Toward a Restorative Math Pedagogy: A Theoretical Overlay Between Two Relational Approaches to Schooling and Mathematics Instruction

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Abstract
Emphasized by the fallout of the pandemic, critical math scholars have long-since called for resistance to the cultural marginalization, systemic racism and violence of math instruction by crafting a liberatory and humanizing mathematics education. In response to that call, this paper illuminates the theoretical connections between the frameworks of two relational approaches to schooling, Restorative Justice in Education (RJE) and Cognitively Guided Instruction in Mathematics (CGI). Through discussing the intersections of the components of both frameworks and their shared vision of equity and agency for all students, this paper argues that integrating restorative justice into math instruction is not only possible, but necessary.

Keywords
restorative justice, mathematics instruction, restorative pedagogy

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Introduction

In the deliberation about how to effectively return to classrooms from the widespread school shutdowns and comprehensive distance learning required as a public safety measure for the Covid-19 pandemic, many social justice warriors envisioned the rupture in “normalcy” as an unprecedented opportunity to re-think school entirely. Schooling in the US for many groups of people, particularly for People of Color, has been a place of trauma, suffering, and cultural subtraction (Ladson-Billings, 2021; Love, 2019; Valenzuela, 1999). The response to the pandemic itself highlighted old inequities in new ways, as many well-resourced schools were able to swiftly shift to remote instruction, while their students were able to complete work in learning “pods” and/or with a private tutor (James, 2021). Under-resourced schools, which are very often home to a larger percentage of Students of Color than well-resourced schools, had to navigate many other challenges from distributing technology and hotspots, to food and school supplies (Herold, 2020). TODOS Mathematics for All (2020) acknowledged the 2020-2021 school year would have specifically negative impact on the math learning of Students of Color, not simply because of the inequities in the move to remote instruction, but also because of the rapid rise of the term “learning loss.” This phrase that was used widely across education and non-school outlets alike characterizes formal math learning as valuable and out-of-school learning as unvaluable or even detrimental, echoing the many deficit frames of Students of Color that permeate math education and scholarship (TODOS Mathematics for All, 2020). Prior to the pandemic, leading critical mathematics scholars such as Gutierrez (2015) and Martin, Groves Price and Moore (2019) called for the resistance to such systemic racism and violence by crafting a liberatory and humanizing mathematics education.

In the quest for approaches that humanize schooling for Students of Color, restorative justice has gained recognition over the past two decades as a viable strategy for transforming school climates. While schools often adopt restorative justice as an alternative discipline strategy, critical scholars and practitioners argue that employing the practices of restorative justice solely as a disciplinary measure amount to appropriation and further entrenchment of dominant norms (Mustian et al., 2021; Vaandering, 2010; Winn & Winn, 2021). Rather than a disciplinary program or set of policies and practices, restorative justice must become a schoolwide paradigm if its promise to transform schools into liberatory spaces is ever to be realized (Evans & Vaandering, 2016; Winn, 2018). Schoolwide embodiment requires that restorative justice become a key element driving pedagogical and instructional practices (Morrison & Vaandering, 2012; Ogilvie, & Fuller, 2016; Vaandering, 2014). A nascent literature base describing restorative justice pedagogy and restorative justice-based instructional practices has begun fleshing out existing efforts in social sciences (Ogilvie & Fuller, 2016; Winn, 2013; Winn & Winn, 2021), as well as frameworks, commitments and pilot projects for integrating restorative justice into science and mathematics teaching (Gholson & Robinson, 2019; Patterson & Gray, 2019; Author & Lee, 2022; Winn & Winn, 2021).

Paper Aims

This paper aims to contribute to the developing research base on subject-matter specific restorative justice pedagogy with a focus on mathematics instruction. To do so, I will illuminate the theoretical connections between the frameworks of two relational approaches to schooling, Restorative Justice in Education (RJE) and Cognitively Guided Instruction in Mathematics.
My hopes for the impact of this theoretical overlay are twofold. First, I hope that by seeing the relationship between the components of both frameworks and their shared vision of equity and agency for all students, that more people will see that integrating restorative justice into math instruction is not only possible, but necessary. Second, I hope that by making a connection between frameworks that are widely adopted across schools in the US, that I might quell some of the frustration that teachers experience at trying to create space in their schedules for multiple initiatives that compete for time by making the case that restorative justice and mathematics instruction can occur simultaneously.

**Positionality Statement**

As a Woman of Color whose classroom experiences and research centers Children of Color, I am aligned with a growing number of mathematics scholars who believe that mathematics teaching and scholarship must actively combat racism and bias that show up in all arenas of classroom life (Aguirre et al., 2013; Chao & Marlowe, 2019; Gholson & Robinson, 2019; Goffney et al., 2018; Kokka, 2019, Yeh et al., 2021). As a former middle school math teacher of Black and Latinx youth, I experienced a great deal of consternation with the evidence that most of my students had not been provided the opportunity to deeply engage with mathematics, or to be affirmed as mathematical thinkers. Being embedded in extremely punitive urban school environments, I also bore witness to the impact of ridicule, exclusion, and lack of opportunities to repair harm on children’s engagement in school. That sense of outrage and often helplessness continue to motivate my research. I care deeply about shaping humanizing learning environments for Students of Color, particularly in gatekeeping subjects such as mathematics, and want to create a sense of possibility for teachers to feel that they can be transformative agents through their pedagogical and instructional practices. This study brings together two frameworks that both inspire and engage my own teaching practice, and hope that their integration will contribute a practical framework for engaging in rigorous, humanizing, anti-racist mathematics teaching practices.

**Literature Review**

**Restorative Justice**

Restorative justice is a paradigmatic approach that views all humans as dignified, interconnected, permanent members of society (Davis, 2019; Pranis, 2012; Winn, 2018). In a restorative system, people who commit harm cannot simply be locked away, but must be engaged in a process of repairing the harm with the person(s) they harmed and the community in which the harm took place (Duffy Rice & Smith, 2019; Wadwha, 2015). The restorative justice paradigm is a new concept to many in the United States, however, scholars attribute its relational ethos and associated practices, such as community circles, to First Nations people across the globe, especially from Africa, North America and Oceania (Davis, 2019; González 2012; Pranis, 2012; Santana, 2020).

Programs employing restorative justice began in the criminal justice system during the mid-1970’s in North America (Umbreit & Armour, 2011). Addressing primarily non-violent property crimes committed by juveniles, victim-offender conversations began shifting the focus of harm away from what crime was committed and what punishment would be levied onto the
offender and toward who has been hurt by the harm, how the harm could be repaired, and who was obligated to engage in the reparation process (Umbreit & Armour, 2011; Zehr, 1990). This focus provides more autonomy to communities in addressing harm rather than surrendering the decision-making process to the state, and preserves the dignity of the offender in providing an opportunity to make amends with those whom they have harmed (Zehr, 2015).

Schools began adopting restorative justice practices into their discipline systems primarily in response to the proliferation of zero-tolerance policies in the 1990’s that resulted in astoundingly disproportionate rates of suspensions and expulsions between Black students and their White counterparts (Davis, 2019; Evans & Vaandering, 2016; Fronius et al., 2019). As backlash mounted to the racist impact of punitive exclusionary measures, schools began using restorative tools, such as group conferencing and peer mediation, as an alternative to exclusion. Though the practices adopted early on gave more voice to involved parties, they were primarily focused on reforming student behavior without addressing structural inequities and adult biases that contribute to punitive school environments (Evans & Vaandering, 2016). Two well-known school districts, Oakland Unified School District and Denver Public Schools, implemented restorative justice in the mid 2000s in response to lawsuits and community organizing efforts regarding racially disproportionate disciplinary practices, and have since led the field in developing whole-school approaches to restorative justice (Davis, 2018; Gonzalez, 2015). Notably, Oakland Unified School District, through their Restorative Justice for Oakland Youth initiative decreased suspensions by 87% and eliminated violence within the first two years of piloting restorative justice at a predominantly Black middle school; the success of that first school led to a district-wide adoption of restorative justice in 2010 (Davis, 2018). Denver Public Schools cut their suspension rate nearly in half (from 10.58% to 5.63%) between 2006 and 2013, and while racial disparities persisted, the disproportionality of suspensions between Black students and White students narrowed by 4% (from nearly a 12% discrepancy to 8%) during the same time period (Gonzalez, 2015).

Though there are not yet nationwide statistics that account for the impact of restorative justice programs broadly, a recent review of literature conducted by WestEd highlighted evidence from across the United States that demonstrates many restorative justice programs are not only reducing suspensions and expulsions, but also increasing academic outcomes, improving school climates, and helping students feel safer at school (Fronius et al., 2019). Significantly, Todić et al. (2020) found that restorative justice also predicts fewer student absences due to adverse health, which in turn, leads to higher attendance rates. They note that these outcomes of restorative justice, increased attendance rates, fewer suspensions, and improved academics, are all contributors to strong graduation rates. Because high school graduation is linked to better health and longevity into adulthood, Todić et al. (2020) make the case that restorative justice should be positioned as a structural population health intervention.

Unlike the Indigenous communities that inspire restorative justice for whom strong relational bonds are inherent, schools are often quite antagonistic, disconnected and physically, mentally, and spiritually unsafe for Students of Color. Centering these experiences, a primary component of successful restorative programs is the proactive building of strong, healthy and trusting relationships amongst all members of a school’s community (Evans & Vaandering, 2016; Todić et al., 2020; Winn & Winn, 2021). Huguley et al. (2022) further submit that for restorative justice to achieve its full potential, it must be: (a) informed by ongoing analysis of race and racism, (b) responsive to intensive mental health needs, and (c) operationalized directly by a socio-emotional framework. They anchor their analysis by describing a notable restorative
justice program, the Just Discipline Project, that accounts for the complexity of schoolwide change by providing a multi-tiered system of support to schools. Components of their program include training faculty around restorative justice as well as on racism and bias, addressing school operation needs from mental health supports to data systems, and by committing the bulk of their day-to-day effort to building and sustaining healthy relationships (Huguley et al., 2020).

Recognizing the power of restorative justice to transform schooling for Students of Color and students with other intersecting marginalized identities, scholars and practitioners are furthering the impact of the restorative justice paradigm by developing strategies for its integration into teacher’s curricular decisions and instructional practices. In this way, it is not only a set of practices that happen outside the classroom or at specific moments in classes but is woven into all of the experiences that students have inside and in connection with their school. Winn & Winn (2021) unite educators and scholars who actively reimagine teaching and learning through the lens of restorative justice, and what it may look like to embody restorative justice while teaching across specific academic disciplines. The chapters provide robust examples of restorative justice-informed teaching in social science fields, such as a year-long Ethnic Studies course that begins with pre-colonial Indigenous histories and infuses Indigenous knowledge and students’ lived experiences into themes of resilience, resistance and reimagining (López et al., in Winn & Winn, 2021). Branching into the STEM fields, Patterson Williams & Gray (in Winn & Winn, 2021) lay out their (W)holistic Science Pedagogy, advancing five commitments one must make toward transformative justice teaching, which emphasize dedicating oneself to self-awareness, attending to students’ social-emotional well-being, and to the practices of science and restorative justice.

**Restorative Justice and Mathematics Teaching**

Anchored with examples from their wealth of critical math teaching practice, Robinson et al., (in Winn & Winn, 2021) discuss three commitments educators must make for justice-centered teaching with Black youth. The commitments call teachers to assert the brilliance of Black learners, center Black students’ mathematical learning identities and honor their agency. With a “radical reimagining” of a mathematics classroom, Bullock & Meiners (in Winn & Winn, 2021) describe mathematics learning experiences that exude restorative justice as they co-design interdisciplinary units with students that employ mathematical thinking along with other content-related skills in such a way that supports students in understanding and taking action on issues in the world and local communities. In earlier, practitioner-facing research, Moran & Steele (2017) developed a rationale for using restorative circles in secondary mathematics classrooms that bridge the aim of engaging students in mathematical discourse that includes justification and argumentation, with the need to create a culture of care and trust for all students to feel comfortable participating in such practices. They also, using Moran’s classroom practice, designed an outline for mathematizing community circles, that begins with personal check in’s and progresses to full mathematical discourse within the circle.

An important note is that while the literature on restorative mathematics is extremely limited, the fight for a mathematics that resists racism and oppression, and instead affirms and inspires Students of Color is not new. The scholars cited at the beginning of this paper and many more have laid the groundwork for the “socio-political turn in mathematics” (Gutiérrez, 2013) that provided the language to name racism and cultural marginalization in math instruction and to imagine a better future for today’s youth. Viewing instruction through the lens of restorative justice provides a framework from which to envision and then create the classrooms that many of
us have only dreamed of but have not experienced. This theoretical paper contributes to the literature that is still primarily in the stage of envisioning a restorative math classroom, with the aims of foregrounding future works that will provide robust examples of practices that embody both restorative justice and humanizing mathematics instruction.

**Theoretical Framework**

This study is framed by two concepts that foreground relational engagement, Restorative Justice in Education (RJE) and Cognitively Guided Instruction in Mathematics (CGI). RJE is an approach to shaping school climate, while CGI is focused on mathematics instruction. In what follows, I describe the theoretical framework for RJE and a set of principles that stand-in for a theoretical model for CGI. Then, I describe the connections between the two, which suggests that with intentionality, they may be able to be implemented together.

**Restorative Justice in Education Framework (RJE)**

In honoring the decades of school-based restorative justice initiatives led by practitioners and recognizing the significance of theory in sustaining and expanding educational practice, Evans & Vaandering (2016) proposed the RJE framework to deepen the theoretical foundation for restorative justice in schools. RJE is described as “the way we do things,” meaning that it cannot be an isolated event, practice, or even program, but that restorative justice must become a part of everything that takes place in a school. The following bullet points outline the model Evans & Vaandering (2016) use to depict the framework:

- Rooted in the values of:
  - Dignity
  - Respect
  - Mutual concern
- Centering the notion that all “People are worthy and relational,” the interconnected components call educators to:
  - Nurture healthy relationships
  - Repair harm and transform conflict
  - Create just and equitable learning environments (Vaandering & Evans, 2016, p. 5)

The on-the-ground practice of restorative justice in schools is complex and multi-faceted, yet the RJE framework is profound in its simplicity. All structures built into effective restorative justice programming, from community building activities with students to on-going anti-racist/anti-bias training for school personnel, create conditions wherein all students are treated with dignity and respect. The focus on the worthiness of students to be in schools that foster healthy relationships and to have harm repaired and transformed brings attention to the fact that just and equitable learning environments must also foster students’ social-emotional well-being.

**Cognitively Guided Instruction in Mathematics (CGI)**

Cognitively Guided Instruction in Mathematics (CGI) is an approach to teaching early childhood through upper elementary mathematics that positions children’s thinking as the basis for instructional decisions. Decades of research on children’s mathematical thinking has proven that all children come to class with some informal mathematical knowledge, and are capable of devising solutions to math problems *without* direct instruction when they are given the opportunity to make sense of the context (Carpenter et al., 2015).
Armed with an understanding of children’s thinking, teachers who apply the CGI approach in their classrooms acknowledge and honor that learning is a relational and generative experience that results in understanding. Learning with understanding is defined by Carpenter et al. (2015) as having four interconnected themes:

1. Knowledge is connected;
2. Knowledge is generative;
3. Students describe, explain, and justify their mathematical thinking;
4. Students identify themselves as mathematical thinkers who see that mathematics should make sense and that they have the power to make sense of it (p.185).

Through designing experiences that prompt students to describe, explain and justify their and their peers’ mathematical thinking, CGI teachers take an active role in supporting students to develop strong identities as doers of mathematics (Carpenter et al., 2015; Empson & Levi, 2011; Stuart McQueen & Lee, 2022).

The following CGI Principled Ideas were curated for teachers by the UCLA Math Project from their study of *Children’s Mathematical Thinking: Cognitively Guided Instruction* (Carpenter et al., 2015):

- Every student comes to math class knowing some mathematics.
- Every student is capable of extending their mathematical ideas.
- Knowing the trajectory of children’s thinking helps [teachers] know how to support that extension. “What am I working toward?”
- Details of children’s thinking support instructional decision making.
- We must challenge our assumptions about what students know and are able to do.
- We must create space for the participation of each and honor the different ways in which students are participating.
- Identity shapes participation, so we want to position students competently.

CGI researchers and practitioners explicitly work toward advancing equity in mathematics instruction by proving that virtually all children across demographics in the US and abroad can learn with understanding (Carpenter et al., 2015; Empson & Levi, 2011). While the approach is profoundly student-centered, it also honors the complexity and professional nature of the role teachers play in students learning with understanding. For these reasons, alongside its decades-long practiced-based research foundation, CGI has been identified for this paper as a theoretical and practical match for restorative justice in advancing a restorative math pedagogy.

**Bringing the Two Approaches Together**

The impetus for this theoretical study was the recognition that both restorative justice and CGI are relational and humanizing approaches at their core. Practices from both approaches emanate from the recognition of the need for all people to feel valued, and to grow in connection to those around them. Below, I briefly discuss connections between CGI and restorative justice, by describing the CGI Principled Ideas in relation to the interconnected components of RJE (as visualized in Figure 1: Interconnected Components). The connections also highlight the practicality of integrating the restorative principles into math instruction, thereby allowing educators to practice both rigorous math instruction and restorative justice simultaneously.
People are Worthy and Relational. When educators invest in the notion that every student is capable of extending their mathematical ideas, they are far more likely to treat all children as worthy of and having the right to be engaged mathematically. Furthermore, when educators believe that every student comes to math class knowing some mathematics, they are acknowledging that children learn mathematics through the relationships and experiences in their lives outside of the classroom. This is more likely to prompt teachers to design relational experiences within the classroom for students to share and extend their mathematical knowledge with one another.

Nurture Healthy Relationships. Creating space for the participation of each and honoring the different ways in which students are participating both fosters and requires the nurturing of healthy relationships. Teachers must consciously craft tasks that draw on student knowledge in order for students to actively participate; in addition, teachers develop and model social norms wherein students honor one another’s unique contributions. These conditions also lend to positioning students competently, such that they are developing a strong mathematical identity within themselves and in relationship with their classmates.

Repair Harm and Transform Conflict. While it was not immediately apparent how CGI seeks to repair harm and transform conflict, in forthcoming work, I am developing an
analysis anchored by the hallmark practices of RJ and CGI, which demonstrates potential for harm reparation (Stuart McQueen & Lee, 2022).

**Create Just and Equitable Learning Environments.** Content knowledge is essential to successfully teaching mathematics to children, but equally important is knowing how children think about mathematics. The CGI approach supports teachers to be attuned to the trajectory of children’s thinking and mathematical strategies and help them know how to support students in extending their own ideas. Coupled with this attunement, CGI teachers gather the details of student thinking to support their upcoming instructional decisions. Gaining access to the details of student thinking requires teachers to encourage and support students to explain and justify their thinking, which is aligned with multiple math scholar’s definition of equitable instructional practices (Aguirre et al., 2013; Bieda & Staples, 2020). Finally, CGI teachers further their reach of justice when they challenge assumptions about what students know and are able to do, and continue to build upon the knowledge, experiences and skills that they bring to the classroom.

An important observation with regard to equity and justice is that neither the RJE nor CGI frameworks explicitly name anti-racism as an essential component of their work. However, restorative justice in practice and in scholarship has been quite explicit about addressing systemic and interpersonal racism. While CGI has taken a firm stance toward equity, very little CGI scholarship is aimed at addressing race, racism and bias and a head-on manner, but I believe that integrating a restorative ethos into CGI practice will propel it forward into anti-racist practice.

**Conclusion**

The current moment in our society has given broad attention to what many scholars, practitioners, activists, and students have been arguing for generations: schools in the US are riddled with inequities and most instruction reinforces racism. Math instruction has often escaped scrutiny because of its perceived political neutrality, yet it has also become clear that math education as a whole is culturally marginalizing, serves as a gatekeeper to upward mobility, and is used to reinforce deficit thinking of Students of Color. The Covid-19 pandemic has given critical scholars new energy for school transformation that does not harken back to any point in the past, but re-imagines entirely what school could look like for Students of Color, particularly Black, Latinx and Indigenous youth. While the theoretical overlay between RJE and CGI falls short of the “hard reset” called for by Gloria Ladson-Billings (2021), it does bring together two efforts towards making school as a whole and mathematics in particular more humanizing and relational. Importantly, these efforts – RJE and CGI - are happening individually right now and research demonstrates their positive impact on Students of Color, including but not limited to improved outcomes including academics, school engagement and sense of safety and belonging. Reimagining what school might look like beyond the borders of our current understanding should include removing boundaries between our current practices that we know are good for students – applying a restorative justice lens to mathematics instruction can serve as a place to start.
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