



A FRAMEWORK TOWARD CRITICAL LITERACY IN MATHEMATICS INSTRUCTION

Created by:
Great Lakes Equity Center

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About Great Lakes Equity Center

Great Lakes Equity Center is one of ten regional Equity Assistance Centers funded by the U.S. Department of Education under Title IV of the 1964 Civil Rights Act. The Center serves the public educational agencies in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin by providing a wide range of technical assistance supports.

The mission of the Center is, to ensure equity in student access to and participation in high quality, research-based education by expanding states' and school systems' capacity to provide robust, effective opportunities to learn for all students, regardless of and responsive to race, sex, and national origin, and to reduce disparities in educational outcomes among and between groups.



About This Tool

This tool is designed to support educators in reflecting on their mathematics instructional practices and ways of being to move towards a more critically conscious stance. The tool offers four key domains of awareness and reflection prompts to support educators in cultivating Critical Mathematics Literacy (CML) themselves, and to support their students' development of CML. The focus of the tool is on the educator as a critical practitioner and is intended to be used as a self-reflection guide.



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Historical Contexts of Mathematics Teaching and Learning

Critical Math Literacy includes possessing an awareness and understanding of the historical contexts that have shaped mathematics education in the United States (Frankenstein, 1990). More specifically, understanding and exploring how ways of being and doing in mathematics teaching and learning is rooted in dominant ideologies that privilege some and marginalize others—leading to inequitable access, participation, and outcomes in mathematics (Frankenstein, 1990). Being aware of the fact that we are all reared into those ways of being and doing, and that it takes intentional effort to disrupt, resist, and redress the inequities that stem from those contexts (Frankenstein, 1990).

Reflection Prompts

What do I value in and as mathematics instruction; why?

Why is mathematics important for students to learn; whose interests are being served?

How does what I value in and as mathematics instruction reflect stereotypes and ideologies that marginalize students and groups of students?

How does my own positionality as an educator influence the way I interpret students and their contributions in mathematics instruction?

How do I define mathematical competency and why?

What barriers are in place that limit students' access to and participation in rigorous, deep mathematics instruction, particularly those students from groups that have been historically marginalized and excluded?

To what extent do I believe that all students can be successful in mathematics? To what end, and to whose benefit?

Who does mathematics education serve and who is not being served; why?

What are some of the stereotypes and assumptions that emerge in my schools and classroom about who can and cannot do mathematics?

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Mathematics Identity and Agency

Critical Math Literacy includes cultivating positive and resisting negative mathematics identity formation. Math identities include how teachers and students see themselves as being able to perform and use mathematics (Aguirre, Mayfield-Ingram & Martin, 2013). Mathematics identities are connected to, shape and are shaped by other identities such as race, ethnicity, gender, religion, family cultural practices etc. (Aguirre, Mayfield-Ingram & Martin, 2013). How mathematics competencies and proficiency are defined influence students' and teachers' sense of math identity as either competent doers of math, or as people who can not do math (Aguirre, Mayfield-Ingram & Martin, 2013). Mathematics identities inform students' sense of efficacy and agency in performing and using mathematics toward social justice and self-determination (Aguirre, Mayfield-Ingram & Martin, 2013).

Reflection Prompts

What is my mathematical identity as an educator? Is it positive or negative?

How do I nurture positive and resist negative math identities for students in my mathematics instructional practices, e.g., modeling?

To what extent do I make mathematics instruction relevant to my students' multiple identities, lived experiences, and cultural practices?

In what ways, if at all, do I encourage and cultivate my students' sense of agency to use mathematics as a tool to understand and shape their worlds, i.e., not just facts?

Who do I consider to be math "doers" and who do I consider to be unable to engage as deep mathematics learners; why?

How do students in my classroom demonstrate positive mathematics identities and agency?

In what ways do my students' math identities appear to influence their sense of efficacy and competency in mathematics?

How do I develop deep understandings of my students' multiple identities so that I can both support and sustain them via mathematics instruction?

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Critical Reflection on Mathematics Instruction

Critical Math Literacy includes moving beyond understanding mathematics as an individual cognitive act and toward an understanding of the cultural nature of teaching and learning. Examining the extent to which mathematics instruction reflects the worldviews and identities of your students. Reviewing instructional practices to disrupt issues of power and privilege such that every student can access, participate in, and experience success in mathematics instruction. And design experiences to honor children's experiences, intuition, and cultural ways of knowing—inclusive of multiple mathematics knowledge bases (Turner et al., 2012).

Reflection Prompts

To what extent does my mathematics instruction include the perspectives and lived experiences of my students?

How do I balance individual, small, and large group activities in mathematics instruction?

In what ways do I incorporate manipulatives and multiple representations of mathematics concepts in my instruction?

What strategies do I use to surface the lived experiences and multiple ways of knowing of my students?

To what extent do my students see examples of people who look like them and come from similar contexts as them in mathematics instruction?

In what ways do I incorporate non-traditional examples of mathematics applications in scenarios and contexts that reflect my students' identities and experiences?

How do I encourage students to use mathematics as a tool to disrupt issues of power and privilege in their communities?

To what extent to my own beliefs and attitudes about who is good at math limit how students engage in mathematics instruction?

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Critical Mathematics Practices

Critical Math Literacy (CML) includes engaging in practices that are designed to redress power imbalances, and historical legacies of marginalization that exclude students and groups of students from rigorous mathematics instruction. CML practices also ensure that every student has access to and engages with rigorous mathematics ideas that balances conceptual understanding, procedural skill, and reasoning skill (Aguirre & del Rosario Zavala, 2013). Moreover, CML practices support students in using mathematics as a tool to question, critique, and change their world and contexts (Aguirre & del Rosario Zavala, 2013).

Reflection Prompts

Do I hold high expectations for every student in mathematics instruction?

To what extent do I approach mathematics instruction as a communal, social activity versus an individual, cognitive activity?

In what ways do I challenge and disrupt legacies of marginalization through and in my mathematics instructional practices; who has access and who does not?

How does my lesson enable students to closely explore and analyze math concept (s), procedure(s), and reasoning strategies? (Aguirre & del Rosario Zavala, 2013)

How does my lesson create opportunities to discuss mathematics in meaningful and rigorous ways? (Aguirre & del Rosario Zavala, 2013)

How does my lesson make student thinking/understanding visible and deep? (Aguirre & del Rosario Zavala, 2013)

How does my lesson distribute math knowledge authority, value student math contributions, and address status differences among students? (Aguirre & del Rosario Zavala, 2013)

How does my lesson provide academic language support for English Language Learners? (Aguirre & del Rosario Zavala, 2013)

How does my lesson help students connect mathematics with relevant/authentic situations in their lives? (Aguirre & del Rosario Zavala, 2013)

How does my lesson support students' use of mathematics to understand, critique, and change an important equity or social justice issue in their lives? (Aguirre & del Rosario Zavala, 2013)



References

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