FORMS OF NASCENT POLITICAL CONOCIMIENTO LEVERAGED IN A CONTENT COURSE FOR PRESERVICE ELEMENTARY TEACHERS

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This study examines the nascent forms of political conocimiento demonstrated by elementary preservice teachers before and after a series of activities designed to engage them in thinking critically and quantitatively about the impacts of different grading systems. In reflections about their learning, the preservice teachers most frequently raised considerations related to knowledge with students and communities, followed by political knowledge. Many of the preservice teachers anticipated using their new knowledge in the near future to understand the implications of their professors' grading systems and in the more distant future to design grading scales in their own classrooms. A few reflections showed awareness of the tensions involved in grading systems, potentially a sign of developing Nepantla, while others evidenced more binary thinking.

Keywords: Social Justice, Preservice Teacher Education, Affect, Emotion, Beliefs, and Attitudes

Introduction

Teachers, especially those working in urban environments, need political *conocimiento* for teaching—a nuanced, situated form of political knowledge-in-practice—to effectively advocate for their students and themselves in the multi-layered, complex political environments of schools (Gutiérrez, 2013). From renewed controversy around standardized testing (Barnum, 2021) to conflicts over school reopening plans (Ludlow, 2021) to debates about student needs and claims of learning loss (Gabriel, 2021), the effects of and societal response to the novel coronavirus in 2020 have made teachers' need for political *conocimiento* even more apparent and more urgent than before the pandemic. Teacher preparation programs must do everything possible to help preservice teachers (PSTs) develop political *conocimiento*. While many researchers and teacher educators whose work focuses on helping PSTs develop political and cultural understanding have distinct but interrelated goals including social justice, equity, culturally relevant/sustaining pedagogy, and political *conocimiento*, there is broad agreement that to effectively prepare PSTs, teacher preparation programs must integrate these goals as broadly as possible throughout multiple courses and program components (e.g. Garii & Appova, 2013; Gutiérrez, 2013; McDonald & Zeichner, 2009; Nieto, 2000; Wiedeman, 2002; Xenofontos et al., 2020).

Math content courses are a perhaps unexpected but potentially powerful category of courses into which political *conocimiento* could be integrated. Math content courses are often among the first courses that elementary PSTs take, and they rarely focus on social justice topics (Felton-Koestler, 2020), so using a math content course to foster political *conocimiento* can create new opportunities for PSTs to start to develop and integrate mathematical and political understanding early in their programs. PSTs can then build on that understanding in future courses such as math methods courses in which they must connect mathematical and social justice goals, with the additional complexity of creating lesson plans (Meyers, 2019). Exploring topics related to political *conocimiento* in content courses could also potentially increase PST investment in content courses which are sometimes perceived as "relearning" elementary mathematics (Zazkis, 2011) by linking them more closely with PSTs' other courses.

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The current study explores PST learning in one such content course. It attempts to make two main contributions to the existing research. First, the course design—discussed further below—focuses specifically on integrating political *conocimiento* in a math content course rather than drawing on a more general understanding of social justice as previous work has done (e.g. Bateiha & Reeder, 2014; Felton-Koestler et al., 2016; Martinez & I, 2019). In particular, the unit that is the focus of this study explored the quantitative and political implications of using different possible grading systems in a class. Second, while the framework of political *conocimiento* is based on extensive field research with practicing teachers (Gutiérrez, 2012, 2013, 2017) there is no empirical work describing its early stages of development in elementary PSTs or in the context of a math content course. Therefore, this research report uses PST reflections before, during, and after a unit on grading systems in an elementary math content course to examine the following research questions:

- What forms of political *conocimiento* underlie PSTs' reflections about their own learning, questions that they have, and what teachers need to consider?
- What roles does mathematical reasoning play in PSTs' reflections?

Theoretical Framework

Both this study and the design of the course from which the data are drawn are rooted in the intersection of two theoretical frameworks: Gutstein's (2006; 2016) framework for Reading and Writing the World with Mathematics (RWWM) and Gutiérrez's (2012; 2013; 2017) framework of political *conocimiento* for teaching mathematics. Gutiérrez's framework was used to conceptualize the goals for the course, while Gutstein's framework was used to inform the design of mathematical activities intended to facilitate those goals. Both frameworks were used to inform this study's data analysis, with Gutiérrez's framework structuring the response to the first research question and Gutstein's framework structuring the response to the second.

Gutiérrez (2012; 2013) describes political *conocimiento* as the situated knowledge-in-action that successful teachers of Black, Latinx, and low-income students use to successfully advocate for their students in the multi-layered, political environments of schools situated within the larger neo-liberal education system. The word *conocimiento* indicates a form of knowledge that is developed through subjective personal experience and grounded in solidarity and praxis. The use of "political" in political *conocimiento* refers to the political implications of actions and systems at multiple levels of society, from the micro to the macro, and the ways in which power and identity operate across and between those levels. For example, the choices that individual teachers make about how to set up grading in their classrooms are shaped and constrained by the requirements and expectations of their fellow teachers, school and district administrators, families of students, and schools that students may attend in the future. In turn, teachers' grading choices may significantly affect students' academic and extracurricular opportunities and mental health, and these effects may have complex predictors based on characteristics including students' racial and socio-economic backgrounds, family structure, disability status, and physical and mental health.

Gutiérrez's (2017) framework of political *conocimiento* for teaching mathematics builds on Shulman's (1986) framework of teacher knowledge. Like Shulman, Gutiérrez acknowledges the importance of developing content knowledge and pedagogical knowledge. She emphasizes the importance of developing knowledge related to students and their communities through

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interdependent relationships rather than abstract study, and therefore describes it as "knowledge with students/communities." To these three categories she adds the form of political knowledge described above and emphasizes that these four forms of knowledge are all interconnected. She grounds the forms of knowledge in the context of what she calls "community en el mundo zurdo," evoking the necessity of communal action and solidarity with those who have been disenfranchised. Gutiérrez situates developing political *conocimiento* in "histories in society" emphasizing the situated, non-generalizable nature of *conocimiento* and the ways in which it influences and is influenced by the histories of a particular context. Finally, Gutiérrez (2012) highlights the role of *Nepantla*—a liminal "third space" that entails constant tensions and an awareness of multiple, potentially contradictory realities and possibilities for the future—as a necessary state for opening the possibility of the development of new *conocimiento*. In the case of grading described above, *Nepantla* could entail a teacher's awareness that adjusting particular category or assignment weights could help some students and hurt others, a tension that could lead to a desire to fundamentally change the underlying system. The teacher would then need to integrate their various forms of knowledge to work to enact change: they might explore different alternatives with students and communities, consider the pedagogical implications of their options, and use their understanding of the political pressures inside and outside their school to join with others in solidarity and figure out the most effective ways to make change happen.

As referenced above, I used Gutstein's (2006; 2016) framework to make sense of how to integrate these goals for preservice teachers into a math content course. Gutstein describes his pedagogy as teaching students to read and write the world with mathematics (RWWWM). When he teachers RWWWM he builds on a Freirean framework, working to use students' experiential community knowledge as a foundation on which they can develop classical knowledge and critical knowledge. In my context, the PSTs' community knowledge was based on their own experiences with grading systems as students and their common goal of becoming teachers who would use grading systems in their future classrooms. The classical knowledge that PSTs needed to develop was their math content knowledge related to ratios, percentages, and weighted averages, and the critical knowledge was the political *conocimiento*—the integration of content, pedagogical, and political knowledge with knowledge with students and communities to consider the constraints and implications of different grading systems. Gutstein further divides critical knowledge into reading the world with mathematics (using mathematics to understand the world) and writing the world with mathematics (leveraging mathematics to change the world). In the context of this study, PSTs could read the world with mathematics by using what they learned to better understand the grading systems that their instructors used and act accordingly, and they could anticipate writing the world by advocating for instructors to change their systems or by planning to make considered choices about grading when they themselves become teachers.

Methods

Positionality Statement and Context

An important piece of context to provide for any math education research, and especially for research situated at the intersection of math, politics, and education, is my positionality as a researcher and an educator (D'Ambrosio et al., 2013). I grew up white, middle-class, and female identified, identities that I share with the majority of in-service and preservice teachers in the United States. I began to develop a more critical political consciousness during my own teacher training in a program focused on preparing teachers to work in urban environments, and my political *conocimiento* developed further through over seven years working in multiple roles in

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two public schools. I spent the last four of those years working as a school's data coordinator, a role in which I often collaborated with teachers and administrators to analyze and address problems related to different data systems, including intervention data, grades, standardized tests, and school rating results. Since moving from an elementary setting to a university setting I have had the opportunity to explore more theoretical critical perspectives that have helped me connect my personal experiences to an understanding of the larger, neo-liberal education system.

I currently work at a public research university in a large city in the Midwest. The university's undergraduate teacher preparation program focuses on preparing students to teach in urban settings, and many of the faculty specialize in critical theories, including some of the faculty who frequently instruct the undergraduate math methods courses. PSTs are required to take multiple courses related to the politics of education, including an introductory course on urban education and a course on race, ethnicity, and education during their first year in the program. Before the current study, the elementary math content courses focused on broadening PSTs' understanding of mathematics, developing their problem solving skills, deepening their conceptual understanding of elementary mathematics, and fostering the mathematical knowledge for teaching; there was not a focus on political understanding. Until the coronavirus pandemic, all courses were taught in-person; the data for the current study were collected during a semester in which the content course was taught entirely online.

Course and Activity Description

The data for this study are drawn from a series of activities around grading systems that took place during two class periods of an introductory math content course for elementary PSTs. The course met remotely twice a week for 110 minutes. The original intention was to include multiple activities connected to political *conocimiento* throughout the semester. Unfortunately, the course moved much more slowly than anticipated, so there was only time to do two mini-units, and the second mini-unit (which explored the local school district's school rating policy) occurred in an abbreviated form in the final class period and was not followed by student reflections. The course centered collaboration and problem-solving, though both were more challenging in the virtual context. The course was also designed to help students develop a supportive community, giving PSTs a variety of ways to share their experiences and emotions. One key form of communication was brief reflections that PSTs completed after every class session, for a total of 26 reflections. These reflections had a consistent format: upload a picture of your work from class, explain what you learned or figured out in today's class, and ask the instructor a question. The intention was to normalize regular communication and the value of asking questions—questions could be about anything, including creating an extension question based on a problem from class.

The grading system activities were designed to help familiarize PSTs with different ways of weighting assignments and grades. The activities alternated between PSTs collaboratively reflecting on the potential implications of and problems with different forms of grading and solving quantitative vignettes based on problems that I had seen arise during my work in schools when there was a mismatch between the design of a grading system and how teachers were using it. The goal was to support PSTs in taking the perspectives of others with different experiences, and connecting the implications of those differences with the quantitative choices made within the grading systems.

Participants

The participants in this study were drawn from PSTs enrolled in two sections of the relevant content course. I was the instructor for one of the sections of the course, and I co-planned with

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the instructor of the other section. There were 70 students enrolled in the two sections, and 29 consented to have their coursework analyzed for the purposes of this study. I suspect that the low rate of consent was related to the stress of the pandemic and the sense of surveillance that PSTs expressed as part of remote instruction. The majority of PSTs were freshmen or transfer students. Three participants did not provide demographic information. Of those who did, 3 were male, and 23 female. One identified as Middle Eastern, 2 as Asian, 5 as white, and 17 as Latina/o.

Data Sources and Analyses

The data for this study are drawn from four reflections that PSTs completed as class assignments before, during, and after the unit on grading systems. Before the activity PSTs reflected on their personal experiences with grading ("Have you ever had an experience as a student in which you felt like the grading for a class was unfair? What was unfair about it?") and their initial beliefs about teacher obligations ("What do you think teachers need to consider when they plan the grading system for their class?"). After each of the class sessions focused on grading systems, PSTs completed reflections describing what they learned and what questions they currently had. At the end of the unit they answered the prompt about teacher obligations again and commented on whether they felt that their answer had changed.

The reflections were first analyzed with respect to the first research question, looking for examples in which PSTs' reflections implicitly valued or applied any of the components of political *conocimiento*: content knowledge, pedagogical knowledge, knowledge with students/communities, political knowledge, community en el mundo zurdo, histories in society or *Nepantla*. Some reflections valued or applied multiple components, while others did not clearly reference any, so some reflections were given multiple codes and others received none. For the second research question, PSTs' reflections were analyzed to find instances in which PSTs referenced explicitly mathematical activities, and then those examples of referencing mathematics were coded for the roles for which they used mathematics: classical content knowledge, reading the world with mathematics, or writing the world with mathematics. Classical content knowledge was used to code reflections in which PSTs focused on calculations specifically as a course assignment or intellectual puzzle. Reading the world with mathematics was used to code reflections in which they described or anticipated making sense of an instructors' grading system or finding what score they needed on an exam to get an A in a course. Writing the world with mathematics was used to code reflections in which PSTs discussed quantitative reasoning that was important for either teachers in general or that they anticipated using when they became teachers.

Findings

Nascent Political *Conocimiento*

A total of 66 codes related to political *conocimiento* were assigned. Every code was used at least once except for histories in society. Examples and descriptions of the characteristics of each code follow:

Knowledge with students/communities. With 25 examples, this was the most common form of political *conocimiento* that PSTs referenced and valued. It emerged across the different reflections both before and after the activities. Some PSTs showed increased specificity and a shift away from their individual perspective in their reflections from after the activity. For example, "I used to think teachers should be more flexible with grades in case students don't have enough time to do homework, or don't have help at home, but now I think there are many other factors such as an unstable living situation, health concerns, and many others."

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Political knowledge. This was the second most frequent form of political *conocimiento* referenced, with 13 examples. Many of the relevant reflections indicated a concern for fairness and for the implication of different grading systems (responses to the prompts that specifically asked about fairness were not included under these criteria). Some reflections also indicated an awareness of the complexity of roles and pressures that teachers need to navigate with grading: "My question is are all teachers required to grade a certain way depending on their school or do they each get to decide. I know for high school, teachers usually get to decide, but I wonder if it's'the same for elementary school teachers," and "Do you see there being a big change to standard based grading in the near future that we might have to implement with our own students?"

Community en el mundo zurdo. PSTs did not explicitly describe themselves as oriented in solidarity with social change, but there were 9 examples in which the positioned themselves as part of a community and emphasized how important the group collaboration was to them, both in the mathematical problem solving and the critical discussions. For example, "I also enjoyed being able to share out our different ideas on grading," and, "When answering and doing the grading problems I remembered how we talked them through in class and it really helped me to solve them."

Content knowledge and pedagogical knowledge. These codes were the least frequently used, with 3 and 7 examples respectively. Identifying cases of valuing content knowledge had many of the same challenges described below for identifying classical mathematical knowledge—there were relatively few examples where the PSTs were clearly valuing the mathematics for its own sake rather than for its potential use in RWWWM. One exception was, "We decided that the best way to show the grades equally weighed was to see what the fraction would look like if the final project was worth the same amount of points as the classwork assignments." A concern for pedagogical knowledge in this context was generally reflected as concerns that hypothetical students understand a class's grading system and considerations about how to make that happen—"I think whatever grading system they choose, they need to make sure to explain it to their students well to make sure they know what to expect if they miss a class or do poorly on an assignment."

Nepantla. Some PST reflections (7) demonstrated awareness of *Nepantla* when they described the inherent tensions in designing grading scales, where often the same choice can improve one student's grades and hurt another's. For example

> When teacher plan the grading system for their class teachers need to consider what will benefit students and what seems fair. This, however, I realized it can be very difficult to achieve because no matter what, not all students will benefit. In the excel page, I was playing around with how much each category should be weighted, but even when 2 students' 'cores would increase, the third student's score would stay the same or decrease so that student was not benefitting from the changes. (Kaila)

Importantly, for these PSTs the tension was something to be grappled with but not necessarily resolve. In contrast, there were 5 examples of reflections in which PSTs moved away from *Nepantla* and tried to identify clear-cut binaries in which one form of grading was always superior to another as in the claim "Teachers should also be grading things equally rather than proportionally because proportionally, in my opinion, only affects the student more."

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Reading and Writing the World with Mathematics

In the reflections, there were a total of 49 codes for the different forms of using mathematics. The most common was reading the world with mathematics—it was used to code 24 responses. Five of those responses were based on student reflections about their personal experiences that referenced quantitative reasoning such as

> [W]e only have writing assignment every two weeks. Although that sounded fun at the beginning not having quizzes or tests, these writing assignments are worth 10 percent and can affect our grade if we do not get a good grade. (Julie)

The majority of the rest were descriptions of how useful it was to be able to do calculations about grades such as:

> This was a moment that made me realize how useful it is to know math. I always wished I knew how to calculate my grade or knew how and why a single score affected my grade so much. It was an Aha! moment both as a student and as a future teacher. (Imani)

Seventeen responses focused on mathematics specifically in the context of class assignments or in the abstract, and 8 referenced writing the world from a teacher perspective when designing grading systems.

Implications

This work provides some initial examples of what forms nascent political *conocimiento* can take for elementary PSTs in the context of a content course, and how PSTs may integrate mathematical content knowledge as part of their *conocimiento*. It found that for this particular set of activities and prompts, PSTs tended to value knowledge with students and communities and reading the world with mathematics. It indicated some potential for even relatively sparse PST reflections to show preliminary evidence for the acceptance or rejection of *Nepantla*. One somewhat surprising aspect of the findings was the relatively small number of references to pedagogical knowledge—surprising because questions related to "How would you teach this?" were one of the most common types of reflection questions during the rest of the course. It is possible that this finding is related to Myers's (2019) description of the struggles that PSTs experienced when planning units that integrated mathematical and social justice standards. The cognitive complexity of balancing the mathematical and critical thinking may make it more challenging for PSTs to also consider pedagogy, at least this early in their teacher preparation programs. Another aspect of the findings is the lack of reflections that connected to history in society. This may be due to the design of the activities, which were specific in terms of individuals' situations, but were not situated in a specific historical or geographical contexts. This is a weakness that was addressed in the abbreviated activity around school rating systems, and is something that I plan to address more thoroughly in future work.

There are a number of other ways in which I hope to be able to build on this work in the future. One is to more explicitly address race and various forms of racism in future activities—the individual focus of this set of activities afforded an unfortunately race-evasive discussion in which students discussed characteristics of students and communities such as income and linguistic background but did not explicitly talk about race. This has been identified in previous research as a common problem with integrating mathematics and social justice (Harper, 2019; Larnell et al., 2016), and I plan to address concerns of race and racism more directly and intentionally in the future. Follow-up research in which I am currently engaged will also

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integrate data from local schools and political lenses more thoroughly throughout a content course and will collect more robust forms of data to hopefully enable a richer description of PSTs' development of political *conocimiento*.

References

Barnum, M. (2021, February 24). *This year's state test results will be tough to make sense of, experts warn.* Chalkbeat. https://www.chalkbeat.org/2021/2/24/22299804/schools-testing-covid-results-accuracy

Bateiha, S., & Reeder, S. (2014). Transforming elementary preservice teachers' mathematical knowledge for and through social understanding. *Revista Internacional de Educación para la Justicia Social*.

D'Ambrosio, B., Frankenstein, M., Gutiérrez, R., Kastberg, S., Martin, D. B., Moschovich, J., Taylor, E., & Barnes, D. (2013). Positioning oneself in mathematics education research. *Journal for Research in Mathematics Education*, 44(1), 11-22.

Felton-Koestler, M. D. (2020). Teaching Sociopolitical Issues in Mathematics Teacher Preparation: What do Mathematics Teacher Educators Need to Know?. *The Mathematics Enthusiast*, *17*(2), 435-468.

Felton-Koestler, M. D., Sutherland, E., & Tracy, N. (2016). Supporting prospective teachers in using mathematics to understand our world. *Teaching for Excellence and Equity in Mathematics: Special Issue Mathematics Education: Through the Lens of Social Justice, 7*(1), 46-51.

Gabriel, R. (2021, March 10). What 'learning loss' really means: It's not a loss of learning. *The Washington Post*. https://www.washingtonpost.com/education/2021/03/10/what-learning-loss-really-means/

Garii, B., & Appova, A. (2013). Crossing the great divide: Teacher candidates, mathematics, and social justice. *Teaching and teacher education*, *34*, 198-213.

Gutiérrez, R. (2012). Embracing Nepantla: Rethinking "K"owledge" "nd its Use in Mathematics Teaching. REDIMAT - *–ournal of Research in Mathematics Education*, 1 (1), 29-56. doi: 10.4471/redimat.2012.02

Gutiérrez, R. (2013). Why (urban) mathematics teachers need political knowledge. *Journal of Urban Mathematics Education*, *6*(2), 7-19.

Gutiérrez, R. (2017). Political conocimiento for teaching mathematics: Why teachers need it and how to develop it. In Kastberg, S., Tyminski, A. M., Lischka, A., & Sanchez, W. (eds.), *Building support for scholarly practices in mathematics methods* (pp. 11-38). Charlotte, NC: Information Age Publishing.

Gutstein, E. (2006). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. Taylor & Francis.

Gutstein, E. R. (2016). "Our issues, our people—Math as our weapon": Critical mathematics in a Chicago neighborhood high school. *Journal for Research in Mathematics Education*, *47*(5), 454-504.

Harper, F. K. (2019). A qualitative metasynthesis of teaching mathematics for social justice in action: Pitfalls and promises of practice. *Journal for Research in Mathematics Education*, *50*(3), 268-310.

Larnell, G. V., Bullock, E. C., & Jett, C. C. (2016). Rethinking teaching and learning mathematics for social justice from a critical race perspective. *Journal of Education*, *196*(1), 19-29.

Ludlow, K. (2021, February 5). *Weaponizing Equity: White Saviorism and the School Reopening Debate.* The Educator's Room. https://theeducatorsroom.com/weaponizing-equity-white-saviorism-and-the-school-reopening-debate/

Martinez, R. & I, J. Y. (2019). Mathematics as a conscious raising experience: A bridge towards social transformation. In S. Otten, A. G. Candela, Z. de Araujo, C. Haines, & C. Munter (Eds.), *Proceedings of the forty-first annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 250-260). University of Missouri.

McDonald, M. & Zeichner, K. M. (2009). Social justice teacher education. In W. Ayers, T. M. Quinn, & D. Stovall (Eds.), *Handbook of social justice in education* (pp. 595-610). Routledge.

Meyers, M. (2019). Learning to teach mathematics for social justice: Helping preservice teachers connect critical topics to standards. In S. Otten, A. G. Candela, Z. de Araujo, C. Haines, & C. Munter. (2019). *Proceedings of the forty-first annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 1087-1095). University of Missouri.

Nieto, S. (2000). Placing equity front and center: Some thoughts on transforming teacher education for a new century. *Journal of teacher education*, *51*(3), 180-187.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, *15*(2), 4-14.

Wiedeman, C. R. (2002). Teacher preparation, social justice, equity: A review of the literature. *Equity & Excellence in Education*, *35*(3), 200-211.

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Xenofontos, C., Fraser, S., Priestley, A., & Priestley, M. (2020). Mathematics teachers and social justice: a systematic review of empirical studies. *Oxford Review of Education*, 1-17.
Zazkis, R. (2011). Relearning mathematics: A challenge for prospective elementary school teachers. Charlotte, NC: Information Age Publishing.

Olanoff, D., Johnson, K., & Spitzer, S. (2021). *Proceedings of the forty-third annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Philadelphia, PA.

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