UNIVERSITY of VIRGINIA | SCHOOL of EDUCATION and HUMAN DEVELOPMENT

Seeking Racial Equity and Social Justice in Mathematics Teaching and Learning

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MONACAN INDIAN NATION

Economics, Technological & National Security

- *A Nation at Risk* (Gardner, Larsen, & Baker, 1983)
- *Before It's Too Late* (National Commission on Mathematics and Science Teaching for the 21st Century, 2000)
- *Foundations for Success: The Final Report of the National Mathematics Advisory Panel* (National Mathematics Advisory Panel, 2008)
- *Rising above the gathering storm: Energizing and employing America for a brighter economic future* (Augustine, 2005)

Goals

Through a hybrid policy analysis using a critical race theory (CRT) lens informed largely by the work of Derrick Bell, this talk makes the case that policies and reforms in mathematics education were not designed to address the needs of historically excluded learners; rather these policies and reforms are often designed and enacted to protect the economic, technological, and social interests of those in power.

Goals

This talk is organized into four sections:

1. The Social Conditions of Historically Excluded Learners
2. Theoretical Framework: Critical Race Theory
3. Historical Perspectives and Unpacking Policies and Reforms; and
4. Discussion and Conclusion.

Social Conditions of Historically Excluded Learners

When I use the term historically excluded learners, I am not ascribing a sweeping set of attributes to Black, Latinx, Indigenous, and poor peoples. I understand that collapsing these groups into one group does not acknowledge the intersectionality within these collectives.

Social Conditions of Historically Excluded Learners

When we consider a historical perspective of public education and policies, we see that there were intentional policies designed to keep historically excluded people uneducated and/or undereducated.

Social Conditions of Marginalized Learners

- The projected population from historically excluded groups is expected to be more than half of the U.S. population by 2043.
- More than half of the children in the U.S. are part of a historically excluded group.
- Historically excluded groups collectively make up only 13% of the STEM workforce and only 16% of all STEM undergraduate degrees awarded.
- The number historically excluded individuals earning science and engineering bachelor's and master's degrees has been rising since 1993, but the number of doctorates earned in these fields has flattened at about 7% since 2002.
- Historically excluded students are equally prepared for Advanced Placement coursework, they are still less likely to experience these courses (College Board, 2018).
- Bressoud (2021) contends that because U.S. schools are funded locally, there is tremendous variation in calculus instruction availability in high school, with the most privileged students having the greatest access.

Social Conditions of Historically Excluded Learners

Research, policies, and reforms must consider historically excluded learners' positionality and the many conditions and contexts in which historically excluded students exist.

Schools are social institutions set up by those in power and are organized to support and value the types of cultural and social capital held by those in power (Bourdieu & Passeron, 1990).

Social Conditions of Historically Excluded Learners

Adding it Up (National Research Council, 2001)
"…research has shown that children from lower socioeconomic backgrounds have particular difficulty understanding the relative magnitudes of single- digit whole numbers and solving addition and subtraction problems verbally rather than using objects…This immaturity of their mathematical development may account for the problems poor and minority children have understanding the basis for simple arithmetic and solving simple word problems." (p. 178)

Social Conditions of Historically Excluded Learners

While the disproportionality and conditions of historically excluded learners is a cause for concern, it is important to understand that addressing the needs of these learners may not have been the primary goal of policies and reforms in mathematics education.

Critical Race Theory

Derrick Bell, a former attorney with the NAACP during the Civil Rights Era, employed his interest-convergence principle to explain how the United States Supreme Court issued the landmark ruling in *Brown v Board of Education of Topeka, Kansas* (*Brown I*) in 1954.

Critical Race Theory

Interest-convergence is an analytical viewpoint for examining how policies and reforms are dictated by those in power to advance their political, social, and economic interests (Donnor, 2005).

Critical Race Theory

In STEM education, the binary is often framed as a negotiation for providing broader access to historically excluded learners in exchange for access to a structure leading to upward mobility.

An example of the binary in STEM is the discourse of increased participation of historically excluded learners in STEM careers leading to high paying job with little focus on whether the climate in the STEM workforce is ready for the increased diversity.

Critical Race Theory

***Educate to Innovate* campaign:**

- "Whether it's improving our health or harnessing clean energy, protecting our security or succeeding in the global economy, our future depends on reaffirming America's role as the world's engine of scientific discovery and technological innovation. And that leadership tomorrow depends on how we educate our students today, especially in math, science, technology, and engineering." (Obama, 2009).

Critical Race Theory

”…status of African American, Latino, Native American, and poor students has not been a primary determinant driving mathematics education reform. When discussions do focus on increasing participation among these students, it is usually in reference to workforce and national economic concerns” (Martin, 2003; p. 11).

Critical Race Theory

Elementary and Secondary Education Act (ESEA) of 1965 and its reauthorizations in 1994, 2001 and 2015.

- *Every Student Succeeds Act* has a purpose statement, "To provide all children significant opportunity to receive a fair, equitable, and high-quality education, and to close educational achievement gaps" (ESSA, 2015, Sec. 1001).

Historical Perspectives and Unpacking Policies and Reforms

- A common theme among policy and reform documents is a call for increased participation of historically excluded learners in mathematics, science, technology, and engineering fields.
- These call usually reference increased and new demands to the U.S. economy, the drive to stay ahead technologically of international competitors, and a need to secure the U.S. from international security threats.
- Rarely, are there references focused on the needs of marginalized people and communities.

Historical Perspectives and Unpacking Policies and Reforms

***Foundations for success: The final report of the National Mathematics Advisory Panel* (NMAP, 2008), we see examples of racial commodification:**

- "Moreover, there are large, persistent disparities in mathematics achievement related to race and income—disparities that are not only devastating for individuals and families but also project poorly for the nation's future, given the youthfulness and high growth rates of the largest minority population" (p. 4-5).

Historical Perspectives and Unpacking Policies and Reforms

***Innovation America: Building a Science, Technology, Engineering and Math Agenda* (National Governors Association, 2007) describe the simultaneous commodification and blaming by stating:**

- Projected demographic shifts have the potential to magnify the U.S. problem if STEM achievement gaps are not rectified. As the U.S. domestic college population stabilizes at about 30 million students from 2010 to 2025, population groups currently underrepresented in STEM fields will attend college in growing numbers. If the achievement gap persists, increasing numbers of students will be unprepared to succeed in college and in STEM degree attainment (p. 6).

Historical Perspectives and Unpacking Policies and Reforms

"…situated many learners in an a priori deficit position relative to disembodied mathematical knowledge—meaning learning mathematics was taken to be harder for certain groups of students due to their backgrounds and/or innate abilities—and failed to acknowledge the importance of mathematics for all students" (Ellis & Berry, 2010; pp. 10-11).

Historical Perspectives and Unpacking Policies and Reforms

As one of the most militarized countries in the world, we cannot overlook the fact that military motivation for improved mathematics and science education is part of the the discourse of policy documents and reforms today

Historical Perspectives and Unpacking Policies and Reforms

- Within the interest-convergence framework, “new math” era was characterized “benign neglect” (Tate, 2000; p. 201) for Black students because their needs and interest were largely ignored.
- This does not imply that these learners did not have access to quality teaching in segregated schools, in fact, there is a body of research that suggest that many teachers in segregated schools “made do” with substandard materials and provided high quality teaching (Foster, 1997; Siddle-Walker, 2000; Snipes & Waters, 2005; Standish, 2006).
- Rather, the “new math” reforms focused on identifying the best and brightest while ignoring Black learners.

Historical Perspectives and Unpacking Policies and Reforms

***Nation at Risk: The Imperative for Educational Reform* (1983)**

- "If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war" (p. 1).

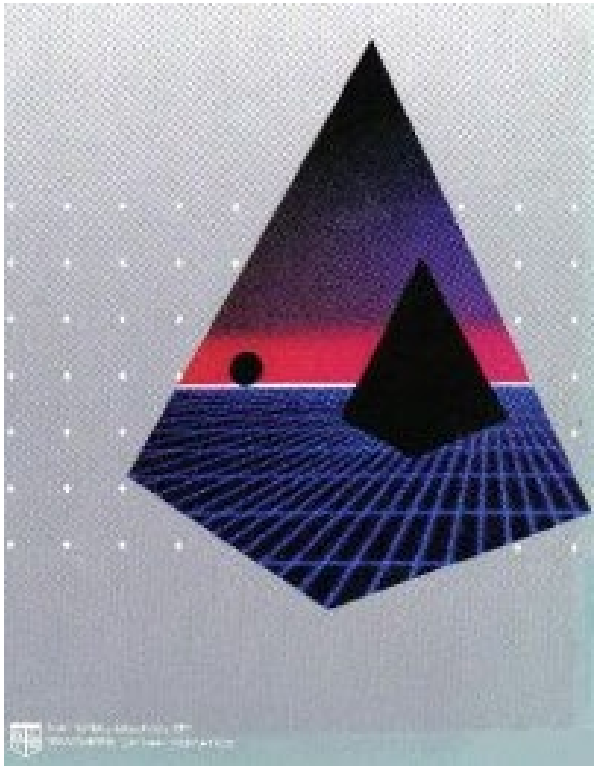
Historical Perspectives and Unpacking Policies and Reforms

- The tensions of the “Math Wars” appear to have an underlying narrative focusing on the nation’s technological interests, social efficiency, and perpetuation of privilege.
- There are intense debates focusing on curriculum, teaching, and assessment but little debate focusing on understanding the realities of children’s lives.
- For historically excluded learners, issues of race, racism, identity, and conditions were not under consideration in the “Math Wars.”

Curriculum and Evaluation Standards for School Mathematics

NCTM argued that schools were not meeting the economic needs of the time and called for new social goals for education (1989). The four social goals for education were:

1. mathematically literate workers,
2. lifelong learning,
3. opportunity for all, and
4. an informed electorate.



CSSM: Opportunity for All

“The social injustices of past schooling practices can no longer be tolerated. Current statistics indicate that those who study advanced mathematics are most often white males. Women and most minorities study less mathematics and are seriously underrepresented in careers using science and technology. Creating a just society in which women and various ethnic groups enjoy equal opportunities and equitable treatment is no longer an issue. Mathematics has become a critical filter for employment and full participation in our society. We cannot afford to have the majority of our population mathematically illiterate. Equity has become an economic necessity.” (p.4)

Historical Perspectives and Unpacking Policies and Reforms

- …the Equity Principle of the *Standards* contains no explicit or particular references to African American, Latino, Native American, and poor students or the conditions they face in their lives outside of school, including the inequitable arrangements of mathematical opportunities in these out of school contexts. I would argue that blanket statements about *all* students signals an uneasiness or unwillingness to grapple with the complexities and particularities of race, minority/marginalized status, differential treatment, underachievement in deference to the assumption that teaching, curriculum, learning, and assessment are all that matter (Martin 2003; p. 10).

Discussion & Conclusion

The review of policies and reforms suggests that economic, technological, and security interests were the drivers of many policies and reforms. These policies and reforms situated mathematics education in a nationalistic position of being colorblind, situating it in a context where race, racism, conditions, and contexts do not matter.

When race, conditions, and contexts are not examined, schools and communities are positioned as neutral sites rather than cultural and political sites. Despite the evidence that racism and marginalization exist in schools and communities, many still adhere to the belief that colorblind policies and pedagogical practices will best serve all students.

Discussion & Conclusion

To have any meaningful policy gains, we must decentralize whiteness when discussing policies and reforms. There is plenty of evidence suggesting that whiteness is at the center of many educational policies and reforms.

By decentralizing whiteness, we disrupt power and the privilege of whiteness. Decentralizing whiteness opens the space and broadens opportunities to consider the roles that histories, contexts, and experiences play in developing reforms and policies.

Discussion & Conclusion

Activities similar to the Black Lives Matter (BLM) Movement will demand that the perspectives and worldviews of historically excluded peoples will be given consideration. BLM is a grassroots effort that is unapologetic in its rhetoric and challenges structural racism, anti-blackness, and institutionalized violence in school reform, policy, and research.

Catalyzing Change

- Broadening the purpose of learning mathematics
- Creating equitable structures in mathematics
- Implementing equitable mathematics instruction
- Develop deep mathematical understanding

Discussion & Conclusion

Mathematics education is part of a complex system of policies, traditions, and societal expectations.

This system and its structures-school district policies, practices, and conditions that either support or impede student learning of mathematics—the latter must be critically examined.

Questions, Comments, & Thoughts