3) deconstructing deficit discourses about marginalized students, and (4) learning to creatively resist the systems for and with our students.

Next we address broader questions about the equity implications of extending political *conocimiento* to disability. We do so without losing attention to race, gender, and language in alignment with our second research question: How might including disability in political *conocimiento* create equitable and inclusive conditions for and with disabled students, particularly disabled students of color?

5.1 Ms. Marquez's developing political knowledge for teaching mathematics

5.1.1 Knowledge as relational and unfolding over time

We begin with a central idea in political *conocimiento*: political knowledge about teaching mathematics is relational and develops over time. In this case, we notice the importance of the relationship between Ms. Marquez and Luis. Ms. Marquez cried in the hallway when she learned about Luis and his love of “problems that give me problems.” Her sadness turned to anger, anger against the “test-makers” who so affected her pedagogy. In our discussions, we returned to how Ms. Marquez's relationship with Luis, particularly as she saw him as a “top student” in her class, played a role in her increased critique of systems like tracking and special education.

To teach towards equity is emotional, as teachers like Ms. Marquez confront the possibility that they might have harmed students. This kind of inquiry about one's own practice can be painful (Abtahi, 2022), yet profoundly transformational as this pain can feed further reflection and resistance. Sentipensante ways of knowing (Fals Borda, 2016) highlight this connection between thought and emotion, rather than allowing a duality between rationality and

emotion. Ms. Marquez seems to develop critical analysis of mathematics through emotion and through relationships.

5.1.2 Understanding and negotiating political contexts

Ms. Marquez clearly connects her mathematics teaching to a goal of increased equity for her students. At the beginning of Luis' seventh grade year, Ms. Marquez presents two visions of equity in mathematics. One is the narrative of equity through increasing test scores, or the dominant axis of equity (Gutiérrez, 2007). Her second narrative of equity is centered on developing students' mathematical voices and sense of self as mathematical learners through problem solving. Later in the year, she presents a third idea of equity, suggesting that there should be a mathematics class that connects social justice to mathematics. These last two visions of equity center on identity and power, critical axes of equity.

Ms. Marquez teaches within a system that includes special education structures designed to provide for students with disabilities, such as a special education co-teacher. In the first half of the school year, Ms. Marquez has no special education co-teacher, and she does not create any fixed ability groups within her class. Once the coteacher arrives, groups are created so that the special education coteacher can provide more focused instruction for students with disabilities. These new fixed groups are seemingly accepted by Ms. Marquez, even though she has been a school leader against tracked math classes. Again, we see two competing visions of equity. Is it more equitable to give a student access to a small group led by a special educator, or is it more important to use heterogenous groups? While Ms. Marquez agrees to the fixed groups in Luis's seventh-grade year, she does not allow them in subsequent years.

Larger institutional power structures at the school reinforced this separation and grouping, as teaching separate groups for disabled students was understood as common-sense and necessary for student “needs.” These disabled students of color were automatically disqualified in eighth grade for the most advanced mathematics class because of the way special education services were structured at the school (the students had to be clustered into one class so that the special educator could support students). The intersecting pressures from the system included special education systems, mathematics tracking systems, and standardized testing demands on teachers.

Over time, we see how Ms. Marquez identifies the larger oppressive systems increasingly impacting her work, and her developing political *conocimiento* about how these systems were affecting her students. She critiqued not only the effects of standardized tests but noted the money that was made through these testing systems. She was angry about

her colleagues deciding to return to tracked mathematics classes after she had successfully led a movement to de-track classes. By the end of Luis' eighth grade year Ms. Marquez is furious about the way Luis has been treated by the school. She presents a metaphor, the funnel, that explicitly tracks how race, gender and disability work together to funnel Luis away from higher mathematical opportunity.

5.1.3 Deconstructing deficit discourses

To understand teaching mathematics to and with disabled students, we posit that teachers' political *conocimiento* includes exploring tensions in how students are named, between medical and social models of disability, and between pedagogies. There is a connection between deficit discourses about marginalized students and the mathematical pedagogies they are offered.

In our discussions, we noticed that Ms. Marquez rejected deficit thinking about her disabled students of color. She expected all students to be able to collaboratively problem solve and share mathematical thinking, as well as learn procedures. She thought very highly of Luis, labeling him a "top student."

Providing disabled students with access to a mathematics that allows them agency and is connected with their identities is a theme in inclusive mathematics education (Skovsmose, 2019). In other writings about Luis, the emphasis was on how he was differently framed within these two different mathematical pedagogies (Lambert, 2015). When he had opportunities to problem solve and engage in collaborative discussions of mathematics, he was seen as a "top student" by Ms. Marquez. When pedagogy shifted towards memorization, she became concerned for Luis, noting that "he can't do rote." This shift illustrates how the social model of disability might operate in mathematics classrooms, as the same child appears disabled in a pedagogy of memorization and gifted in a pedagogy of problem solving.

We also note how Luis challenges binary systems of sorting students in mathematics. Is he a top mathematics student? Or does he need support? It is difficult to address these questions because he thrives in one kind of mathematics, problem solving, and resists or was not able to engage in memorization of rules and procedures. It seems as if the system was not designed for a student with a disability who excelled in mathematics. He quickly moved from the group with the highest achievement to the group with the lowest.

Ms. Marquez moves towards a pedagogy of social justice, one that would allow Luis to engage in problem solving and discussion, but also connect his interests in social contexts, his way of seeing mathematical objects like the number line as the borderlands between the US and Mexico. This is also a way of seeing Luis that does not reduce him to

a disability, or to his identity as Latino, but as who he is: a complicated and complex sociopolitical learner. Thus, Ms. Marquez and Luis' narrative offers a rich way to expand the concept of political *conocimiento* to include disability and intersectional analysis in deconstructing deficit discourses about multiply-marginalized students.

Shifting definitions of disability emerge from the counterstory, where new ways of naming Luis as disabled operate in tandem with processes of exclusion. As a young child, Luis had been classified as having a "Behavior Disorder," a particular special education designation used for students with challenges in following school rules and expectations. His elementary school teachers and family removed this category from his special education paperwork in preparation for middle school, leaving dyslexia as his only disability. According to Luis's sixth grade teacher, Luis no longer qualified for a behavioral disability, and his family and teachers worried that if it was listed on his special education paperwork, he may be moved to a separate special education classroom. Along with African American boys, Latinos are overrepresented in the category of behavioral disorders in the US, and more likely to be suspended or suffer harsher consequences for the same infractions than other students (Skiba et al., 2011). So for an adult to call him "a behavior" is to invoke his past label, and to shift his "disability" from a learning disability to a behavioral disability. Kafer (2013) suggests in the political/relational model of disability, disability identification itself is a political process. Thus, developing teachers of mathematics' political *conocimiento* involving disability centers such intersectional individual, social, political, and historical analysis.

5.1.4 Learning to creatively resist the system

We begin with Luis's resistance. Luis saw mathematics itself as political and cultural, using metaphors about race and borderlands to learn operations with integers. He resisted the shift to a less collaborative mathematics. Luis was told to leave the classroom not because he spoke in a disrespectful way, or broke other classroom rules. The only rule he broke was talking about mathematics to his peers. He insisted on relational, collaborative mathematics. Luis also resisted by continuing to define himself as a mathematical thinker and insisted on loving mathematics. Such resistance and radical agency from a disability perspective enriches the notion of political *conocimiento*.

We note a transformation over the course of these two years in Ms. Marquez's political knowledge about her work and her resistance. While she was already a leader in her mathematics department to de-track mathematics classrooms, as some of the teachers decided to return to tracked classes, Ms. Marquez vocally protested. She engaged in

creative insubordination (Gutiérrez, 2016) and radical agency (Padilla, 2021), eventually resisting fixed groups in her own classroom. We wonder what might have been if Ms. Marquez had more colleagues to support her in her resistance. The role of community and radical solidarity is critical in creating resistance that can transform schools towards more equitable mathematics (Gutiérrez, 1999; Padilla, 2021).

5.2 Political *conocimiento* for inclusive mathematics

The counterstory of Ms. Marquez and Luis provides a rich, contextual narrative that asks us to consider how mathematics teachers develop political knowledge for teaching mathematics that includes disability. Next, we address the second research question: How might including disability in political *conocimiento* create equitable and inclusive conditions for and with disabled students, particularly disabled students of color?

Expanding political *conocimiento* to disability can create more nuanced intersectional analysis. For example, the more rigid procedural mathematics connected to high stakes testing impacted all students' opportunities to learn rigorous mathematics and engage in problem-solving, however, we would argue that this switch was intensified for disabled students of color. Because of the fixed groups, students receiving special education services were clustered together with a teacher who discouraged collaborative mathematics. This is the participation structure that Luis resisted.

Ms. Marquez describes Luis' trajectory using intersectional analysis that considers how race, disability and gender interrelate (Annamma et al., 2013). Her analogy of "the funnel" that was separating disabled students from the mathematics she wanted them to experience connects to the school-to-prison pipeline in the US which limits the opportunity of Black and Latinx youth (Allen & White-Smith, 2014). That is, political *conocimiento* that includes a disability analysis better supports teachers' developing knowledge of the nexus of pedagogy, surveillance, and punishment. As Ms. Marquez notes, Luis is treated differently because he is Latino, a boy, and because he has a disability classification. All three aspects of his identity matter in his positioning as less capable in mathematics, as he is moved out of the mathematical opportunities Ms. Marquez believes him capable of.

Including disability in political knowledge for teaching mathematics is necessary for all mathematics teachers, each of whom must develop understanding of and negotiate special education systems. These systems differ internationally, but their mechanisms matter for equity for those students. Mathematics teachers can and should see disabled students

as capable of complex mathematics, as Ms. Marquez saw Luis. To provide equity for all their students, mathematics teachers will need to question and resist deficit thinking about their students, as well as systems that assume that students with disabilities always need more and different supports to learn.

We want to highlight here the relational and emergent nature of this knowledge. As Gutiérrez makes clear in her use of the Spanish word "conocer" rather than the static "saber", this kind of knowing changes over time. Knowing ourselves, knowing the children we teach, even knowing mathematics will change over time as we build relationships. Disability itself is a complex, changing category as we see from new forms of disability emerging in our society such as Long Covid. Along with new forms of disability, we see new forms of resistance from disabled people. As the first author noted in one of our conversations for this paper, "nos estamos conociendo," loosely translated as we are always knowing of each other, improving what we know and how we relate to each other. There is no finalized or complete political *conocimiento* for any teacher, just a commitment to working towards equity.

6 Conclusion

Learning to teach mathematics is more than learning how to design and facilitate mathematics lessons; we must teach within systems that can be oppressive to us and our students. Thus, inclusive teachers should develop knowledge that involve negotiating different ways of understanding what mathematics is, who our students are, what they need, and how their intersectional identities interact with policies and practices that impede/afford equitable education.

Increased inclusion of students receiving special education is an equity-based movement across the world, impacting mathematics educators. Political *conocimiento* offers a robust theoretical-analytical tool to develop mathematics teachers' political knowledge, and will be even more powerful if it includes disability. Using political *conocimiento*, we have explored one counterstory which elevates the journey of a mathematics teacher in an urban area of the US as she wrestled with equity in mathematics for one particular student, a Latino with a learning disability receiving special education services. The systems that she dealt with included (1) high stakes testing regimes, (2) debates about whether or not to track mathematics classes by prior achievement, and (3) different ways of providing students special education services. These systems will be different across the myriad contexts in which mathematics teachers work, but there will always be systems that affect teachers' work worldwide. Yet, we lack robust theories of what and how mathematics

teachers develop political knowledges within these complex systems. In this paper, we extend the concept of political knowledge for mathematics teaching to include disability, with the aim to foster discussions in mathematics teacher educational research about the political knowledge at play in teaching inclusive mathematics.

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