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## For Better or Worse? Examining the California Math Wars and its Lasting Impacts

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### **Abstract**

In the last thirty years, mathematics standards have undergone frequent changes due to two conflicting perspectives: reformists and traditionalists. The purpose of this study is to assess any lasting impacts of the 1997 California Math Standards. I interviewed three faculty in three categories about diversity, curriculum, and stakeholder perspective. Presented here are findings and common themes that emerged from the analysis of interviews. Results showed that a lasting impact of the Math Wars was the 2010 Common Core Standards, written in a way to favor the reform movement of the 1990s. A professional development perspective as an approach is utilized.

Keywords: California Math Wars, Common Core State Standards, curriculum, diversity, professional development

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## Introduction

In the 1997 Mathematics Content Standards for California Public Schools, the Kindergarten standard under Measurement and Geometry 1.4 states "Identify the time (to the nearest hour) of everyday events (e.g., lunchtime is 12 o'clock; bedtime is 8 o'clock at night)" (California State Board, 1999, p. 11). This standard uses specific language that fails to take into account the cultural relevance that students carry into the classroom. For example, students with parents who have multiple jobs may not go to bed at 8 o'clock, and therefore, might not understand the cultural relevance around this time. There is a need for a specific, in-depth analysis of the California Math Wars of the 1990s in order to document its lasting impacts on mathematics education in light of the addition of the 2010 Common Core State Standards (CCSS). There is a concern about the lack of diversity. Because of this, there must be more time spent at the intersection of cultural relevance and math education due to the impact both hold in the classroom.

## Significance

Previous research has shown that students who are disproportionately affected by how a curriculum is written results in the exclusion of certain communities of color. As Alan Schoenfeld (2004) explains, "knowledge of any type, but specifically mathematical knowledge, is a powerful vehicle for social access and mobility. Hence, the lack of access to mathematics is a barrier—a barrier that leaves people socially and economically disenfranchised" (Schoenfeld, 2014, p. 255). As we can see in the Math Wars launched in the 1990s, the two factions formed, the reformists and the anti-reformists, took different sides to approach their arguments. The reformists argued that math was not accessible for communities of color and low socioeconomic status because the curriculum and standards were written in a way that did not allow them to succeed. The traditionalists, or anti-reformists, however, claimed that the math standards were working well for students (and believed that the test scores proved that), which is why they believed that change was not necessary.

## BACKGROUND

When the National Council of Teachers of Mathematics (NCTM) implemented a reform-based curriculum in 1989, it initiated a new discourse of mathematics standards, curriculum, and the methods in which they should be taught to students, and, most of all, the

California Math Wars.

This discourse divided parents, teachers, policymakers, and administrators. Davis et al. (2015) argue that mathematics in the 1980s and 1990s concentrated on standards which "focused on problem solving, based in "real life," and utilized emergent technologies and manipulatives; practical and applied, but still aimed at comprehension (over calculation)" (Davis et al., 2015, p. 55). People who believed this to be true were given the name reformists.

In 1997, after much debate, traditionalists, who believed that standards should be based on drill-and-practice methods, influenced the standards commission in California that their methods were more equitable and trustworthy than those of the reformists. However, many reformists believed that the standards needed to be changed to be inclusive of marginalized communities. According to Schoenfeld (2004), reformists believed the 1997 standards contributed to how students of color were disproportionately affected by the method that mathematics was being taught; therefore, only certain groups of students benefited. Others (anti-reformists or traditionalists), represented primarily by parents, professors, and policymakers, believed that the standards students learned were acceptable because these were how they learned mathematics in school; therefore, change in the curriculum was unnecessary (Schoenfeld 2004). Nevertheless, this argument ignores the fact that the 1997 standards excluded certain groups of students and failed to address diverse learners.

Because of the disagreements in standards, in 2010, two groups, the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO), were brought together to create standards that would bridge the gap between the traditionalists and reformists. Together, they wrote the Common Core State Standards Initiative. The aims of the Common Core State Standards claim to be more inclusive by changing the language in which the standards were written and "provide clarity and specificity rather than broad general statements... not only stressing conceptual understanding of key ideas, but also by continually returning to organizing principles" (NGA Center et al., 2010). Although the 2010 standards are preferable to those from 1997, they do not completely eradicate the lack of diversity and its learners. Again, it is fair to assess the Math Wars to investigate if there are lasting impacts that affect the 2010 Common Core Standards (CCSS) and whether the CCSS alleviate (or

add to) any consequences of the Math Wars.

## METHODS

### Participants

Initially, the research was supposed to include five participants; however, due to COVID-19, the final sample included three case studies. Due to the consent forms originally signed to protect their identities, pseudonyms were given to each participant. The participants were site supervisor coordinators and/or professors. Site supervisors have experience within academia and the educational field to support and guide pre-service and in-service teachers in lesson planning, classroom management, etc. As they are a part of both academia and field experience, they can participate in two different discourses.

Participants were chosen based on the criteria that they have at least one decade of experience in the field. Two of these participants (Diana and Lisa) were credentialed teachers and taught in public schools for over ten years, both in California and New York. The other participant (Dave) coordinates national professional development programs. The participants were mostly of European descent. All participants were adults over the age of eighteen.

I interviewed site supervisors to examine the details of discourse affecting a Pacific coastal city. All interviews completed were done either in-person or through email conversation. Participants were interviewed in an office setting while being audio recorded for research purposes. Participants were interviewed once, lasting from twenty-five to sixty minutes. One interview was conducted through email. Additional emailing was done to receive follow-up information on the participant's original answers.

### Overview

Each participant was asked eight interview questions prompted by the interviewer. Using Spradley's (1979) ethnographic interview process, I built a rapport with my interviewees by initially asking what they did for the Teacher Education program at UC Santa Barbara and how they became interested in teaching.

For the interview protocol, I used three categories of analysis: the perspective of stakeholders, curriculum, and diversity. In the "perspective of stakeholders" category, the aim was to seek information on how teachers, policymakers, parents, and educators perceive the California Math Wars and its impact on curriculum and diversity in California. Next, I used the "curriculum" category to

understand the change in curriculum and how it has adapted to the new 2010 Common Core State Standards. Lastly, the "diversity" category was used to show the intersection between diversity and culture, particularly how it is portrayed in standards and curricula and how this intersection affects students of all backgrounds.

## RESULTS

### Category One: Perspective of Stakeholders

Three elements influenced the comparison of perspectives: professional development, parents, and media portrayal. My interviewee, Lisa, stated that "professional development is important in mathematics education because teachers initially lack the professional knowledge to teach mathematics." Generally, in teacher education programs, student teachers are not given the resources to understand mathematics as a mathematician would. Professional development closes this gap and gives teachers the skills and tools necessary to teach reform-adjacent methods for mathematics, which will help mathematics become more equitable to additional students. According to my interviewee, Dave, "What you find is teachers are enthusiastic about the Common Core" when they are given access to professional development programs. More importantly, in order to successfully teach students mathematics, the teacher must understand where the students are developmentally in mathematics. Not all students are at the same level of mathematics when they reach a classroom, so in order to be successful, there must be an understanding of each individual students' ability to do mathematics.

All three participants mentioned that parent perception is important in understanding the disconnect between them, their students, and teachers. According to the standard mentioned in the introduction (Measurement and Geometry 1.4), if students are told by their teachers that bedtime is 8 o'clock, but their bedtime, in reality, is later than that, the student may not know who to believe, and they have to choose between their teacher or their parent. In general, parents are worried and concerned about their children and want their children to succeed in school. When a parent feels powerless in helping their child with a homework problem, they become upset, especially in reform-based classrooms, because it was not how they experienced it when they were in school. However, to bridge this gap, teachers must involve parents in the learning processes with their children. For example, Diana discussed how doing Family Math Nights at her school was a helpful way in which

parents can get involved in their child's education while also making meaningful relationships with their child's teacher.

Lastly, the media's portrayal of the California Math Wars played a large part in how people perceived both traditionalist and reform-based methods on mathematics education and has exacerbated the Math Wars' impact on the public (Becker and Jacob, 1998). By reporting that there was a controversy between the two camps, and not explaining why there was controversy, the media created an influx of misinformation to the public, making it more difficult for people to make informed decisions about what was happening. Diana claimed that there was a "public relations concern" because the education community did not do a proper job of communicating what was happening in the 1990s. Because there was no reliable source for people, it led to many supporting the traditionalist camp to stop reform-based methods in mathematics curricula. Media portrayal is so heavily influenced that it can, for example, persuade how principals feel about reform-based methods. Dave told of an experience they had with a principal:

I asked some third-grade teachers, with the principal's, their principal's in the audience. And I said, "the tests are coming up, what's the hardest problem these third grade teachers, their kids gonna have on the test?" And they said something like, "This, they'll never get this right. If they are asked 350-199, they will get that wrong for sure." And I said, "But this is really 356-200, isn't it? Because you move this by one, and I said, "will your kids have any trouble with that?" And they say, "Oh, everybody gets that right, that's too easy." So I said, "Well, would you talk about this, because actually this is a detractor problem you find on standardized tests....I shared this and one of the principals rose to his feet and he screamed "I will not allow that in my school." And I said, "why?" He said, "Because you're encouraging the children to cheat. That's cheating." And it was an incredibly tense situation, it was not resolved.

This interaction is proof that even though the mathematics done in the aforementioned quotation is correct, people believe that reform-based mathematics is trickery and cheat the system, even if there is research to prove that this is not the case.

### **Category Two: Curriculum**

Two participants, Diana and Lisa, mentioned that mathematics, as a science, is supposed to be impartial; nonetheless, it is taught partially. However, a teacher feels about math is the way they will portray it to their students, no matter what curriculum is used. If teachers had a positive experience in math in grade school, whether it

was a traditional or reform-based curriculum, they are more likely to give their students that feeling as well; however, if it is the opposite, students may have a difficult time learning mathematics. This is important in understanding why professional development programs for teachers should be mandatory.

According to the traditionalist camp, context applied to content dumbed concepts down for students. However, according to my interviewees, the role of context in the curriculum is essential for all students, especially low-income minority students, to succeed in school. Eric Gutstein (2006) argues how using a pedagogy with social justice concepts helps students to understand not only mathematics but also real-life situations.

Understanding the curriculum and its role in the Math Wars is crucial. The reform-based curriculum relies on problem-solving techniques as a necessity. Lisa stated that "the way it is taught in traditional classrooms, rote memorization of procedures, does nothing to help students really understand." Research has shown that test scores improve when a problem-solving-based curriculum is used versus a drill-and-practice-based curriculum (Jacob, 2001). The NCTM (1989) standards were preferred, not only because they were reform-based, but because they used problem-solving as the core of their philosophy. Certain states, like New York, preferred the NCTM (1989) standards over California's back-to-basics (traditionally based) curriculum, which was being used around the same time.

### **Category Three: Diversity**

According to Diana, money and resource allocation plays a large role in which students are given a better education. Students that go to schools with less funding and resources (attended by students mainly who are underrepresented and of low socioeconomic status) are at a disadvantage compared to students that go to a school with more funding and resources.

Referencing back to the 1997 Kindergarten standard under Measurement and Geometry 1.4 (see introduction), there was a general consensus amongst my interviewees that this standard was developmentally inappropriate for students regarding age and grade. The reason this standard was included was based on the need to assess standards. To prove that the standard was "achievable," policymakers needed to create a standard that would create a bell curve, meaning that they knew some students would not be able to reach this benchmark at this age, which says a lot about assumptions between students and culture. If standards only represent one group of students, many underrepresented students



are left behind to fail, leaving the question of “why aren’t all standards equitable for all students?”

## DISCUSSION

The results of this research show that parent perception is important to students’ mathematical learning. For a productive learning climate, there must be outreach (i.e., Family Math Nights) where parents are introduced to what their children are learning in the classroom.

In addition, the reform movement of the 1990s resembles the 2010 Common Core State Standards; however, the CCSS has decades of research completed about its effectiveness, compared to the reform movement that had previously failed.

Research has shown that social justice is one pedagogy teachers can use to address inequities in curriculum and standards. According to Marilyn Cochran-Smith (2004), there are six principles of social justice that attempt to eradicate inequities embedded in standards and curriculum. Three of these principles are explicitly essential: Principle Two, Principle Four, and Principle Six. Principle Two (Build on What Students Bring to School with Them--Knowledge and Interests) argues how all students (no matter what their backgrounds or demographics are) have cultural knowledge and it is important that students can use that knowledge in classroom discussions (Cochran-Smith, 2004, p. 69). Principle Four (Work With (Not Against) Individuals, Families, and Communities) discusses why students’ families must be incorporated into classroom discussions. Student teachers must be mindful of how they portray ideas to their students because teachers can have underlying biases on certain topics and must learn how to teach students impartially (Cochran-Smith, 2004, p. 72-73). Principle Six (Make Inequity, Power, and Activism Explicit Parts of the Curriculum) explains the importance of why student teachers must include activism in their classrooms whenever possible.

Multiculturalism is important in the classroom, and teachers need to change curricula in order to find better ways to teach their students about (age-appropriate) inequity and power structures. To support this argument, Gutstein (2006) uses case studies of Latino/a parents to argue that without context, some students cannot relate to content, which leads them to feel left out of conversations in the classroom. Social justice as a pedagogy will help teachers alleviate some of the consequences of both traditional

and reform-based curriculum and standards.

Jo Boaler (2016) and Pete Wright (2012) discuss how multi-dimensional mathematics, complex instruction, and relational equity can also be used together to create a mathematical framework for teachers who need guidance on navigating standards and curricula given to them. Multi-dimensional mathematics involves “disciplinary practices, such as problem-solving, reasoning, and constructing arguments that are now enshrined in the Common Core Practice Standards” (Boaler, 2016, p. 172). Complex instruction shows “an approach where students are encouraged to explore different ways of representing and solving a problem and to work collaboratively” (Wright, 2012, p. 10). Relational equity “involves students demonstrating respect for the contributions of others and taking responsibility for the learning of the whole group by helping those with less understanding” (Wright, 2012, p. 10). If teachers can successfully employ these frameworks, they will reduce the amount of inequity that the standards and curriculum bring. Even if the standards are to change, it is still important that teachers practice these in the classroom so that their students have the best possible chance of learning.

Lastly, the theme that emerged throughout all of the interviews established that professional development is important for teachers to have access to when standards and/or curricula are changing. Without professional development, teachers have limited resources available to help them understand new concepts.

## CONCLUSIONS

Regarding the 1997 standard Measurement and Geometry 1.4 (see introduction), compared with the 2010 CCSS, nowhere in the 2010 Common Core State Standards is there a mention of kindergartners needing to understand time, with reference to when tasks should be completed during the day. Not only has that standard disappeared in the 2010 Common Core State Standards, but the CCSS has split the 1997 standard category of Measurement and Geometry into two categories: Measurement and Data, and Geometry.

The results of this research prove that the lasting impacts of the California Math Wars are the 2010 Common Core State Standards. Common Core has the potential to alleviate the consequences of the Math Wars through a social justice pedagogy if resources are given to both teachers and parents. The media portrayal of the CCSS has similar feedback from parents: negative. Because there is not enough parent outreach, parents do not have the tools

necessary to help children, which resembles the reform movement of the Math Wars in the 1990s. There needs to be more professional development programs for teachers and more outreach for parents to reach common ground. Common Core is written in a way to favor the language of the reform movement of the Math Wars, proving that problem-solving techniques are preferred over drill-and-practice methods of mathematics.

### Future Directions

Due to COVID-19, the availability of participants was limited. To enhance this research, there should be a larger sample size that accounts for a diverse demographic of participants. Participants should include teachers, especially in mathematics, who have been teaching for more than thirty years, to record personal experiences from the Math Wars in the 1990s. Given the current educational climate, professional development needs to be complex and account for diversity, socioeconomic status, mathematics, and content. A reevaluation of policy that uses the Math Wars as a guide is necessary for professional development programs. Also, because this research only involves California and New York, further research should include considering case studies that compare math reform across the United States to see if there is a basis for mathematics standards policy reform. Lastly, research should be done to effectively assess if, and how, the Common Core State Standards use cultural relevancy to bring equity to all students because curriculum should not be the only access students have to cultural relevancy.

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**About the Author**

Marissa Woods, a graduating senior, is a History major with a minor in Education. During her time at UCSB, she participated as a mentor in the Black Scholars Hall Mentorship Program. Marissa was also an URCA Grant recipient and dedicated her senior year to two research projects within the Education Department. After graduating, she plans to attend UC Riverside to obtain a Master's in Education and multiple-subject teaching credential to become an elementary school teacher.

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