Opening the Door?

How Wisconsin School Districts Respond to Increased Mathematics Graduation Requirements

and its Impact on Students' Educational Opportunities

By

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A dissertation submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

(Educational Leadership and Policy Analysis)

at the

UNIVERSITY OF WISCONSIN-MADISON

2020

Date of final oral examination: May 15th, 2020

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Dedication

For my mom and dad, who sent me to math camp when I was in kindergarten.

Thank you for raising a math nerd and reminding me of my potential when I need it most.

FOR MY GRANDMA, WHO ALWAYS MADE ME FEEL SPECIAL AND LIKE THE SMARTEST PERSON SHE KNEW.

Acknowledgments

I would first like to acknowledge and thank my participants. Without their willingness to speak with me, I would not have been able to complete this research.

Second, I would like to thank my dissertation committee members, Dr. Erika C. Bullock, Dr. Bruce King, and Dr. Julie F. Mead for believing in my research and steering me in the right direction when I needed it most.

I want to specifically thank my dissertation chair and advisor Dr. John B. Diamond for his support and mentorship over the past six years. I have learned so much from you, and I am a better scholar and person for it.

Dr. Becky Fliss Swanson was my math tutor in middle and high school. Little did I know she would also be my dissertation tutor. Thank you for always telling me I am smart, checking in on me, and helping me see through the fog.

Thank you to Paige Duda, who has always responded to my texts no matter the topic and stress level. Thank you for remaining my supporter and friend through all our degrees. Perhaps you are next?

I want to thank my friends Jessica Simmons, Katie Spaeth, Tim Marks, Connor Dacey, and all the Usual Suspects who became my Madison family and kept me sane through this process.

Thank you to my ELPA friends who have become family. I would not be here without your support, accountability, laughs, and feedback. Special thanks to Nicholas Mitchell, Dr. Jamila Lee-Johnson, Jacquie Forbes, Ashley Gaskew, Shelby Rogers, and Khadejah Ray.

My family has supported me in every adventure I have chosen to take. This dissertation adventure was no different.

To my uncle Mike Morris, you have been one of my biggest supporters and always put a smile on my face. Thank you for reminding me to love life.

To my aunts AnnMarie Olson, Patti Rogers, and Maureen Staloch, thank you for loving me, cheering me on, and being role models of successful women in business and life.

Thank you to my aunt Peggy Kist for our political conversations and challenging me to see things in multiple ways.

Thank you to Rina Longo, you have helped me learn about myself and pushed me to believe in myself.

My cousin Maggie Morris has been by my side all my life as a friend, sister, and enemy. Thank you for having my back and helping me become a better person.

To my grandma (Gogo) Barbara Jean Olson, who has set an example by breaking barriers, thank you for supporting my educational endeavors and being my friend.

Thank you to my sister Olivia, who is someone I find myself looking up to even though she is younger. I love you more than you know.

To Brent, thank you for being an instrumental part of my life. You have reminded me to breathe and pushed me to see beyond my bubble. I have learned so much from you, and you have shaped who I am today.

Last but not least, thank you to my mom and dad. It seems like an impossible task to fully express how much you both mean to me and my gratitude for your love and support.

Mom, thank you for letting me find my way and supporting me through it all. You have been the ultimate role model. Everything I have achieved and will achieve is because of you. I love you.

Dad, thank you for all you have done to make sure I became a confident woman. Thank you for the math problems during the Nightly News. Thank you for all the car lectures; I was actually listening. Most importantly, thank you for being there for me no matter the distance, loving me, and being proud of me. I love you.

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Abstract

This study examines how mathematics leaders in seven school districts responded to a Wisconsin state graduation policy that requires students take three credits of mathematics and the rationale for their responses. In this qualitative study, I interviewed mathematics leaders in seven districts to answer the following research questions: 1) How do mathematics leaders respond to increased credit requirements for mathematics in terms of high school course sequencing and course offerings? 2) What rationale do these leaders give for their responses? 3) What are the implications of these responses for students' mathematical opportunities?

The findings of this study show four reconfigurations of course sequences that resulted from course offering decisions made by the mathematics leaders. These decisions were made according to the mathematics leaders' beliefs about mathematics, students, and equity. These reconfigurations either take students away from Algebra 2, which means students are not eligible to apply to a four-year University of Wisconsin institution, or take students through an Algebra 2 lite version, which earns them the course credential on their transcript so they can apply but does not properly prepare them for future mathematics courses. Although mathematics leaders responded with equity in mind, these reconfigurations may perpetuate the inequities in mathematics education.

This study fills a gap in the literature concerning the decision-making process and sensemaking of mathematics leaders when responding to a non-instructional policy. Additionally, it provides a missing discussion around mathematics structures. Not only do these structures impact students before they enter a mathematics classroom, they also have implications for their postsecondary opportunities.

At the end of this dissertation, I discuss the implications of my findings for policy, practice, theory, and research. In addition to building on the established sensemaking, tracking, and equity literature, the implications of my findings call for a greater connection between policy and practice to produce more effective implementation. The findings suggest the importance for mathematics leaders to critique their current structures to understand if students are truly being equitably served. Finally, additional research can continue to examine how mathematics leaders respond to policies and how their responses have impacted the mathematics structures and student course-taking. It is these structures that determine what life opportunities are available to high school students when they graduate.

Chapter 1: Introduction

On December 11, 2013, the Wisconsin state legislature passed 2013 Act 63, which changed the graduation requirements for high school students under s. 118.33(1)(a)[1]. These changes increased the number of science and mathematics credits that students needed to graduate from two credits to three credits and also allowed certain career education, technical education, and computer science courses to count for mathematics credit. News articles published at the time of the law's signing stated that the intention of the policy was to produce more competitive students who were better prepared for business, industry, or college (Beck, 2013; Colson, 2013). The Alma Center-Humbird-Merrillan superintendent said, "This additional credit will expose our students to additional mathematics and science courses and the hope is that they will be better prepared as they enter college or the workforce" (Colson, 2013). These statements suggest that the policy was, at least in part, about exposing students to more mathematics content to make them more competitive when they graduate high school.

Wisconsin's change came thirty years after *A Nation at Risk* recommended an increase in mathematics credits for high school students (National Commission on Excellence in Education, 1983). This made Wisconsin one of the last states to increase its graduation requirement from two to three credits. The late timing of Wisconsin's change can be seen when comparing it to states like Connecticut, which made the change from two to three credits for the graduating class of 2004 and from three to four credits for the graduating class of 2020. Only three states still require just two credits: California, Maine, and Montana. News articles suggested Wisconsin policy and lawmakers decided to change the law to be more in line with neighboring states who had already required three credits for years (Rada, 2013). Additionally, one state representative

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[1] The full policy is included in Appendix A.

suggested, “We’ve gotten to the point that many members finally understand that Wisconsin’s performance is not as spectacular as we once thought it was” (Beck, 2013).

Across the United States, policies that raise graduation requirements are linked to ensuring students are college and career ready (Achieve.org, 2017). As the superintendent from Alma Center-Humbird-Merrillan suggested (Colson, 2013), it is argued that if students take more courses, in this case mathematics courses, they will master basic skills and will have the opportunity to take courses with more complex material (Teitelbaum, 2003). In turn, this better prepares them for both college and career opportunities. For instance, most four-year colleges require three credits of mathematics to be eligible for admission. The University of Wisconsin system requires three credits, while the University of Wisconsin-Madison requires four credits (Board of Regents, 2018a; Board of Regents, 2018b). So by increasing credits, the state requirement aligned with admission requirements at many universities. Research has also shown that students’ career earnings increase as they take more mathematics in high school (Rose & Betts, 2004). Thus, with the increase in credits, students should be better prepared for their futures in both college and/or career fields.

This increase also came at a time when mathematics (as a part of STEM) had been and continues to be identified and publicized as a door to future opportunities for students (Commission on Mathematics and Science Education, 2009; Holdren et al., 2010). Unfortunately, this door to opportunity is not equally open to all students. The differentiated experiences of students moving through the hierarchical structure of mathematics create disproportionate outcomes. In the 2016–2017 school year, 43% of white Wisconsin high school students scored proficient or advanced on the mathematics section of the ACT, while 14% and

6% of Hispanic[2] and Black Wisconsin students scored proficient or advanced. The disparities were also seen along economic lines. Of the Wisconsin students classified as economically disadvantaged, 15% scored proficient or advanced, while 46% of those classified as not economically disadvantaged scored proficient or advanced. The inequity in these outcomes points to a system and structures that are not providing for students equally.

The intention of increasing the mathematics credit requirement was to provide high school students with additional mathematics learning as they determine their own career paths and education beyond high school. With a third credit of mathematics, more doors of opportunity remain open to students. Students will have the required number of mathematics credits to apply to postsecondary institutions (Board of Regents, 2018a; Board of Regents, 2018b). However, simply having a third year of mathematics is not enough. The level and quality of the mathematics courses students are provided and encouraged to take also shape their opportunities (Stevenson et al., 1994).

Purpose

In this study, I set out to understand how mathematics leaders responded to Wisconsin's policy and the implications these responses have for opening the door of opportunity for students. To answer this question, I examined how mathematics leaders made sense of and responded to the states' high school graduation requirements and the implications of their decisions for students' mathematical opportunities. More specifically, I asked the following questions:

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[2] In this study I use the terms Latinx, Black, Asian American, American Indian, and white to identify racial categories. However, when referring to a study or state public data I use the racial terminology used by the researcher or state.

1. How do mathematics leaders respond to increased credit requirements for mathematics in terms of course sequencing and course offerings at high schools?
2. What rationale do these leaders give for their responses?
3. What are the implications of these responses for students' mathematical opportunities?

Significance

This study contributes to both educational research and practice. First, unlike most previous research, this study examined how districts responded to graduation requirements rather than the outcomes from graduation requirements. To date, graduation requirements in mathematics, like those recently adopted in Wisconsin, have been examined to understand their impact on student outcomes (Daun-Barnett & St. John, 2012; Teitelbaum, 2003), high school completion and college success (Daun-Barnett & St. John, 2012; Plunk et al., 2014), and mathematics course-taking (Clune & White, 1992; White & Porter, 1996). This study extends this literature by examining the interpretation, design, and implementation processes that occurred when districts respond to state policies like graduation requirements.

Second, the literature that looks at mathematics credit requirements for graduation is dated. Because Wisconsin was one of the last states to make this credit increase, this study helps us understand how such policies play out in the contemporary context and examines if the current responses are distinct from those in states that made these changes earlier.

Third, while previous research paid attention to course offerings, it did not consider other structures like course sequencing. With the addition of sequencing, I offer a more complete illustration of district responses that place course offerings in context. With the full context, more can be understood about the impact of graduation requirement policies on mathematics structures.

Fourth, this study contributes to the literature by examining the implication of structural changes on the mathematical opportunities of students. We know inequity in student outcomes exists across gender, class, and racial lines. These inequitable outcomes point to a system and structures that are not providing for students equally. This study moves beyond considering gender, class, and race in only disaggregated data and as variables of student outcomes. This study considered how gender, class, and race are discussed during districts' decision-making processes and how those discussions impacted the structures developed.

Lastly, understanding different district responses to graduation requirements and the implication of these responses on equitable mathematical opportunities for students not only contributes to established research but also adds to the practice of mathematics education. District leaders can look to this study when considering their own responses to policies to understand how their responses can promote equity or perpetuate inequity.

Conceptual Framework

The conceptual framework that guided my study brings together organizational and institutional theory; mathematics structure in high schools; teachers' beliefs; the intersection of mathematics with gender, class, and race; and equity in mathematics education. Together they form a lens to examine mathematics leaders' responses to the state policy.

Organizational and Institutional Theory

The implementation of educational policy is often thought of as a bureaucratic, top-down process and does not give enough consideration to the influence of school districts and educators (Spillane, 1996; 2009). However, districts and schools do not work this way. Instead, when state policies are to be implemented in districts, organizations and individuals interpret the policies and decide how they will ignore, adopt, or adapt them (Spillane, 2000). It is during these processes that policies are molded to fit a district school system and can often be implemented in ways the policy-makers did not intend (Coburn, 2005; Spillane & Burch, 2006).

State-level policies are designed to impact what happens inside individual districts, schools, and classrooms. However, policies themselves do not generally present specific directives on what educators should do. It is left up to the leaders to interpret what the policy is asking from them. Many times during this interpretation process, leaders can misunderstand a policy and interpret it differently from the policy-makers' intention (Spillane, 2009). After interpretation of the policy, leaders are left with the decision to change existing systems to comply with the policy, ignore it, or work to sidestep it (Cantlon et al., 1991; Spillane, 1996). Leaders then design and implement the response based on their interpretation of the policy (Cohen & Ball, 1990; Spillane & Jennings, 1997).

Researchers have used organizational and institutional theory to understand how organizations work. Institutional theory pursues this by making connections between the structures, norms, and social patterns of an organization and the larger social and cultural environment surrounding the organization. Institutional theorists have established that the institutional environment outside of school is key to shaping the cultural conception of a school. This, in turn, shapes how these organizations react to those external pressures.

Educational organizations are thought to be very bureaucratic with a great deal of control from the top down for efficient operation (Meyer & Rowan, 1978). However, institutional theory research has found there is often a lack of coordination and control within educational organizations (March & Olsen, 1976; Weick, 1976). Specifically, consider how instruction is not directly connected to the organizational structure and is largely left to individual teachers. The decisions made about instruction do not necessarily always align with the goals and strategies of an educational organization, because teachers can have some autonomy when it comes to their instruction. In situations like these, there is a lack of connection between the bureaucratic, organizational structure and the activities of a school (e.g. instruction), which is defined as loose coupling (March & Olsen, 1976; Weick, 1976). When the activities of a school are aligned with the organizational structure, there is tight coupling. Coupling focuses more on the actions of an organization rather than the structures, so there can be contradictions. For example, some actions and activities inside an organization can be loosely coupled while others can be tightly coupled (Orton & Weick, 1990).

The contradictory nature of loose coupling within an organization means the organization can often be coupled and decoupled simultaneously. When an organization is decoupling, it is responding in ways to avoid inspection from external pressures. For schools, decoupling helps them avoid or minimize inspection from outside forces on the activities and outcomes of the school (Meyer & Rowan, 1978) even though accountability polices have created more coupling (Meyer & Rowan, 2012). The action of decoupling has been studied to understand how administrators and teachers often insulate the school and classroom to resist external pressures. Decoupling and buffering classrooms from external pressures and inspection gives teachers power to decide how and to what extent policy changes enter their classroom (Coburn, 2004; Diamond, 2007; Spillane & Callahan, 2000). Through decoupling, outside pressures do not directly influence the classroom, and this allows teachers to maintain more control of their classroom. For example, a teacher may display a poster that explains a new instructional activity and method being promoted throughout the district but not reference the poster during instruction. While responding symbolically, this teacher has decoupled her classroom from the outside pressures from the district.

This decoupling between school administrators and the classroom has been studied as has decoupling between government reforms and school response (Coburn, 2004; Malen & Ogawa, 1988; Malen et al., 1990). Some research has found that institutional responses are more complex, and there are more responses than just decoupling (Coburn, 2004; Oliver, 1991). For example, Oliver (1991) investigated how organizations respond when pressured by outside institutions. She proposed a typology of five possible responses for organizations based on the level of active agency and resistance the organization exhibited. The responses of acquiescence, compromise, avoidance, defiance, and manipulation range from lowest to highest level of resistance an organization exhibits in their response. Organizations that exhibit a low level of resistance would conform to the pressures from the outside, because conforming is actually selfserving. Greater resistance would occur when the pressures do not align with the interests of the organization.

There are several types of responses that districts might make when responding to a state policy that increases credit requirements. A school district may compromise by changing the number of credits required but adding additional low-level courses, so students can earn the three credits without having to take a higher level of mathematics. A district may respond with avoidance by changing the district requirements but giving students mathematics credit for courses that were not previously credit bearing.[3] By doing this, the district complies with the state policy, but their students could earn their credits without taking more mathematics. So students would not be advancing or even taking additional mathematics courses but would still earn the additional credit. This response is similar to decoupling, as the district buffered the impact of the state's pressure from the course-taking structure the district had in place.

Along with external pressures, some institutional theorists have considered the importance of including individuals' experiences and preexisting knowledge to understand the institutional environment (Coburn, 2004). Many studies use a foundation of institutional theory and employ a cognitive perspective to understand the influences on actors' decision-making. Research using a cognitive perspective has found that the interpretation, design, and implementation processes are filtered through leaders' prior knowledge (Spillane 1999; Spillane & Jennings, 1997; Spillane & Miele, 2007). For example, leaders comprehend mathematics policies in relationship to their experience and interests (Hill, 2001). Likewise, local policy-

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[3] These courses tend to be support classes that students take in addition to their regular mathematics courses. For example, a student would take their Geometry course and would also take a Geometry support class with pre-teaching and re-teaching of the material from the Geometry course.

makers and leaders may interpret state policies through their preexisting ideas; sometimes this results in implementation that is not aligned with the policy's intention (Hill, 2001; Spillane, 2009). Like district leaders, teachers also interpret mathematics policy in accordance with their preexisting practice, knowledge, and beliefs about what is most important and appropriate for their students (Cohen & Ball, 1990; Porter et al., 1998).

While investigating teacher response to new ideas for the reading curriculum in California, Coburn (2004) believed Oliver's typology rested on the assumption of top-down pressures from the institutions. She also believed the relationship between institutional pressures and the classroom was less linear than Oliver had hypothesized. Therefore, Coburn studied teacher responses to reading instruction policy over sixteen years and identified five different categories that reflected the individual responses of teachers to institutional pressures coming from outside the school. The responses she found were rejection, symbolic response, parallel structures, assimilation, and accommodation. Each response varied in how teachers filtered the policy through their preexisting beliefs and current practices in their classroom. When a policy or idea was inconsistent with the teacher's own beliefs for reading instruction, the teacher would reject the idea.

Symbolic response, as Coburn labeled it, is similar to decoupling. Teachers would respond by having new approaches and assessments present in the classroom without applying them, like a rubric on the wall that was not actually used. Coburn found that teachers were following a strategy in Oliver's typology by creating parallel structures as a form of balancing and compromising the multiple and conflicting priorities they faced. With an increase in mathematics credit requirements, mathematics leaders could create an Algebra 2 lite course for students to complete. This way, students are completing the traditional track of mathematics courses, but the course rigor and content is downgraded to guarantee students will earn credit.

Coburn (2004) classified most responses by teachers as assimilation. Teachers used their preexisting knowledge, worldviews, and assumptions to assimilate the new information into their practice. Often this response resulted in teachers not utilizing the new reforms and information in the ways policy-makers intended. The last response category of accommodation occurred when teachers reconstructed their knowledge and assumptions about reading instruction to include and utilize the new information.

Coburn's study showed how teachers filter a policy through their own beliefs to make sense of and then respond to that policy. Other studies have shown the sensemaking of actors when they respond to a policy. Sensemaking occurs when individuals or groups are faced with events that are out of the ordinary (Ganon-Shilon & Schechter, 2017). These events usually cause confusion and chaos. Sensemaking brings that confusion and chaos into order (Ganon-Shilon & Schechter, 2017; Weick et al., 2005).

During the process of sensemaking, actors first notice a policy then interpret it. An actor's preexisting knowledge determines what gets noticed in a policy (Spillane & Miele, 2007). What policy messages an actor chooses to apply or ignore depends on their preexisting knowledge, beliefs, context, and practices (Ganon-Shilon & Schechter, 2017). For example, in this Wisconsin policy that increased mathematics credits, there is a portion that allows for computer science courses to count as a third credit of mathematics. Not every actor, in this case mathematics leader, will notice this portion and decide to consider it. Noticing this portion may require mathematics leaders to have previous experience with computer science or may require them to already be thinking about including computer science as a mathematics course.

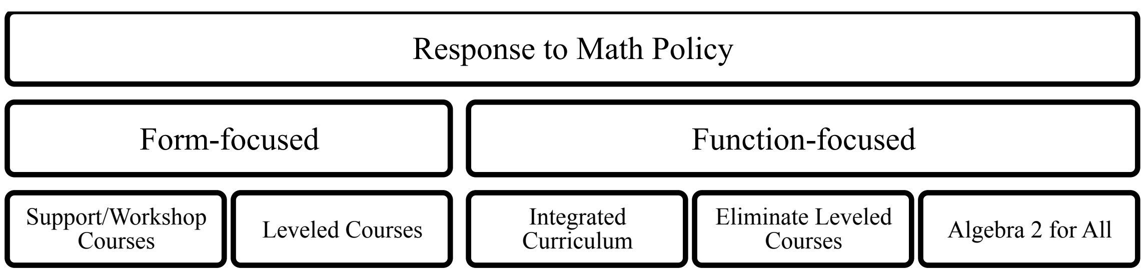
After noticing, an actor continues the sensemaking process by interpreting the policy message. Again, with their preexisting knowledge, beliefs, and practices, a mathematics leader will make sense of and interpret what the policy means for them in their context (Ganon-Shilon & Schechter, 2017; Spillane & Miele, 2007). For the Wisconsin mathematics credit policy, the expertise of the mathematics leaders will be important to consider, as differing levels of expertise can lead to differing interpretations of the policy message (Spillane & Miele, 2007). Together with their preexisting knowledge, beliefs, expertise, and current practices, mathematics leaders will then interpret what the state policy requires for what third course their students need to take to earn three credits and how they want their students to earn that third credit.

This cognitive understanding of sensemaking is based on the individual's mind, but the constructive understanding of sensemaking is based on a collective process through social interaction and negotiating language (Coburn, 2005). Mathematics leaders will make sense of the policy individually and collectively through meetings with other mathematics leaders. Mathematics leaders will need to negotiate and reconcile their own preexisting knowledge, beliefs, and practices with others to come to a common interpretation so that they may have a consistent response to the state policy.

Previous research on sensemaking when responding to mathematics policy has shown leaders to respond in more form-focused methods rather than function-focused methods (Spillane, 2000). Form-focused refers to learning activities, instructional materials, and grouping of students, while function-focused concentrates on the bigger picture of mathematics. The form-focused changes Spillane (2000) saw reconfigured the activities students completed but did not address any shifts in the end goal. The leaders tended to rely on familiar practices and understandings of mathematics that matched their prior knowledge. For this state policy increasing mathematics credits, mathematics leaders can respond in form-focused ways that provide additional courses to students but do not push students' mathematical knowledge. Alternatively, mathematics leaders can respond in function-focused ways by evaluating their curriculum, rigor, and knowledge expectations to create new structures and courses that push students to a new, higher standard of learning and knowledge. Figure 1 shows examples of possible ways districts can respond to the increased credit requirement in form-focused or function-focused ways.

Figure 1

Form-Focused and Function-Focused Responses to Increased Credit



Examining district responses using organizational and individual aspects of institutional theory and individual and collective sensemaking is not enough. The specific context of this state policy is set within mathematics education. To properly examine mathematics leaders' responses, specific issues in mathematics education must be acknowledged. This state policy for graduation requirements is implemented and understood in the context of the traditional mathematics structure, teachers' beliefs about mathematics, and the intersection of mathematics with gender, class, and race.

Mathematics Structure and Organization

This study examined the processes of interpretation, design, and implementation by mathematics leaders to understand their responses to increased credit requirements by the state.

Part of this work considered the structures of mathematics organization in high schools. The mathematics organization at a high school can be examined by attending to at least three aspects: course offerings, course sequences, and course placement. This study focused on course offerings and course sequences. To understand the policies and practices of high schools, researchers have considered the course-taking of students as a function of school policies, policy interpretation, students' personal choice, and courses offered (Finn et al., 2001; Lee, Croninger, & Smith, 1997). Course offerings and sequencing are born out of the history of tracking in schools. Tracking in mathematics lays the foundation for the current organization of high school mathematics.

Tracking. The sorting system of tracking in U.S. schools became popular in the early twentieth century with the influx of European immigrants (Terman et al., 1923; Tyack, 1974). Tracking was thought to be an effective way of educating a diverse group of students based on their previous performance and ability. Schools organized students into tracks where a student would take all their courses in a specific track (Lucas, 1999; Oakes, 2005). For the most part, schools had three tracks: academic, regular/general, and vocational (Hallinan, 2005).

In the 1960s and 1970s, some schools started to eliminate tracking programs and instead left individual subjects tracked (Lucas, 1999; Oakes, 2005). So rather than having a remedial track that encompassed all courses, courses would be categorized as remedial, honors, etc., and students would enroll course by course. Although some school districts were essentially detracking, tracking and detracking did not receive much attention.

In the 1980s, tracking received the attention and criticism that was missing with the publication of Jeannie Oakes' (2005) influential book, *Keeping Track: How Schools Structure Inequality*. In the book, Oakes presented evidence of the disadvantages students experience in lower tracks. Looking at twenty-five schools, she found inequities in the distribution of students, their opportunities to learn, and student attitudes. At one point, these inequities left her to explain that tracking, "exists to deny opportunity, to create further differences" (Oakes, 2005, p. 195). The denying of opportunity was most felt by students of lower social and economic status and Latino and African American students, as they were more likely to be found in lower tracks. Her findings suggested evidence that tracking was created to separate immigrants and poor students from students who were considered American and well off, i.e. white and middle-class, specifically boys.

Although rigid tracking structures have been removed in schools, the practice of placing students into ability groups by individual subject continues the stratifying role that tracking once had. The rigid tracking structure, with little to no mobility for students, was replaced with a structure based on ability that allowed for mobility as students' ability changed. Although it allows for mobility, this system continued and continues to perpetuate the stratification of students seen in traditional tracking systems (Lucas, 1999).

Decisions about tracking have remained mostly with districts and schools. However, depending on the placement policies of a district and school, sometimes parents play a role in the placement process. The parental role in tracking and course placement can create inequities through opportunity hoarding (Kelly & Price, 2011; Lewis & Diamond, 2015; Useem, 1991; Useem, 1992). Because of the criticism of tracking and the evidence that it reproduces inequities, districts have distanced themselves from the term, as it now has a negative connotation. Because schools have detracked in the traditional sense, finding three or more distinct tracks that encompass all subject areas with different levels of rigor is difficult (Anderson & Oakes, 2014).

Essentially, the structure of tracking is composed of two elements: the generation of multiple tracks and the criteria used to place students in these tracks (Kelly, 2007). For this study, the responses to the state policy by leaders and schools will be examined under the lens of tracking by looking at course sequencing and course options as related to the generation of multiple tracks. This study did not examine course placement polices, as there were no formal policies in the districts. With a lack of formal placement policies, it was more difficult to thoroughly understand the process.

Seeing how course sequencing and course offerings are structured and changed provides insight into how tracking continues to influence student opportunities today. Therefore, understanding the response to increasing credits through a lens of tracking provides a window into why specific changes were made and the implications for those changes on educational opportunities. Collecting and analyzing curriculum and course guides illustrates the legacy of tracking and how students' opportunities are impacted.

Course Sequencing. Course sequencing connects directly to the issues of inequity produced by tracking. Course sequencing can be thought of as opportunity sequencing (McFarland, 2006), as course-taking is structured through prerequisites. This makes a student's path through course work rigid with predetermined opportunities. These predetermined course sequences advantage and disadvantage students based on where they enter in ninth grade.

For this study, course sequencing focused on the different routes or pathways students may take to reach three credits of mathematics. These sequences may not have had labels but rather were understood through prerequisites and school-recommended routes through the courses. They were best seen in curriculum and course guides.

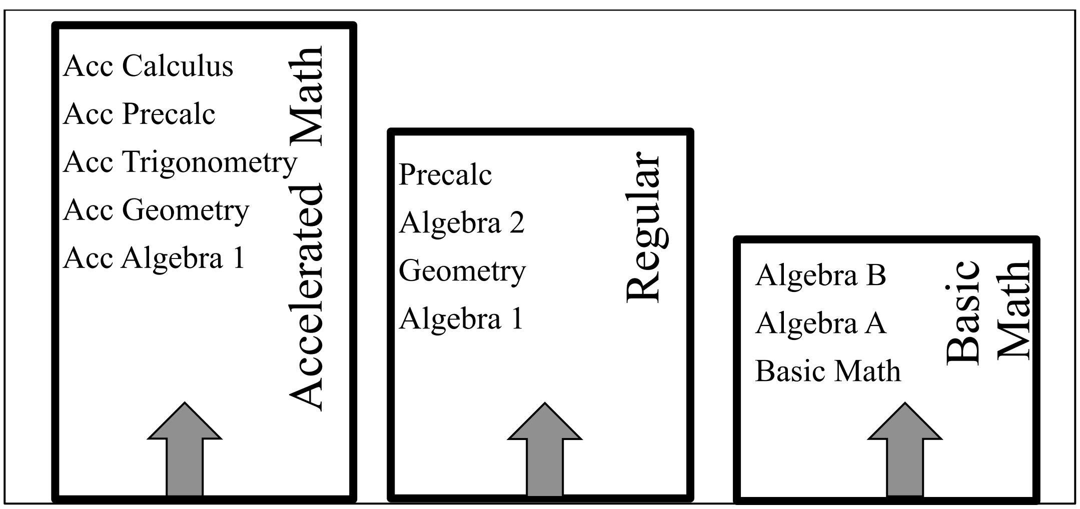
Mathematics and science are the two most sequenced subjects for high school students. Across the United States, high school mathematics is traditionally sequenced starting with Algebra I, then Geometry, followed by Algebra 2, onto Trigonometry/PreCalculus, and finishing with Calculus if a student makes it that far (Domina & Saldana, 2011). However, it should be noted that some districts have students take Algebra I in the eighth grade. The sequencing of these courses is purposefully organized in a hierarchical manner by topic and ability grouping (Schneider et al., 1998). The hierarchical structure is based on the institutionalized, pedagogical understandings of how topics in mathematics build upon one another and how less complex topics need to be mastered before more advanced topics (Schiller et al., 2010). This structure of mathematics course sequencing is the most traditional and popular way to deliver mathematics to high school students. It is this traditional structure that leaders can work either within or outside of when responding to the increase in graduation requirements. New sequencing may be designed and implemented as part of mathematics leaders' responses.

This traditional course sequencing is similar to the traditional tracking structures that were commonly used in schools until the 1980s. Although traditional tracking has been phased out, the remnants of tracking can be seen in the course sequencing structures in mathematics and science. Although this structure is common in high schools across the country, there is room for variation at the local level. During the design and implementation processes, decisions about the specifics of what students should learn in each course are made at the school level, allowing for variation within a school district if it has more than one high school (Stevenson et al., 1994). These decisions can also vary among teachers within a school depending on teacher autonomy and department structure. Local decisions can create differences in the curriculum in terms of the organization and content of courses (Stevenson & Baker, 1991).

Although the sequencing of Algebra I, Geometry, Algebra 2, and beyond is established, the pathway along this sequence can look different depending on the school. McFarland (2006) expanded on curricular differentiation by considering the patterns, structure, and dynamics of the movement students take through their mathematics departments. He examined the pathway structures available to students at two high schools, one rural and one magnet. The rural school had three different beginning points for students in their ninth-grade year depending on their mathematics skill level and placement that can be seen in Figure 2. Each predetermined path progresses farther than the one before it. This structure limits students based on their entry point and shows how course sequencing is closely linked to traditional tracking, as students are tracked into one route without ease of mobility across tracks.

Figure 2

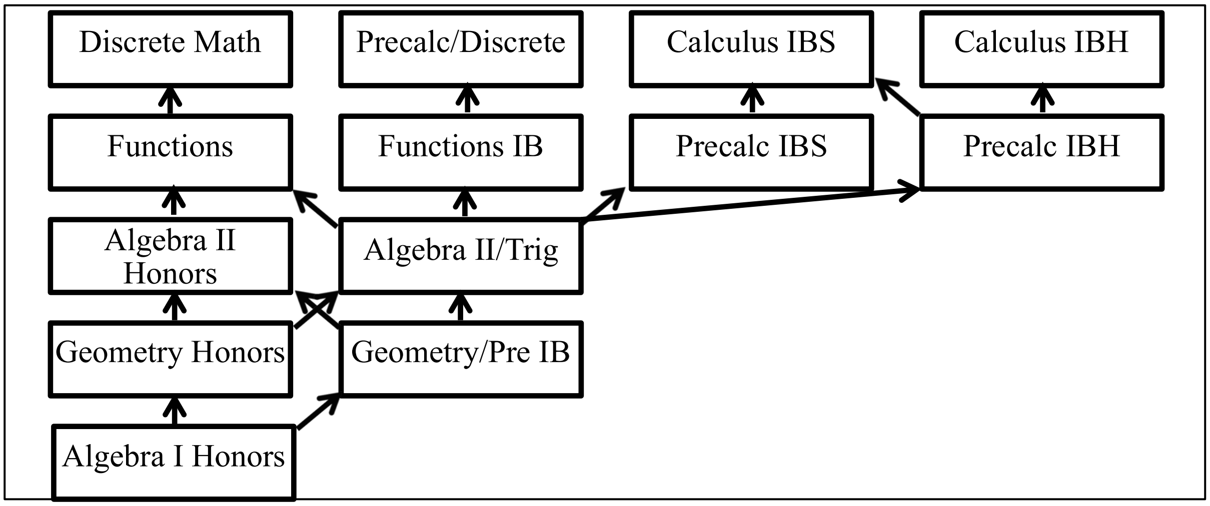
Rural School Curricular Flows From McFarland (2006)



The magnet school had one mathematics entry point for ninth graders as seen in Figure 3, and opportunities expanded as they went on in their schooling. Each year a student progressed, there were more course opportunities available to them. Where the other structure created dead ends for students, this structure allowed for growth and mobility.

Figure 3

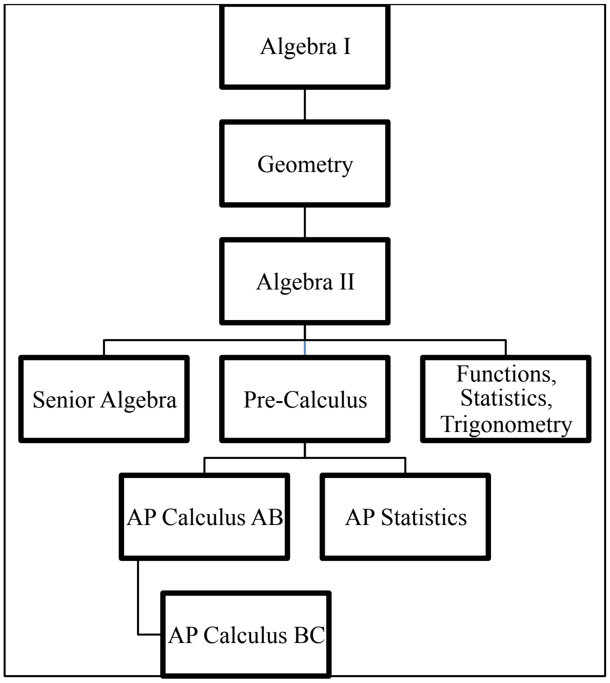
Magnet School Curricular Flow From McFarland (2006)

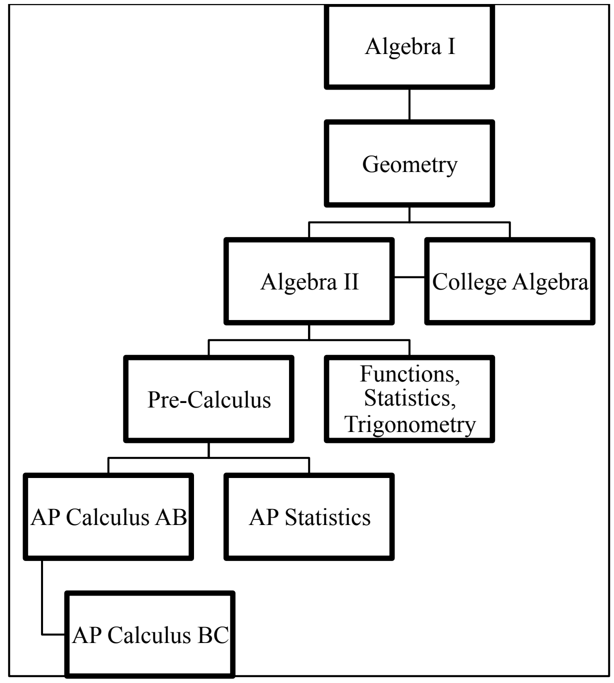


New credit requirements would strongly impact a school with multiple entry points, like the rural school in McFarland's study. One of the paths may not have three credits sequenced for students to complete. Mathematics leaders would need to create a way for students to complete three credits of mathematics. How they choose to do this can vary across school districts, as mathematics leaders may consider different factors.

Figure 4

Before and After Response by Rivercrest in Pilot Study





From my pilot study[4], in response to the third credit, Rivercrest changed title of Senior Algebra to College Algebra and opened the course up to juniors. The sequence changes can be seen in Figure 4. Opening this course up to juniors allowed a student to take Algebra I, Geometry, and College Algebra their first three years of high school to complete their three credits of mathematics. It will then be the student's decision to take Algebra 2 for their fourth year of mathematics. This response can be seen in the course guide, but to understand the rationale it was necessary to hear from leaders through interviews.

School policies create a "microstructure" for grouping students in different sequences, thereby directly impacting the stratification of students' opportunities (Useem, 1990). The stratification of students related to race has shown that Black and Latinx students are more often in the lower-level course sequence, while Asian students are in the higher-level course sequence,

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[4] I conducted my pilot study for this dissertation in two suburban districts, Rivercrest and North Lake, outside of an urban district in Wisconsin (not Robinson nor Vincent). I have chosen not to include these districts in the final study but have used the information I learned from the pilot study to inform my data collection and data analysis.

and white students are in the high and middle levels (Wallace et al., 2009). Depending on the sequence, a student's access to college can be limited or enhanced because of their preparedness and college admission requirements (Wallace et al., 2009). These sequencing structures have the potential to determine how far a student is able to go in their academic career from the moment they enter the sequence (Lucas, 1999; Lucas & Berends, 2002; Schneider et al., 1998; Stevenson et al., 1994).

The response by mathematics leaders to new graduation credit requirements can have direct effects on course sequencing, thereby impacting opportunities for students. Based on the opportunities for students created or eliminated by changes to course sequencing, these effects can positively or negatively influence the inequities that may already exist in the school district.

Course Offerings. The mathematics courses offered to students can vary across a state, across a school district, and within a school. Many studies have found that students in rural schools are less likely to be offered and take advanced mathematics courses compared to urban and suburban students (Anderson & Chang, 2011; Finn et al., 2001; Iatarola et al., 2011; Irvin et al., 2017; Monk & Haller, 1993). Larger schools tend to have more resources and are able to provide more diverse course offerings. This leaves students in smaller schools, specifically rural schools, with fewer opportunities than those students in larger schools. Although larger schools have more course opportunities, these opportunities can also be more stratified.

Research has also found that the types of courses offered by high schools differ by the students served. Schools that serve predominately families of higher socioeconomic (SES) status tend to offer more advanced courses than schools with families that have lower SES status (Attewell & Domina, 2008; Finn et al., 2001). Courses offered by a school also differ by the racial makeup of the school. Schools that predominately serve students of color are less likely to offer their students access to advanced courses, oftentimes having no mathematics courses beyond Algebra 2 (Oakes et al., 2004). Schools that predominately serve low-SES families and students of color tend to have courses that provide their students with less content than the courses students take at schools with more high-SES families and white students (Lee, Smith, & Croninger, 1997). So even though a school with predominately students of color may offer Algebra 2, the content is not guaranteed to reflect the rigor and content of an Algebra 2 course in a predominately white school. Adelman (1999) found that Algebra 2 courses in schools that were predominately low-SES families resembled the Algebra I courses in schools with predominately high-SES families.

So, depending on the school and students served, mathematics leaders can respond differently in terms of course offerings. Mathematics leaders in urban and suburban schools may respond with more advanced options, while leaders in rural schools may create additional lower-level courses. The intersection of these categories with the demographics of the student population served can provide for information-rich findings, as urban and suburban schools do not all serve the same demographic of students. This study examined how mathematics leaders of schools of different makeups and locations respond to the state policy and the rationale behind those responses. By understanding the rationale, greater insight can be gleaned in understanding where these differences come from.

Mathematics Beliefs

The beliefs that teachers have about mathematics create the structures that exist in school, while the beliefs they have about students can determine the opportunities students can access. It is important to consider mathematics leaders' beliefs about mathematics and beliefs about students, as these mathematics leaders construct the mathematical structures students experience through school.

Teachers' Beliefs about Mathematics. Both society and mathematics teachers tend to believe the mathematics curriculum is fixed and sequential (Buckley, 2010). Using survey data collected from high school teachers (McLaughlin & Talbert, 1993), Stodolsky and Grossman (1995) found secondary mathematics teachers see mathematics as stagnant and highly sequential; however, there were individual teachers who believed mathematics did not need to be so sequential. These teachers could work to change the traditional sequencing and structures of mathematics in their schools, but they would probably encounter pushback, as most teachers and the community would want to keep the traditional structures.

Mathematics teachers believe that the subject needs to be taught in a specific order, and variation of this order is not feasible (Gamoran & Weinstein, 1998). Teachers' own experiences of mathematics in school also influence their beliefs about what students should be taught and how (Ball, 1990; Battista, 1994; Cohen & Barnes, 1993). Because of this, during the interpretation, design, and implementation of a response to an increase in graduation requirements, mathematics teachers may tend toward keeping the same structures and sequences that are already established in their school. But if the department is made up of mathematics teachers who hold similar beliefs about mathematics being more flexible and want to change the traditional structure, it is possible that significant changes can be made (Stodolsky & Grossman, 1995). The beliefs of mathematics teachers play an important role in the structures of a mathematics department in terms of course sequencing and offerings. Therefore, considering the beliefs of teachers and mathematics leaders is important in order to understand the sensemaking that occurred during the interpretation of a policy and the impact on how the mathematics organization was constructed in the district.

Teachers' Beliefs about Students. Teachers decide the appropriate methods of teaching for a student based on their perception of the student's ability and expectation for the student (Beswick, 2016; Buckley, 2010). Although these studies are concerned with how mathematics curriculum is taught, the perception and expectations a teacher has for a student based on their ability also influences the courses teachers offer based on what they believe students need. This decision comes from the teacher's perception of the student's ability, what course fits that ability, and what they believe is necessary for the student's future. These evaluations and decisions are not completely conscious but are made in part by teachers' implicit beliefs about their students, which allows for unconscious prejudices to be enacted (Faulkner et al., 2014). Implicit bias is the unconscious stereotypes we have in regard to gender, class, race, and ability, etc. that can unintentionally impact our actions. Implicit bias can keep students from courses they are prepared for and have a right to take.

Battey and Leyva (2018) write about how understanding implicit racist attitudes can help in understanding disparities in mathematics education. Implicit racist attitudes are unconscious beliefs that can be opposite to one's publicly held attitudes (Greenwald & Banaji, 1995). So, a teacher can profess beliefs of equity but hold implicit racial attitudes that work against the claimed belief in equity. Although these attitudes are not explicit and do not appear through the use of blatant racist language, proxies are used in place of race (Dovidio & Gaertner, 2004). In a subject area like mathematics that is often described as color-evasive[5], there can be a lack of

[5] While others in the literature, including my participants, use the term colorblind, I use the term color-evasive. There has been a call to replace the problematic term, as it is ableist language and

discussion or mention of race during decision-making. So, although race is not being explicitly talked about, it is explicitly being left out. To understand how implicit attitudes can impact decision-making by mathematics leaders, teachers' beliefs about students according to gender, race, and class are presented below.

Beliefs about Students Based on Gender. The implicit biases of teachers influence their perceptions of students and have an impact on students' mathematical experiences. Mathematics and now STEM are part of a national discussion around the lack of interest and participation of girls and women in the field (Coronado & Neal, 2017). A lot of this comes from the field of mathematics being male dominated. This dominated space has led to mathematics being thought of as a more masculine subject, and biases about girls in mathematics have developed (Leyva, 2017; Stinson, 2013; Walkerdine, 1998).

Studies have shown how teachers often think of male students as more naturally adept at mathematics while female students have to work to do well in mathematics (Fennema, Peterson, Carpenter, & Lubinski, 1990; Jussim & Eccles, 1992; McKown & Weinstein, 2002). More recent literature has found that teachers rate girls at least as favorably as boys according to mathematics ability and performance. However, these studies do not account for behaviors of students and the possibility of teachers' perceptions of student achievement and teachers' perceptions of behavior being tied together (Robinson-Cimpian et al., 2014). Taking perceptions of behavior into account, girls were perceived as mathematically competent as boys of similar achievement only when they were seen as working harder, behaving better, and being more eager to learn

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is passive (Watts & Erevelles, 2004). Color-evasive acknowledges a person is purposefully avoiding talking about race and "calls into question the presupposed goodness of ignoring race" (Annamma et al., 2017, p. 156)

(Robinson-Cimpian et al., 2014). This supports the idea that teachers' perceptions of girls in mathematics are more tied to their behavior rather than a belief in their ability.

Beliefs about Students Based on Race. The longstanding negative stereotypes of Black students can influence the implicit racial attitudes of teachers that then impact the teachers' perceptions, resulting in different experiences of mathematics education for Black students. The perceptions formed by teachers of Black students are born from different stereotypes that then impact students' educational experiences in the classroom (Pianta & Stuhlman, 2004). Research has shown some stereotypes emerge from the simple movements of Black middle school students (Neal et al., 2003). Teachers rated the movement styles of African American students as lower in achievement, more aggressive, and more in need of special education services compared to European American student movement styles. These stereotypes impact how teachers perceive their Black students and influence the classroom and the experiences of students in the classroom.

Students are aware of the stereotyping and microaggressions that occur in mathematics classrooms (Berry, 2005; Martin, 2006; McGee & Martin, 2011). Black students point to interactions that are considered microaggressions throughout their experiences in mathematics that frame Black students' ability through deficit thinking (Martin, 2009). Battey and Leyva (2018) argue that the microaggressions position Black students as illegitimate members of mathematics classrooms.

Many of these negative perceptions of Black students are also present for Latinx students. Teachers have been found to nominate Anglo students for talented and gifted programs at a much higher rate than Hispanic students (Plata et al., 1999). In addition, for those Hispanic students that were nominated, they were still perceived to have less potential by teachers than their Anglo classmates. Latinx students are experiencing some of the same negative experiences in mathematics classrooms as Black students because of the negative perceptions teachers have of them.

These negative perceptions impact how students are placed and the opportunities available to them. The Latinx students not selected for the talented and gifted program will be shut out from those opportunities. The Black students identified for special education because of their movements might have a difficult time finding mobility out of that track once placed into it. These perceptions are based on implicit racial attitudes that are sometimes difficult to point out. Often these implicit racial attitudes are disguised with other language. Within mathematics education research, some have found teachers using proxies for race to discuss complex issues or their treatment of students, because discussing race can be uncomfortable (Dovidio & Gaertner, 2004). Discussion of culture, family values and involvement, poverty, or student behavior occurs when avoiding discussions of race (DiME, 2007; Johnson & Martinez, 1999). Throughout several case studies, teachers spoke of and framed their students using these proxies for race to explain how they taught and how they interacted with students. One study showed how lessons that were focused on repetition, basics, and fun were created based on teachers' perceptions of their students' deficits, because there were predominately Black students and students from low-income families in the classroom (Jackson, 2009). This teacher was not focused on building mathematics knowledge for future courses but rather was focused on the basics the students needed now. Although it is important for students to know the basics, it is even more important to allow them the opportunity and space to understand the material and work with concepts to grow their mathematics knowledge and build capacity for higher-level thinking.

Beliefs about Students Based on Class. The study above points to the intersection of race and class, as the teacher's classroom served predominantly Black and low-income students. Social class is another influence that shapes the perceptions teachers have of their students. Teachers can hold different expectations for students based on the student's social class (Warren, 2002). While studying the effects of gender and socioeconomic status on teacher perceptions, Auwarter and Aruguete (2008) found that teachers predicted less promising futures for hypothetical students of a low-SES background than identical students with a high-SES background. When both SES and gender were considered, something interesting happened: teachers rated low-SES female students more favorably than high-SES female students but rated high-SES male students more favorably than low-SES male students. These results are in reference to overall academic future, not just mathematics future, but they point to the importance of considering the multiple influences that together form a teacher's expectation of a student.

Although a school may not have a defined tracking structure, teachers' expectations can influence the courses students are offered and take, which can lead to classrooms that are segregated along gender, class, and racial lines. With the disparities in expectations and placement, race and tracking/sequencing and placement become conflated. Lewis, Diamond, and Forman (2015) found that at Riverview High School, the lower-level courses were understood to be courses for students of color. When talking about the disparities in racial makeup of courses, a white Riverview student said, "I mean, if you look at the numbers, I'm betting there are more white kids that are in the honors classes, and more black kids that are in minority class" (Lewis & Diamond, 2015, p. 97). By calling the lower-level courses "minority class," this student illustrates how the tracks in Riverview had become racialized. This racialized tracking hierarchy translated to lower expectations for Black and Latinx students. These courses also had less rigor compared to the courses taken by white students in the school. This example of racialized tracking leads us to consider how not only race but gender and class intersect with mathematics and create a space not meant for all students.

Mathematics and the Intersection of Gender, Class, and Race

The impact of gender, race, and class does not just influence schools through the actions or beliefs of teachers and leaders in education. Mathematics and schools are systems created to privilege some students over others (Gutiérrez, 2013; Tate, 1997). University mathematicians, who are mostly white men from the middle and upper classes, define the field and values of mathematics (Ernest, 1991). Therefore, it is not surprising that mathematics would be formed to privilege this group by advantaging males over females, white over Black students, and middle classes over lower classes. Discussions of social issues concerning gender, race, and class inequities do not stay outside of mathematics. Students are aware of the stereotypes and narratives around issues of stronger mathematics ability of boys over girls, underrepresentation of different races in higher level mathematics courses, and the correlation between achievement and social class (Esmonde et al., 2009). The decisions made by school districts can either challenge the system of social reproduction along these gender, class, and racial lines or perpetuate these inequities.

Gender and Mathematics. There is a national conversation around the underrepresentation and underachievement of girls and women in mathematics. This conversation perpetuates and strengthens the masculinization of mathematics. Girls and women are held to the same measures of success that their male counterparts are, but when we remember that these measures and systems were created for male students, we can begin to understand how these measures were also created to keep girls and women from achieving (Boaler, 1997).

Researchers (Fennema & Sherman, 1978; Fennema, Carpenter, Jacobs et al., 1998; Leyva, 2017) have shown that earlier work on gender and mathematics unfairly points to something innately different about female students in mathematics to explain their lower achievement and different approaches to problem solving. These studies are shortsighted and do not consider where these methods of learning or personality traits are developed. Hyde and Jaffee (1998) suggest that it is not something innate in girls, but that teacher-student interactions may influence how students conform to gendered expectations of how to perform mathematics. Boaler (2002) explained, “An important responsibility of gender researchers in the future will be to build upon our predecessors’ work and search for explanations of the differences they found, not within the nature of girls, but within the interactions that produce gendered responses” (p. 139). Many so-called radical feminists have pushed on research to consider the ways society and mathematics needs to change to stop privileging men in mathematics (Lacampagne et al., 2007; Leder, 2010; Lubienski & Ganley, 2017).

Studies like Lazarides and Watt (2015) have taken up this task to push against research on characteristics of girls in mathematics and have found that characteristics of a mathematics classroom, such as teacher interactions and class goals, affect the mathematical career intentions of girls. Other studies have also investigated how interactions with teachers can position girls inside or outside of mathematics (Robinson-Cimpian et al., 2014).

Class and Mathematics. The knowledge and skills possessed by students of white, middle-class families make up what Bourdieu (1990) defined as habitus. Habitus is the “collection of informal skills and knowledge which participants have constructed over time”

(Jorgensen et al., 2014, p. 223). A person's habitus is formed through the socialization of their family and immediate environment. Students engage in learning using the knowledge and skills, i.e. habitus, they have collected through their early life.

The habitus of an individual does not work in isolation; it operates within a set of rules defined by society. Bourdieu (1990) defines this set of rules as the field of power. A person's habitus either matches or varies from the field of power. Taking education as a field of power, the habitus of white, male, middle-class or upper-class students aligns with the field of power and allows these students to succeed with minimal barriers. Students and families whose habituses do not align with the field of power established in education experience barriers in the structures of schools, the structure of school subjects, and in communication with teachers. The barriers created by the misalignment produce inequities.

Studies have shown the habitus of some students does not align with the mathematics classroom in terms of language and teaching strategies (Walkerdine & Lucey, 1989; Zevenbergen, 2000; 2001). Students from middle-class families have a linguistic repertoire that aligns with the language standards of the classroom (Zevenbergen, 2000; 2001). Here the habitus, in the form of the language of the middle-class student, aligns with the field of power, the established language of the classroom. On the other hand, students from working-class families hear and use language that is not as closely aligned with the mathematics classroom (Walkerdine & Lucey, 1989).

While studying how students in a socioeconomically diverse classroom responded to instructional strategies from mathematics reform, Lubienski (2000) found that students of high-SES and low-SES responded differently to the strategies implemented. Lubienski connected the difference in students' responses to their class differences and the cultural class differences established in the literature, such as middle-class students having more practice and support to be creative and exercise autonomy. This grants them confidence to problem solve, whereas working-class students are more likely to be obedient and expect to be shown the way to problem solve (Lareau, 2011; Lubienski, 2000).

Although these characteristics of class differences are presented as coming from the students' cultures and homes, it is important to acknowledge how schools support and perpetuate these differences by assuming these learning distinctions in students. Like the studies of different approaches to problem solving by boys and girls, this study points to issues of structures in schools that benefit some students and disadvantage others. Lubienski (2002) writes, "Researchers and educators should not assume that learning mathematics through problem solving and discussion is equally natural for all students. Instead, we need to uncover the cultural assumptions of these particular discourses" (p. 120). Uncovering these cultural assumptions can explain differences among low- and high-SES students through a lens of structural barriers in the form of instruction strategies rather than attributing the differences to a student's home.

Using Bourdieu's framework as a lens for understanding allows the lack of success by students of backgrounds other than middle class or upper class to be seen as a systemic problem rather than an individual student's problem (Jorgensen et al., 2014). How a student's habitus relates to the field of power of school and particularly the field of power of mathematics becomes interpreted and established as the student's innate ability (Thomson, 2002) and the student's reputation as a successful learner (Jorgensen et al., 2014).

In addition to studying the influence of social class at the individual level, social class has been studied at the school level. Anyon (1981) examined the mathematical knowledge present in elementary schools of four different social classes. Students in the working-class schools were not being prepared or given the chance to prepare for more advanced mathematics where creativity and discovery are important. There was a lack of interest in growing students' knowledge and more of an attitude of, "Well, we keep them busy" (p. 7).

Teachers at the middle-class school were focused on preparing students for what they needed in high school and even college. The knowledge and comprehension that they wanted students to achieve was based on textbooks, which was different from the affluent professional school, where teachers wanted students to discover and construct their own knowledge through activities of exploration in mathematics.

At the executive elite school with the most privileged students, teachers' goals were to develop mathematical reasoning in students while simultaneously getting through the curriculum to make sure they were prepared for the best schools. The students in the executive elite school are the most privileged of the students in Anyon's (1981) study. The differences in learning structures of their school and the middle-class school, for example, allow for students at the executive elite to acquire knowledge and habitus that is necessary to play the game in higher levels of mathematics and education. The differences in how these four schools value knowledge and prepare students impact the opportunities the students will have in their future education.

This is important to consider, because based on the school and socioeconomic level different decisions can be made when creating structures for students to travel through. The works of Lubienski (2000) and Jorgensen et al. (2014) look at individual students and attribute student variation differently. Both Lubienski and Jorgensen et al. find that structures of school fail to recognize the habitus of those not in the middle class. Anyon (1981), on the other hand, attributes social class inequities to the school and teachers by focusing on observations of mathematics content and interviews with teachers. Together, these three studies show how social reproduction thrives when some students' habituses are recognized and others' are not, like in Lubienski (2000) and Jorgensen et al. (2014), or by recognizing habitus but not giving students the opportunity for knowledge growth, like the working-class school in Anyon (1981).

Both of these perspectives need to be considered. Looking at what knowledge a student brings to the classroom is necessary so that the learning in the classroom can align and build. However, this needs to be done with caution. When students' knowledge is assumed and is viewed as a deficit, then social inequity appears. By recognizing the impact of social class assumptions and the misalignment between students' knowledge and the structures of schools, we can understand that changes to school structures can impact social class inequities in a positive or negative way.

The way mathematics leaders respond to the new state policy in terms of course offerings and sequencing can either perpetuate or challenge the field of power of mathematics. It is possible for policies and structural shifts to challenge the social and cultural inequities that are so embedded in society, but those policies and attempted shifts have not always been successful (Whitty, 1997). For policies to have that power to shift the normalized practices of education, specifically mathematics, we need a focused effort on equity and identifying how the field of power keeps students from succeeding and the opportunities to which they have a right. This effort needs to focus on how changes in mathematics structures and policies can align with a variety of habituses based on socioeconomic status.

Race and Mathematics. This discussion of habitus and fields of power in relation to mathematics focuses on class, but race also plays a major role in the experience and opportunities of a student in school and in mathematics. Martin (2009) argues and explains that mathematics education is a racialized experience, as the socially constructed meaning of race impacts the structuring of experiences and opportunities for students in mathematics and the framing of a competent mathematics student. Research from this perspective focuses on the racialized nature of students' experiences in mathematics rather than the achievement gaps between races that marginalize Black, Latinx, and American Indian learners and perpetuate a belief that racial hierarchy in mathematical abilities is natural (Education Trust, 2003; Martin, 2009). Observing mathematics through a critical lens, the beliefs about mathematical ability and opportunity are formed by the socially constructed meanings of race (Martin, 2008). A student's racial category carries a symbolic meaning that other people use to determine legitimacy and status within mathematics (Lewis, 2003).

Mathematics is often incorrectly thought of as a neutral field, removed from social issues like race. Many researchers have established that mathematics is a racialized experience for all students, not just students of color. These racialized experiences are born out of the history and establishment of mathematics as a white institutionalized space (Martin, 2008; Moore, 2008). The term "white institutionalized space" was first used in work examining the white space of law schools where the ideologies and practices privilege white perspectives, ideological frames, power, and dominance while at the same time presenting law as neutral and objective (Moore, 2008). Using Moore's research, Martin (2008) shows how contexts of mathematics education, research, and policy are examples of white institutional space. Mathematics is often thought of as a neutral space like law school (Ernest, 1991), but mathematics is not immune to the system of racism in society.

This dissertation study focused on the structures that students experience through their mathematics educational career in high school, acknowledging that this experience is racialized. To understand the impact of the policy and mathematics leaders' response on student opportunities in mathematics, it is important to break from primarily looking at outcomes and move to examining how school experiences can contribute to these outcomes (Lubienski & Bowen, 2000). The districts' mathematics structures were examined to understand how these mathematics experiences are formed.

Equity in Mathematics

There is no single understanding of equity. Scholars have used many different definitions and views of equity in research (Gutstein et al., 2005). In this section, I will introduce some of the ways equity has been understood, operationalized, and critiqued.

One traditional understanding of equity is explained as two views of equity: equity as a process and equity as outcomes (Crenshaw, 1988; Rousseau & Tate, 2003). Equity as a process can be understood as equal treatment and the belief that equity is sameness (Gutiérrez, 2012; Rousseau & Tate, 2003). This view of equity means providing students with the same curriculum, with the same instruction, and the same support. Some have discussed the process in terms of the conditions of learning for students (Gutstein et al., 2005).

Equity as outcomes challenges equity as a process by saying there is no equity if the outcomes of the process are differentiated (Rousseau & Tate, 2003). If students are receiving the same instruction, but all students are not reaching the same outcomes, then equity is not being achieved. To achieve equity of outcomes, multicultural curricula has been suggested as a method to provide instruction to a variety of learning styles and connect with students from various backgrounds with the purpose of having an impact on student performance and outcomes (Carey et al., 1995).

In other research, two versions of equity have been used: equal outcomes and equal access (Post, 2004). Like Crenshaw's (1988) view of equity, Post understands equity as equal outcomes but also equal access. This version of equity as equal access can be related to equal process, as equity can be students having equal access to an equal process, like a specific course. However, equal access does not necessarily mean that equal access is taken or received. A student may have equal access to Course A because there are no barriers, but if there are other course options, a student may take one of those courses that is not the same standard or equal to Course A.

The understandings of equity above all include equal outcomes. This understanding has led many researchers to focus on outcomes and the achievement gap between students of different races, specifically the white/Black and white/Latinx gaps (Gutiérrez, 2008). Gutiérrez (2008) and others have used the term gap gazing to describe the obsession with focusing on the single issue of the achievement gap (Benjamin Banneker Association, 2005; Rodriguez, 2001). These researchers want to broaden the notions of equity to include supporting mathematics identities, excellence, and literacies of students that are historically marginalized.

Research on the achievement gap perpetuates and normalizes students of color, English language learners, and students of low socioeconomic status as low achievers without acknowledging the racism in schools and in society (Darder & Torres, 2002; Gutiérrez, 2008). Equity discussions tend to minimize any discussion of race or existence of race (Martin et al., 2017; Parks & Schmeichel, 2012; Stinson, 2011). Martin (2019) writes, "Equity work in mainstream mathematics education often represents little more than a convenient and comfortable waypoint so that the path of racial justice does not have to be traversed" (p. 460). Martin (2019) goes on to say that equity reform in mathematics education is not framed as liberatory (against the system) but is framed for equity within the current system. Equity and inclusion are then an implied promise to keep the status quo of white supremacy and only make incremental changes that do not fundamentally change the system (Martin, 2019).

Previous understandings of equity and critiques of current equity reforms create a space to grapple with how equity should be understood and how to achieve equity. Lubienski and Gutiérrez (2008) have two different views of the importance for research on the achievement gap, but both agree “the goal is for students to gain access to dominant and critical ways of viewing the world so that they might become empowered citizens” (p. 367). Gutiérrez (2002) explains that equity means “the inability to predict mathematics achievement and participation based solely on student characteristics such as race, class, ethnicity, sex, beliefs, and proficiency in dominant language” (p. 153).

To achieve true equity, she presents four dimensions of equity that all need to be addressed: access, achievement, identity, and power (Gutiérrez, 2007). Access refers to the resources available for students, and achievement addresses test scores and participation rates. These two dimensions are the dominant axis, as they represent the status quo and the traditionally understood dimensions of equity. Identity and power represent a critical axis, as they address the social and political issues in society. Identity can be understood as maintaining cultural connections in mathematics education, and power is the agency of students to effect change in school and society (Gutiérrez, 2012).

Gutiérrez’s dimensions of equity and other researchers’ views of equity appear in how mathematics leaders discuss equity in terms of the state policy. However, mathematics leaders may share additional views and understandings of equity. Lubienski and Gutiérrez (2008) recognized this and explained that a researcher cannot address every aspect of equity, but “we all have something unique to contribute that drives our work and offers a piece of the puzzle" (p. 370) to mathematics education.

Previous Research

Previous research has examined how leaders respond to instructional policy related to mathematics education by looking at the three processes of interpretation, design, and implementation of instructional policies (Spillane, 2000; Spillane & Burch, 2006). Although these three processes have not been examined in the context of graduation requirements, there is ample research on what was implemented after an increase in mathematics credit requirements (Clune et al., 1989; Cohen & Ball, 1990; Porter, et al., 1998) and the impact on students' course-taking (Chaney et al., 1997; Schiller & Muller, 2003).

Often through the implementation process, leaders redefined the policy to fit the local agenda and needs of their own community (Spillane, 2000). For example, in the mid-2000s there was a growing push for "Algebra 2 for all." This led to a variety of "fake" Algebra 2 mathematics courses that had lowered proficiency standards (Steen, 2007). Districts and schools responded with mathematics courses with the name Algebra 2, but the classes were not defined by the standard rigor and did not include the standard content. These responses satisfied the requirement without investing resources to sufficiently implement the initiative (Noddings, 2007).

Although the "Algebra 2 for all" initiative was for a specific course and focused on a third credit, Algebra 2 is typically the third course students in high school take. Therefore, understanding the implications of the "Algebra 2 for all" initiative are helpful when examining districts' responses to the third-credit policy. If the response to "Algebra 2 for all" was the creation and addition of less rigorous courses for students to complete instead of the traditional

Algebra 2 curriculum, similar decisions might occur in response to a third-credit requirement. The response to the “Algebra 2 for all” initiative suggests the importance of understanding how leaders interpret policy and what beliefs are enacted during the interpretation, design, and implementation processes.

While the processes of responding to graduation requirement policies have not been examined like those responses to instructional policies, there has been research on what has been implemented in response to graduation requirements and the outcomes on students’ course-taking. When states started increasing graduation credit requirements, there were hypotheses of detrimental effects. One hypothesis conjectured requirements would be met through the creation of remedial or basic courses (Porter et al., 1998). These concerns were not unfounded; there had been findings that schools tended to create basic, remedial, and general mathematics courses in response to increases in mathematics credits needed for graduation (Clune et al., 1989). There are different rationales in creating courses at these levels. These courses allow students to build their basic skills and prepare for the mathematics courses they may need in the future. However, these courses also create an alternative route in the traditional mathematics structure for students to complete credit requirements. This alternative route and these basic level courses would ensure students who have been labeled “at risk” or deemed incapable of completing the credit requirement in “at level” courses receive a third credit for graduation.

Other studies showed that some schools added middle level courses like Pre-Algebra and Algebra I when responding to mathematics credit requirements (Clune & White, 1992). Unlike the basic level courses, these courses allowed students to learn at a level above remedial and remain within reach of the traditional mathematics structure. By keeping students within reach of the traditional mathematics sequence, schools were not resigned to the idea that certain students could not succeed at high levels and on the traditional mathematics sequence. Although at the time of Clune and White's (1992) study Pre-Algebra was considered a middle-level course, today it would be considered a low-level course for high school students, as Algebra 1 is the assumed course for ninth graders.

However, the types of courses created in response to increased graduation requirements can work against the equity the policy intends to achieve (Porter et al., 1998). A high level of course work for students is not guaranteed with increased credit requirements; in fact, increased requirements can push certain students into courses that are not challenging.

Schiller and Muller (2003) studied the effects of greater high school graduation requirements and accountability policies on students' course-taking. By using longitudinal data to connect students' course work with states' graduation requirements for high school students, they found that graduation requirements shape the course trajectories of students through high school. Graduation requirements had a small but statistically significant effect on the types and number of mathematics courses taken by students as well as an effect on stratification related to social class and race or ethnicity. Although more African American students were taking more advanced courses than before the graduation requirement, it was still in lower numbers and lower courses than their white schoolmates. Graduation requirements are capable of influencing the course-taking of students and therefore increasing students' opportunities, but it is necessary to remain aware of other influences on students' course-taking that can affect equity.

There are many potential limitations to the graduation requirements. There is little control over how mathematics leaders interpret, design, and implement these increased requirements. Once enacted, state policies around graduation requirements tend to be open for interpretation. Although Schiller and Muller (2003) found a significant effect on the types of courses, others have found that students were taking more mathematics courses, but they were taking additional introductory courses (Chaney et al., 1997). Students may be taking more introductory courses, because new opportunities might not be open to all. Domina et al. (2016) found that during the intensification of curricula, “affluent and high achieving schools create new academic opportunities for elite students…rather than creating heterogeneous learning environments” (p. 1260). So, the impact seen on course-taking can also come from the structures students encounter during their high school mathematics career.

This period of intensification stressed the importance of mathematics and increasing course requirements for high school graduation (Burris & Welner, 2005; Dougherty et al., 2006). The intention of these policies was to increase the number of students in high-level mathematics courses and narrow the gap of mathematical inequities based on students’ class, race, and skills (Domina & Saldana, 2011). These policies have been considered a success, because more students began taking more mathematics courses. Students were progressing further in the course sequencing with nearly half of all high school graduates earning credit in trigonometry, which is often part of Pre-Calculus. Although this is progress, it still leaves many students behind.

More courses do not necessarily solve the issue of inequity or the concern over the lack of mathematics preparation of students. Chaney et al. (1997) write, “One cannot assume that students take courses within a specified sequence and that an additional year of course work will advance them in that sequence. Students may take courses that do not advance them at all” (p. 231). There are many different decisions mathematics leaders can make when responding to an increase in graduation requirements. Some mathematics leaders target course offerings while others target course sequences. Therefore, examining how mathematics leaders responded in terms of structures like these provides insight into how those responses may lead to greater opportunities for students given the different structures.

What Is Missing?

The implementation of a state policy has been shown to rely on both district leaders and teachers' understanding of the policy. The bulk of previous research on responses to state mathematics policies is focused on districts and schools responding to policies specific to mathematics instruction (Coburn, 2004; Cohen & Ball, 1990; Cohen & Barnes, 1993: Spillane, 1999; Spillane, 2000; Spillane & Burch, 2006; Spillane & Callahan, 2000; Spillane & Thompson, 1997; Spillane & Zeuli, 1999). Research on responses to mathematical instructional policies provides a foundation for understanding leaders' responses to Wisconsin's state policy.

Policymakers need to understand responses to those educational policies that are not directly related to instruction. Policy for graduation credit requirements is distinctly different from instructional policies, because the primary response and implementation to credit requirements happens at a district level, not at the classroom level. In addition, graduation requirement policy is not about instruction but about the structures needed for students to reach the new requirement.

There has been research on graduation requirements and increased credits, but time has passed since these studies (Clune et al., 1989; Cohen & Ball, 1990; Porter, et al., 1993; Sipple et al., 2004; Spillane, 2000; Spillane & Burch, 2006) were completed, and the interest in researching district responses to mathematics credit requirements for high school graduation has diminished. Many states transitioned to three or more credits years ago, and research has focused on different forms of graduation requirements like exit exams. The first Wisconsin high school class required to have three credits of mathematics was the Class of 2017. This timing provides the opportunity to fill a gap in the literature. The types of courses added in response to new credit requirements changed in a short amount of time between the late 1980s and early 1990s. When responding to credit requirements now, have they changed once again? With the longer period of time between the first states' responses to three credits and Wisconsin's, has time allowed Wisconsin school districts to learn from those that went before?

The research that does exist on graduation requirements only explains the impact on students' achievement or later success. Examining the outcomes that occur in response to graduation requirements is important, but understanding the process of creating the structures that lead to these outcomes is also needed. This study focused on the processes and decision-making taken by the school districts to examine considerations and rationale from the processes and how those decisions impact opportunities for students.

The outcome focus of previous research on graduation requirements used race, class, and gender as variables for explanations. This study looked at race, class, and gender as they appeared in discussion during the decision-making process and the implications for opportunities for students along those lines. Examining how race, class, and gender were considered during the decision-making processes provided insight into how choices made in the districts' response acknowledged current inequities and potentially made an effort to provide equitable opportunities for students regardless of demographic characteristics.

Chapter 2: Methodology

In this chapter, I describe my research methods. First, I review the research questions for this study and then explain why a cross-case study design is appropriate. I then discuss the site selection process and provide a variety of relevant demographics for each district in the sample. From there, I discuss my methods of data collection and data analysis. I conclude this chapter by discussing my potential research bias and how I attempted to protect my data collection and analysis from those biases.

Research Questions

In December 2013, Wisconsin changed its high school graduation requirements to three credits of mathematics instead of two. In this study, I examined how mathematics leaders made sense of and responded to graduation requirements in terms of course offerings and course sequencing at high schools. After examining the actions by the leaders, I assessed the implications of these decisions for educational opportunity. More specifically, I ask the following questions:

1. How do mathematics leaders respond to increased course requirements for mathematics in terms of course sequencing and course offerings at high schools?
2. What rationale do these leaders give for their responses?
3. What are the implications of these responses for students' mathematical opportunities?

Cross-Case Study

For this study, I used a qualitative cross-case study design. The qualitative data included interviews with mathematics leaders and the collection and analysis of documents to understand the responses of the mathematics leaders.

Qualitative studies are useful when seeking to understand a process and the perspectives of the people involved (Merriam, 1998a). I was interested in how mathematics leaders in seven school districts responded to the state policy requiring three credits of mathematics for high school graduation. In order to understand the reasons for mathematics leaders' responses, I collected their perspectives through interviews. A case study design was appropriate, because it allowed me to focus on the leaders' responses and how the leaders confronted the implementation of the new state policy (Shaw, 1978). Because the increased graduation requirement impacted schools throughout the state, I looked at seven districts to account for potential variation. I focused on high schools in each district to understand how mathematics leaders responded and how they implemented their responses. By defining each case at the district level, I was able to consider the relationship between the high schools and their school districts, especially for those districts with multiple high schools.

Researchers choose case studies when they are interested in a process because of the in-depth understanding that results from the data. Case study evidence allows researchers to glean insight and interpret in context, which can influence future policies, practice, and research (Merriam, 1998a). Case studies provide in-depth information on the processes and actions being studied that other educational actors and decision-makers can consider when they encounter similar situations in their work (Stenhouse, 1988).

To provide the necessary in-depth understanding of a situation, many case studies describe a case and then analyze, assess, and evaluate it (Hancock & Algozzine, 2017). Guba and Lincoln (1981) believe case studies are best for reporting an evaluation and providing "information to produce judgment" (p. 375). This study describes the responses formed by mathematics leaders at each district, treating one district as one case. The study then analyzes each case in order to understand the relationship between school and district during the response process and to evaluate how the responses may have influenced mathematical opportunities for students. By first focusing on one district at a time, I uncovered and understood the processes and factors at play during the interpretation, design, and implementation of their responses to the policy. From there, I had a comprehensive understanding of the decision-making process of the mathematics leaders at each district and how the school and district communicated with one another. Similar to McFarland's (2006) study, I then was able to examine similar processes, structures, and themes among high schools. For my study, I was able to examine across high schools in the same district and between separate districts. In addition to comparing and contrasting between districts, the multi-case study strengthens the validity of a single case if similar or unique findings are revealed (Miles & Huberman, 1994).

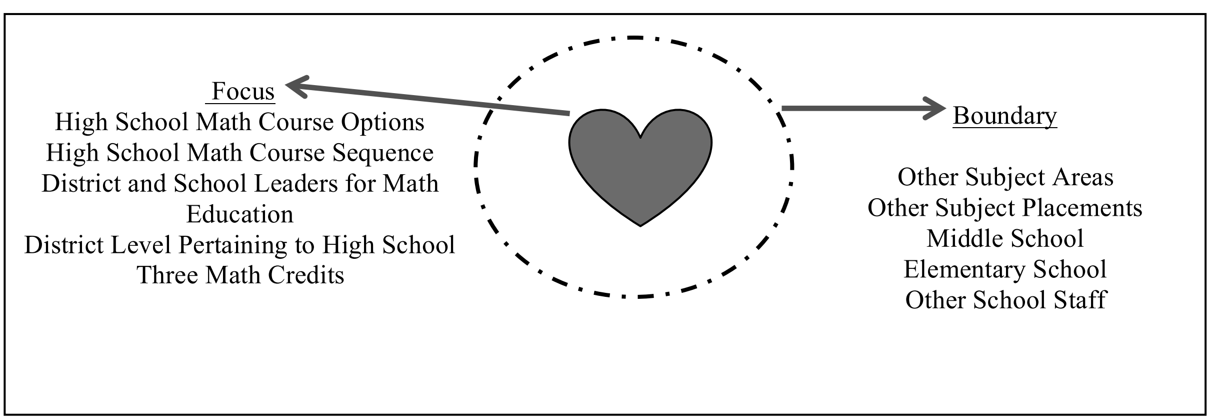
It is my hope that insights from my research can influence mathematics leaders and school districts as they evaluate the structures in their mathematics departments. This research can influence mathematics leaders to change the structures they have in their mathematics departments that limit certain students. It can also influence future research on the common structures and sequences in mathematics and their impact on mathematical opportunities.

Site Selection

Although there are many definitions for a case study, all definitions indicate the importance of the boundary of each case (Patton, 2014). Before considering site selection, establishing the boundaries of each case and site is important. Miles and Huberman (1994) illustrate a case and its boundaries with a figure of a heart and a circle around it. The heart is the focus of the study, which represents the process being studied and defines the case. The circle is the boundary for the case, with the edges representing what will not be studied. The boundary defines where the case ends and what is not part of each case. Figure 5 shows the focus and boundary for this study. The focus of this study is the response by mathematics leaders in school districts to an increase in mathematics credit requirements in terms of course options and sequence of high school mathematics courses. The focus location of this study is the school district. The high schools of each school district were considered to see how district decisions were ultimately implemented and to understand the connection and relationship between the districts and high schools during the response process. Those mathematics leaders who were interviewed as part of this study are also included as part of the focus of the study. The boundary of this study includes any other subject areas, elementary schools, and any other school staff members. Although mathematics sequencing and placement often starts in middle school, this study did not consider middle schools in the focus. The boundary for this study keeps the case defined as the high school mathematics structures of the districts and the mathematics leaders in the district that influence these structures.

Figure 5

Case Definition Based on Miles and Huberman (1994)



Sample

With the focus and boundary established for each case, I selected districts strategically and purposefully (Patton, 2014), including criteria for each district and attempting to be representative of Wisconsin. The research question narrows down potential school districts to those in Wisconsin that required two credits before the state policy was approved in December 2013. Originally, I intended to use only districts that officially changed their mathematics graduation requirement to three credits in the 2016-2017 school year.[6] The 2016-17 school year was the official deadline to implement the state policy so that the graduating class of 2017 would earn three credits. While discussing district options with a fellow researcher, we came to the conclusion that I should also include districts that officially changed in the 2014-2015 and 2015-2016 school years. Selecting districts that changed in these three school years would capture different responses to the state policy. Those that officially changed in 2014-2015 would have taken less time to plan and respond to the state policy. Considering three different school years added a time dimension to the discussion of how the leaders in each high school responded. The state policy had been discussed for a while, so districts were anticipating the change. However, not all districts were preparing for the change until it was passed, as they were focused on other district and state initiatives. Understanding the impact of time on planning and responding to the state policy can point to different factors leaders considered during the response process.

In addition to the criteria of when the district officially changed their requirements, I selected different types of school districts. I have included two districts with multiple high schools. Including these districts provided an opportunity to understand how district decisions are implemented across multiple schools. I selected school districts purposively to include a

[6] The official change is defined by information available on WISEdash, a public database of school district data.

variety of urban, suburban, and rural districts. According to literature (Anderson & Chang, 2011; Finn et al., 2001; Iatarola et al., 2011; Irvin, et al., 2017; Monk & Haller, 1993), course opportunities vary across urban, suburban, and rural districts, so looking at schools in each category provided comparative theoretical leverage.

Defining Urban, Suburban, and Rural

Describing a school district using urban, suburban, and rural classifications tends to provoke images of what these spaces look like. Researchers have been grappling with how to define these classifications (Lacy, 2016; Milner, 2012; Posey-Maddox, 2016). "Urban" elicits classrooms of majority students of color and students of poverty, rather than eliciting images of a school building set in a large metropolitan city surround by businesses (Milner, 2012). "Suburban" tends to be imagined as middle-class white families living in large homes with green lawns and a picket fence (Lacy, 2016). However, Black families have been living in suburbs for over a century, and recently there have been large demographic shifts, so much so that in 2010 the majority of every major racial group lived in the suburbs (Frey, 2015; Lacy, 2016). "Rural" creates images of country life, poverty, and small and homogeneous communities (Kettler et al., 2016; McCulloch & Crook, 2008). These descriptions can be true for some rural districts but not all, as there can be a low-poverty rural district next to a high-poverty rural district (Fishman, 2015). Of course we can establish generalized characteristics for urban, suburban, and rural school districts that may apply to many of them, but I wanted to stay away from defining based on characteristics.

For this study, I used the National Center for Educational Statistics (Geverdt, 2015) classifications for school districts. The NCES classifies districts by city, suburban, town, and rural. According to the U.S. Census Bureau, city and suburban comprise urban while town and rural compromise rural in the urban-rural dichotomy. For this study, I used the NCES definition of an urban district as a school district in a city classified city-large, city-midsize, or city-small. Suburban districts for this study follow the NCES suburban-large, suburban-midsize, or suburban-small classifications. To select rural districts, I used the U.S. Census Bureau definition using the NCES classifications town-fringe, town-distant, town-remote, rural-fringe, rural-distant, and rural-remote.

Urban Districts

Milwaukee is the only Wisconsin city categorized as city-large and was not considered for this study because there are no other similar districts to compare it to. There are two cities categorized as city-midsize. One was not considered because the school district already required three credits of mathematics years before the state policy change. The other was considered but the district did not approve of the study to be conducted. There are fourteen cities that are classified as city-small in Wisconsin. I selected an urban district, Robinson, from the southeastern part of the state where many of the Wisconsin urban districts are located. After using the criteria of the year that the district applied the state policy, there were five districts left to consider from other areas of the state. From those five school districts, I selected Vincent because of its location in western Wisconsin where there are not many urban districts.

Again, this study is using the definition of urban to refer to the location of a school district in a city classified by NCES. These two urban districts show how defining the characteristics of an urban school district can be difficult. Milner (2012) writes of his experience in a Midwestern, rural school district where the superintendent described one of the district's schools as urban. As Milner visited the school, he realized the superintendent was using 'urban' because the school had a large population of Black students. Milner explains,

> People across the U.S. classify schools in different parts of the country as urban because of the characteristics associated with the school and the people in them, not only based on the larger social context where the schools and districts are located (p. 557).

This use occurs when districts share characteristics typical of large urban districts like a large population of Black students or a large population of English Language Learners (ELL) (Milner, 2012).

Milner created an evolving typology of urban education with three categories: urban intensive, urban emergent, and urban characteristics. 'Urban intensive' refers to schools in large, metropolitan cities like New York or Atlanta. 'Urban emergent' refers to schools is smaller cities than those in the previous category, but still large cities like Nashville or Austin, Texas. The last category, 'urban characteristic' refers to schools that might be in rural or suburban settings but have some of the characteristics and challenges typical to the first two categories like a larger population of Black students or large population of English Language Learners (Milner, 2012). The district Milner was visiting would fall under this category.

Robinson School District does not fit the population classification of Milner's urban with a population of 78,000. However, Robinson fits Milner's classification of "urban characteristic" as it has a majority population of students of color. In Robinson, 25% of the student population are Black students and 28% are Latinx. On the other hand, Vincent School District does not fit any of the urban definitions Milner discusses. It does not share the typical characteristics found in urban intensive and urban emergent schools with a population of 52,000 people, and the student population is 70% white students and 6% English Language Learners. However, both Robinson School District and Vincent School District are urban districts based on this study's classifications.

Suburban Districts[7]

The first suburban school district I have chosen for this study is Lakeway, outside of Milwaukee. Lakeway is a school district with one high school and has district offices located at the high school. This case offers interesting data, as the district office leaders and high school leaders work closely together.

It was important to me that the second suburban school district be a suburb of Vincent. Including a suburb of one of the urban districts provided an opportunity to examine if there were any connections between the responses of an urban district and one of its suburban districts. There are two suburban school districts of Vincent, and I selected the School District of Bluffton, as it was a more similar size to Lakeway. Literature has established that the size of high schools influences the course offerings available to students, so using two suburban districts of similar sizes provided an opportunity to attend to this comparison (Finn, et al., 2001; Lee, Smith, & Croninger, 1997; Monk & Haller, 1993).

Rural Districts

A majority of Wisconsin districts are rural districts and serve 44% of Wisconsin's PK-12 students (Wisconsin Department of Public Instruction, 2017). NCES has six sub classifications for rural districts: town-fringe, town-distant, town-remote, rural-fringe, rural-distant, or rural-remote. I selected rural districts from these four categories.

When first selecting rural districts, I considered splitting the state into quadrants and selecting a district from each quadrant and one from the middle. With this in mind, I used the

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[7] I conducted my pilot study for this dissertation in two suburban districts outside of an urban district in Wisconsin (neither Robinson nor Vincent). I have chosen not to include these districts in the final study but have used the information I learned from the pilot study to inform my data collection and data analysis processes.

CESAs[8] of Wisconsin to create six regions of Wisconsin. In the end, I did not use each quadrant but did use the quadrants to determine the three districts I used. I selected a district from the upper right quadrant and two districts in the upper left quadrant. I chose to select districts from these two areas, because the urban and suburban districts chosen were in the lower quadrants of the state, so it was important to have districts from the northern part of the state. The three districts I chose are Two Harbors, Cedar, and Clarksville.

I selected both Two Harbors and Clarksville based on their location and the sizes of their high schools. Because literature has pointed to differences in mathematics courses based on a school's size, having a variety of high school populations among the rural schools was important. I selected Cedar School District because of its population of American Indian students, which is not unique to this region of Wisconsin but is unique to Wisconsin as a whole. Cedar also offers an information-rich case, because as a district they use Integrated Mathematics in the middle school and high school. Integrated Mathematics does not have separate courses for Algebra I, Geometry, and Algebra 2; rather, it combines topics from each into courses labeled Math I, Math II, and Math III.

Selected Districts

The final sample of districts includes two urban, two suburban, and three rural districts. A majority of the school districts in Wisconsin are rural, so it is appropriate to have more rural school districts in the sample. The sample includes two districts that changed in the 2014-2015 school year and five districts that changed in the 2016-2017 school year. Figure 6 shows the

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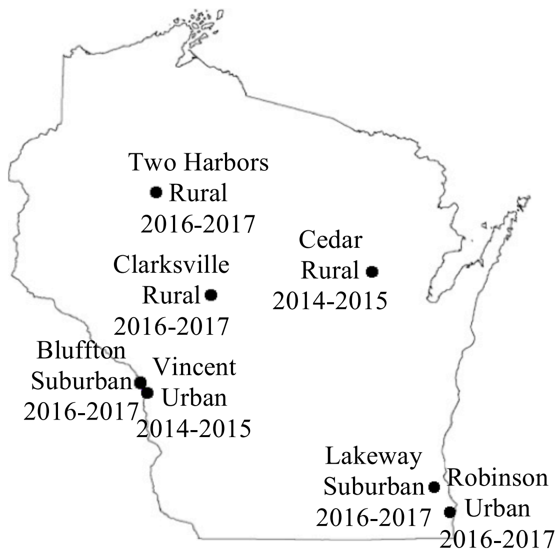
[8]CESA stands for Cooperative Education Service Agency. There are twelve CESAs around Wisconsin that were created to connect school districts with one another and connect school districts with the state for support and guidance (CESA, 2020).

location of each district with their urban, suburban, or rural designation and the school year the district officially changed their requirement.

Figure 6

Selected Districts



In Appendix B, the demographics of each high school in the sample are provided. The variety in school size among the rural high schools added information-rich cases and cross-case analysis. Different responses may occur based on the size of the mathematics departments, what courses are offered, and how the school provides for their students.

The racial demographics of the student populations are noteworthy. The urban high schools of Robinson are by far the most diverse of the high schools. Lakeway and Bluffton are racially similar to one another, but Lakeway has a much larger Hispanic population.

The rural districts offer a snapshot of some typical Wisconsin districts where there is little racial diversity. The student population of Clarksville High Schools is over 90% white students. In comparison, Cedar School District represents some of the school districts in Wisconsin that have a significant American Indian population. In northern Wisconsin, there are several

American Indian Reservations, which creates school districts with larger American Indian student populations.

The Vincent high schools differ most in percentage of students who receive free or reduced-price meals but are all similar in average ACT scores and postsecondary enrollment for the students that graduated in 2018. Of those that responded to the survey, 59% from South went on to postsecondary education. Of those 60%, 39% went to a two-year institution, and 55% went to a four-year institution. At North, 65% of graduating students in 2017 went onto postsecondary enrollment. Of that 65%, 35% went to two-year institutions, and 58% went to four-year institutions. This is important to note, because many postsecondary institutions require three credits or even four credits of mathematics to be eligible for admission (Board of Regents, 2018a; Board of Regents, 2018b).

The high schools of Robinson School District will offer an information-rich case with their differences in student percentage receiving free or reduced-price meals, post-graduation plans, and average ACT scores. All the high schools have between 46%-52% of graduates enrolled in postsecondary education, but the breakdown of two-year and four-year institutions is very different. The average ACT scores also show a difference between the high schools.

The suburban high schools have the lowest percentage of students that receive free or reduced-price meals and the highest percentage of students planning to attend four-year institutions. There are differences between the suburban districts, like median income and average ACT scores. Although they have different average scores from each other, the two suburban high schools have some of the highest average ACT scores of all the schools in the sample.

The urban and rural schools all have similar percentages of students enrolling in postsecondary education. Notice, Robinson River and Two Harbors have similar and the lowest percentage of students enrolling in postsecondary education. Two Harbors then has the largest percentage that are going to two-year institutions. There is a significant difference in the postsecondary enrollment for the students in the suburban districts of Lakeway and Bluffton. In Lakeway, 70% of students attending postsecondary education attended a four-year institution, while 51% of those students in postsecondary education in Bluffton attended four-year institutions.

Data Collection

Participants

Hancock and Algozzine (2017) believe the most important point to consider for interviews is identifying people in the research setting that can best address the study's research questions. To do this I used a network map method to identify the next participants to interview.

The initial network map was collected during an interview with the director of curriculum and instruction director of curriculum and instruction, or equivalent, in each district. The director created a map of those involved in the decision-making process and sometimes included lines to show connections between different actors. Not all participants made lines in the map; some participants listed people in order of importance. This network map identified those involved in the decision-making process and the extent of their involvement. The map, along with the accompanying discussion, pointed to the next appropriate participant to interview based on their presence in the network map and involvement in the response. I started with those actors that had substantive influence during the decision-making process. These participants were mostly mathematics department chairs and mathematics teachers. Some participants did not draw or write different actors on the page. For example, the Clarksville mathematics teachers I interviewed together did not write anything. This suggested they were the only ones involved with the decision-making. This was strengthened by the lack of mentioning of any other important actors throughout the interview. Completed network maps from two participants are included in Appendix C.

Some directors of curriculum and instruction did not choose to be part of the study; instead they passed me along to who they thought was best to answer my questions. The directors in Clarksville, Bluffton, and Vincent all passed me along to either mathematics coordinators or mathematics chairs. In the case of Two Harbors, the director passed me along to the school counselor, who I interviewed first. Table 1 shows the participants interviewed for the study by district in the order they were interviewed. In addition, the table also identifies those participants who I interviewed together and those that had mathematics expertise, as I found this information to be helpful during analysis.

In total, I interviewed thirty-two participants. All but two interviews were conducted one-on-one. The interviews with the Clarksville mathematics chair and the mathematics teacher were done together, and the interviews with the Robinson Washington mathematics chair and mathematics teacher were done together. These interviews were done with both participants because the mathematics chair pulled the teachers into the interview.

Table 1

Study Participants

District	Participants (in order of interview by district)
Cedar	***Associate Principal (former mathematics teacher)*** Director of Curriculum and Instruction ***Mathematics Teacher*** ***Former Mathematics Chair***

Clarksville	***Mathematics Chair**** ***Mathematics Teacher**** Counselor
Two Harbors	Counselor ***Mathematics Teacher***
Bluffton	***Former Mathematics Coordinator*** ***Mathematics Chair*** Associate Principal ***Mathematics Teacher (former mathematics chair)*** Counselor
Lakeway	Director of Curriculum and Instruction Counselor Principal ***Mathematics Chair***
Robinson	***Director of Academics*** Assistant Director of Curriculum and Instruction (Mathematics) ***Washington Mathematics Chair***** ***Washington Mathematics Teacher***** ***River Mathematics Chair*** ***Memorial Mathematics Chair*** Washington Counselor
Vincent	***Secondary Mathematics Coordinator*** ***South Mathematics Chair*** ***South Algebra 2 Teacher*** ***North Principal (former mathematics supervisor)*** Former South Principal ***North Teacher*** North Counselor
*Interviewed together **Interviewed together ***Mathematical expertise***	

Interviews

I conducted and audio recorded semi-structured interviews of each participant and collected documents to support these interviews. Semi-structured interviews were well suited for this case study research, because they allow for researchers to have both predetermined questions and flexibility during the interview (Hancock & Algozzine, 2017). The flexibility of the interview was especially useful in this case study. The predetermined interview questions can apply to every district, but follow-up questions were necessary depending on how the mathematics leaders responded to the policy. I did not know each district's response to the state policy until the interview, so it was important for me to ask follow-up questions in the moment based on the direction of the interview. With the semi-structured format and the flexibility, mathematics leaders were able to tell their story in their own words (Bogdan & Biklen, 2003). Having the mathematics leaders tell their story provided me the opportunity to develop insights into the leaders' interpretation of the district's response (Bogdan & Biklen, 2003). The interview protocol for these semi-structured interviews can be found in Appendix D.

I intended for all interviews to be conducted in-person, but because of weather, travel, and scheduling constraints, some interviews were done virtually. Twenty-four of the participants were interviewed in-person, five were interviewed via Zoom with video, and three were interviewed by phone or via Zoom without video.

Documents

In conjunction with the interviews, documents of curriculum and course guides were collected from each high school. Collecting the curriculum or course guides for each high school in the same district was important to see if and how the guides varied (Kelly, 2007). I attempted to collect the guides from the 2013-2014 school year through the year the district officially changed but had to rely on what was available on the district websites and what participants were able to provide. Table 2 shows curriculum guides I was able to collect for each district.

Table 2

Curriculum and Course Guides Collected

	2012-13	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Clarksville				x			x	x
Two Harbors			x		x			x

Cedar	x	x				x	x	x
Bluffton		x	x				x	x
Lakeway		x	x	x	x	x	x	x
Vincent			x	x			x	x
Robinson		x	x	x	x	x	x	x

These documents launched a path of inquiry in terms of course offerings and sequencing (Patton, 2014). Curriculum and course guides verified and challenged how the mathematics leaders explained their response. Often times, documents were able to provide information that was not observed or verbally explained in interviews (Patton, 2014). Many times, the course sequence was illustrated with a figure in the curriculum or course guide of a flow chart of courses. These visual explanations sometimes were more helpful than a verbal explanation of the response. For the districts that did not include visual course sequences in their guides, I created course sequence flow charts from the information provided in the course guide.

Data Management

I kept organized through the data collection process and the data analysis stage by constructing documents to assist me in logging and reflecting on the data. I created a file-formatting document that stated how I would label data throughout the study for consistency. I kept an electronic log of everything done each day; this log has remained up to date through the completion of this dissertation. If a new document was created, the log linked to it. I created a spreadsheet to log when participants were first contacted, scheduled for an interview, interviewed, and when the interview was transcribed. This document was organized by district and by high school to ensure I conducted all the necessary interviews.

After every interview, I created a write-up about the interview and included the notes I hand wrote at the time. I created a template for the interview write-ups for consistency. After the interviews, I transcribed all thirty of interviews in MAXDA software. While transcribing and afterward, I created memos to keep track of my thoughts and speculations (Merriam, 1998b). Transcribing the interviews myself allowed me to have a deeper connection to the data.

Data Analysis

Miles and Huberman (1994) suggested interweaving data collection and analysis from the beginning of the study. Following their suggestion, I transcribed interviews throughout the data collection process so I was able to begin analyzing. Transcribing the interviews myself allowed me to be very familiar with the data before coding. Miles and Huberman (1994) also suggested creating a starting list of codes before beginning data collection. However, Bogdan and Biklen (2003) explained that a coding system should develop from reading through the data for topics and patterns and taking note of words and phrases that appear while data is collected. Because I had conducted a pilot study, I had a list of codes. Some of these codes were *Type of Student, Algebra 2, Equity, Tracking, and District Culture.* However, given the importance of the first readings of data and the ideas and codes that can come from that, I read through the data making note of possible codes and ideas by hand (Richards, 2009). With a list of codes from my pilot study and some additional codes from the first read through, I proceeded to complete a first round of coding of five interviews. Codes were either descriptive or topic-based. The descriptive codes described the case and the participants (Richards, 2009). Topic coding in the first round labeled passages of interviews with relevant topics. These topics were then organized into categories and were broken down into subcategories when needed. For example, the code *Type of Student* from the pilot study became *Student* for when mathematics leaders discussed a student or students. This was then broken down into *Behavior, Future, At Risk, Course, Ability/Skill* and those were used when a mathematics leader spoke about a student with one of those descriptors. Consider the following quote,

> Okay Pre-Calc is for kids that are either really enjoying math or think they are going to do something with math and science. Algebra 3 is more like okay this is a kid that wants to go to college but isn't really a math person, doesn't really want to do math, but doesn't want to take a year off of math and then have to go take college algebra 2 years from now. So Algebra 3. So we start to see a little bit of a divergence there.

This quote was coded with *Student: Future: STEM, Student: Future: College Bound, Student: Hate Math, Tracking: Separate Tracks.*

I read through those five of the thirty total transcripts and created a draft codebook and then tested that draft codebook on five additional interviews. From there, I edited the codebook and received peer debriefing. I had two peers read several pages of an interview I had used to test the draft codebook. With their help, I verified the validity of some of the codes in the draft codebook. I redefined, added, and discarded codes during this phase and continued to throughout the data collection and analysis stages like Bogdan and Biklen (2003) suggest.

With a codebook established, I engaged in analytical coding. During analytical coding, I interrogated the data by considering the deeper meanings of what was said. During this process, new categories emerged that corresponded to the new ideas from the data (Richards, 2009). Richards advises that the key to analytical coding is to "keep your thinking 'up' at this abstract level, and to keep generating ideas and questions" (Richards, 2009, p. 95). I did this by using Richards' steps of "taking off" (p. 94) by answering the questions of "Why is it interesting?" and "Why am I interested in that?" (p. 71).

During the analysis process, I created summaries for each district and their response with quotes from the mathematics leaders. This allowed me to initially answer the first research question. From these summaries, I recreated course maps for each district to see how the addition of courses or reorganization of courses changed. I animated these course maps, which allowed me take my analysis of the course sequencing and tracking to a deeper level. Pairing the points of change in the course map with the codes from interviews made clear the rationale of these mathematics leaders as they responded to the third-credit requirement.

Positionality and Potential Research Bias

Several mathematics education researchers have called for fellow researchers to better reflect on their personal and professional experience to ask how these influence their research (Aguirre et al., 2017). Mathematics education is racialized and gendered, and so mathematics education research is also racialized and gendered (Martin, 2006). A researcher's identity influences their research process (Foote & Bartell, 2011), and therefore it is important for research in mathematics education to include the positionality of the researchers. Because this study has implications for mathematics education, it is important for me to provide my positionality.

I am a white, cisgender woman from middle- and upper-middle-class families. Through school I excelled at mathematics in classrooms where I was often one of few woman students. After earning my bachelors and masters in mathematics, I taught college mathematics to mostly white adult students from rural, suburban, and urban contexts and varying socioeconomic backgrounds. When I returned to graduate school, I began tutoring in a midsized urban high school that was diverse both racially and socioeconomically.

My life experiences have influenced my research and perspectives on mathematics education. My experience as the only girl in my high school Calculus class and one of few women in my college mathematics courses has allowed to me understand how mathematics is encouraged for some students based on gender. My experience teaching college mathematics to mostly white students from varying socioeconomic categories showed me again how mathematics is encouraged for some students based on class. Tutoring at the high school illustrated how mathematics was held for some students based on color, as I saw the lower-level courses overrepresented by students of color and AP courses underrepresented by students of color.

Together these experiences have led me to see mathematics education as a structure designed for only some students to succeed in based on their gender, class, and race. My research intends to examine those structures to illuminate where and how we allow disparities based on gender, class, and race to continue. As a white cisgender woman of middle- and upper-middle-class background, it is important for me to acknowledge my positionality to allow the reader to better understand and critique my research. Additionally, it is necessary to acknowledge my potential research bias for this study in particular.

Bogdan and Biklen (2003) warn that the researcher's perspectives and values can influence how and what data is coded. For this reason, it is necessary to acknowledge my potential researcher bias that could have arisen during the study. This study developed from a conversation I had with a high school student I tutored. She showed me a piece of paper that had a line down the middle with "Four Year College" and "Two Year College" at the top of the two columns and mathematics courses below each. This was the guide her high school mathematics department gave her to select her mathematics course for her junior year. I was frustrated by how this guide was putting students into categories and forcing students to choose their future at fifteen and sixteen years old because of the structures the department established.

I believe that students are too easily put into categories and tracks when it comes to mathematics based on their gender, race, socioeconomic status, and past performance. I believe teachers often underestimate a student's ability and potential, which keeps the student from mathematical opportunities they deserve. I believe school districts and teachers are focused on getting "at risk" students the bare minimum of what they need to achieve requirements, not what they need for complete understanding and future success. Therefore, I worry loopholes and short cuts have been established for certain students that teachers do not believe need three credits of mathematics. These loopholes and short cuts will continue to close doors on certain students.

I hope high school graduation requirements work to guarantee that students are provided with a quality education, but I know that new structures and new courses can also increase inequity in schools. I approached this study with an open mind hoping to find school districts and schools creating new mathematics structures that provided more flexibility for students, but at the same time, I was aware that the rigid structures of mathematics education have a long tradition and are difficult to change.

To protect against my biases influencing interviews and participants, I found it important to encourage respondents to say what they feel. To learn their views and where they come from required me to put any of their comments that conflict with my views to the side and focus on collecting their story (Bogdan & Biklen, 2003). There were times I disagreed with what was said, but I did not express this verbally or through body language. There were times I would nod my head as to agree to allow them to feel comfortable to continue.

To protect against my biases influencing my analysis, I used validation techniques to ensure trustworthiness and internal validity. These validation techniques include: triangulation, peer debriefing, and disclosing personal biases (Creswell, 2007). To triangulate the data, I used interview data from multiple people in the districts and data from documents. This strengthened my analysis by protecting against my bias, as multiple data points were used; with one data point, my bias could have greater influence. Triangulation also allowed me to see a clearer picture of what each district's response was. By collecting documents such as curriculum guides, I was able to verify the data collected during interviews. In some cases, the document data provided more information than what was presented in interviews, or even contradicted what was provided in interviews. Utilizing peer debriefing provided a space for a peer to ask hard questions about methods and analysis to ensure my findings were based on the data and not on my biases.

Lastly, by disclosing my potential research bias and using direct quotes from interviews, the reader is an external auditor. Providing the direct quotes from interviews gives the reader an opportunity to decide if and how my research biases disclosed here have influenced my analysis and findings.

Limitations

There are limitations to this study in how and what data was collected. For example, I was not able to collect courses taking data as originally planned. School districts did not respond to my requests for these data. Without course taking data, I was not able to examine what courses students were actually taking and which students were taking which courses. With course taking data, I would have more information to discuss how the responses by the mathematics leaders changed the demographics in classrooms. With course taking data from before and after the responses, we could see if equity was served by examining if the demographic proportions of the courses changed to match the school.

There are also limitations based on who my participants were. I chose to recruit participants using a top down strategy in each district by starting with the director of curriculum and instruction. I did not start with the superintendent in the districts because my research questions focus on course offerings and course sequencing, which would fall under the director of curriculum and instruction. Using the network maps in the interviews to identify the next participants to recruit affirmed my decision to not include superintendents because these first participants did not mention superintendents taking part in the district response. Using a top down strategy to identify participants is also a limitation as I could have used a bottom up strategy by interviewing mathematics teachers first and identifying other mathematics leaders from their network maps. By using a bottom-up strategy, teachers would know I came to them first perhaps making them feel that they are the experts. They may have talked more freely, they may have talked more about content impact of the policy rather than structural. By starting with a top down strategy, I assumed it was a top down response and that could have impacted how mathematics teachers responded during the interview.

The research questions I use for this study also create another limitation. The research questions focus on structure and as opposed to instruction. There is a possibility that my questions biased how educators responded to my questions and led them away from focusing on instructional changes. So although little discussion of instruction appeared in the data, that does not necessarily mean no instructional changes were made when responding to the third-credit requirement policy.

Chapter 3: Responses to the Policy

This study investigated how mathematics leaders responded to the state policy increasing mathematics credit requirements, specifically in terms of course offerings and course sequencing. Each of the seven districts complied with the state policy and changed their credit requirements for mathematics. This response was seen in the curriculum guides and graduation requirement documents in each district to reflect the new state policy. All seven of the districts made this change, but only one stopped there. Six of the seven districts made additional changes that impacted both their course offerings and sequencing.

This chapter will introduce the ways in which mathematics leaders responded to the policy. The mathematics leaders in Cedar only responded by complying with the credit requirement, whereas the responses in the other six districts were in terms of course offerings and sequencing. First, I will present Cedar, and then I will present the general responses of the other six districts.

Requirement-Only Response

The rural district of Cedar is unique to the sample, because the only response by mathematics leaders was changing the requirement for two credits to three credits in their course guide. Although this was their only response to the state policy change, coinciding with this was their transition to an integrated mathematics curriculum. With the adoption of Common Core State Standards in Wisconsin in 2011, Cedar decided to transition to integrated mathematics courses. Before adoption of the Common Core, Cedar offered a variety of traditional mathematics courses that followed the sequence Algebra 1, Geometry, and Algebra 2. They also offered an Applied Math sequence of pre-Algebra courses. A student would complete these courses and then take Algebra 1 in their second or third year of high school. They also offered a variety of courses after Algebra 2. With their many mathematics course offerings, Cedar had more than seven different course sequences students could take.

After the adoption of Common Core Standards, Cedar transitioned to an integrated mathematics curriculum. They offer Math I, Math II, Math III, and Math IV for students to then progress to AP Calculus from there. They also offer AP Statistics for students that have completed Math II and Tech Math for students that complete Math III. With these options, Cedar has created a single route track with spurs off the track that consist of one course.

Although Cedar mathematics leaders did not respond to the increase in credit requirement in terms of course offerings and sequencing like the other districts, they did respond by changing the district's requirement to be in compliance with the state policy. Given that the increased credit requirement is state policy, it was necessary for Cedar and all school districts to comply by increasing their own requirement so that their students could be awarded high school diplomas from the state of Wisconsin.

Cedar mathematics leaders' simple compliance with the state policy comes from their confidence in the course offerings and sequences they had in place with their transition to the integrated mathematics sequence. With a majority of their students already taking three credits of mathematics before the state policy change, the mathematics leaders were not concerned about all their students reaching the third-credit requirement. The former department chair expressed that she felt the transition to integrated mathematics would be providing their students with a higher-level mathematics than their previous offerings and sequences. Together with the third-credit requirement, the integrated sequence would better address career and college-ready standards as well as prepare students for the ACT.

The former department chair now works with multiple school districts around school improvement, which has given her the chance to see how other districts have responded to the state policy. When I asked her about how this state policy and responses have addressed equity she said,

> I think it made sure that districts had to make sure kids took it. You know I said I work with a lot of districts that they still don't require that algebra, geometry, advanced algebra. I got districts that still do Algebra 1 over two years. Here is the kid is a junior in a geometry class. I mean there is no way that they have a chance at the ACT, there's just not. They don't have the content down. And so I still think there is some inequity even though districts are complying with the three years. But I think there is some people are just complying and then the equity issue is not being addressed at all. I think districts that are taking that to heart and are making sure kids take three years of college bound college career ready math then I think that equity issue is being addressed better."

Here the former department chair frames equity around providing students three credits of mathematics that are preparing students to be career and college ready. She sees districts that do not push their students beyond geometry to take advanced algebra as not addressing equity.

The inequity the former department chair suggests she sees in districts can come from what courses are offered and the course sequences available to students. By offering courses like Algebra 1 over two years, which the former department chair said she sees, a student would only need to complete one additional course beyond Algebra 1 to earn their three credits of mathematics. The mathematics leaders in the other six districts in this study responded in ways that changed the course offerings and sequence. The changes did not always address equity or address mathematics leaders' different definitions of equity. The following section will introduce the ways in which mathematics leaders responded in terms of course offerings and sequencing.

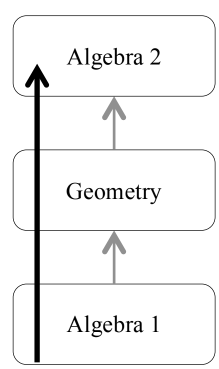
Course Offerings and Sequencing Responses

Following the literature on responses to increased credit requirements, six of the seven districts responded to the increased credit requirement by changing course offerings. Some mathematics leaders created new courses, while others brought back courses from the past. These course offering decisions not only provided more types of courses for students to take but also impacted the course sequencing of each school district.

The course sequence a student takes is often informed by the prerequisites for courses and/or the established sequences by the district. In the traditional course sequence, shown in Figure 7, a student would complete Algebra 1, Geometry, and Algebra 2 (Schiller & Hunt, 2003) to earn three credits of mathematics. Algebra 2 or an Advanced Algebra course is important in this sequence, because it is a requirement to apply to four-year University of Wisconsin system schools. By taking Algebra 2, the probability of a student enrolling in college, particularly two-year colleges, increases significantly (Kim et al., 2015).

Figure 7

Traditional Mathematics Course Sequence



The course sequencing of a district constructs the inequitable system of tracking. Given that mathematics is a highly tracked subject, with three fourths of American students being placed in tracked mathematics courses, this is not surprising (Loveless, 2013). However, depending on the type of course offered, there were different impacts on the course sequence or track. The traditional sequence in Figure 7 can change with the introduction of additional courses. Some districts in the United States, like Cedar, attempted to detrack by eliminating a variety of courses so that all students were taking the same mathematics courses. For the other six districts, some mathematics leaders responded in the name of equity or attempted to detrack in some manner, however their responses to the third credit ultimately perpetuated tracking.

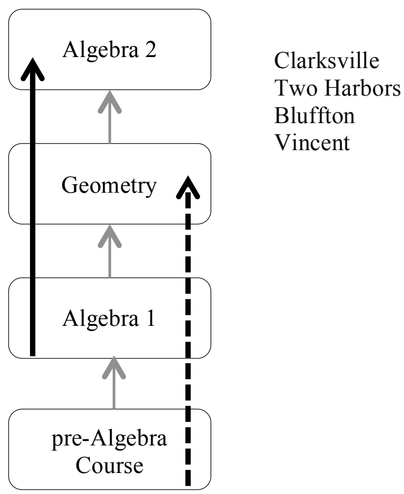
I used interviews with mathematics leaders about sequences, prerequisites found in the course guides, and course sequence maps found in the course guides to identify the sequences in each district before and after the response to the policy change. These changes to course offerings led to four reconfigurations of the course sequences: (a) backing up the track, (b) parallel track, (c) spur from the track, and (d) bypass track. Each of these reconfigurations is discussed below along with the course offerings that led to them. The specific responses and rationale for course offerings and sequencing by mathematics leaders in these six districts will be discussed in the following chapter.

Backing Up the Track

Four of the seven districts offered a course or multiple courses that cover material before Algebra 1. I refer to these courses as “pre-Algebra” courses, compared to “Pre-Algebra,” which is the name of a course. Students that are not considered ready to take Algebra 1 in their ninth-grade year were assigned to these courses. The four districts that had pre-Algebra courses were two rural, one suburban, and one urban district from the sample. The literature suggests that rural districts offer more low-level courses than suburban and urban districts (Anderson & Chang, 2011; Finn et al., 2001; Iatarola et al., 2011; Irvin et al., 2017; Monk & Haller, 1993). Although, we see these low-level courses offered in a suburban and urban district, it is still more common in the rural districts of the study.

Figure 8

Back Up the Track



By adding pre-Algebra courses, the traditional track of Algebra 1, Geometry, and Algebra 2 is backed up. In Figure 8, the traditional track is designated by the solid black line, and the now backed-up track is shown with the dotted line. As a result of backing up the track with the introduction of pre-Algebra courses, students only need to complete a pre-Algebra course, Algebra 1, and Geometry to meet the third-credit requirement.

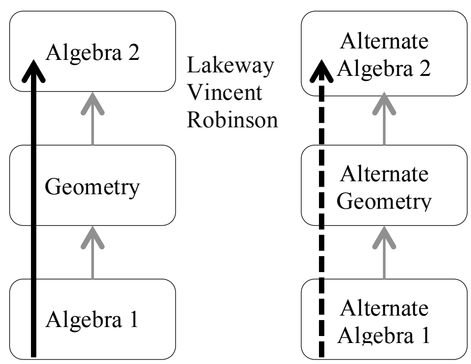
By choosing to offer pre-Algebra courses, mathematics leaders have done two things; they have delayed when students take Algebra 1, and they have allowed students to earn three credits without reaching Algebra 2. Some mathematics leaders saw the decision to delay when students take Algebra 1 as addressing equity by not "throwing" students into Algebra 1 unprepared. Other mathematics leaders saw offering pre-Algebra courses as inequitable, as they set a student behind and can keep students from reaching Algebra 2, a course that offers preparation for the ACT and the credential to apply to four-year colleges.

Parallel Track

Some of the course offerings created by mathematics leaders introduced a parallel track alongside the traditional track. Courses in the parallel track might cover the same material as the course on the traditional track but at a slower pace. This is done with the introduction of double-dose courses. Figure 9 shows the parallel track with the dotted line made up of alternate Algebra 1, Geometry, and Algebra 2, because these courses are not identical to those in the traditional sequence with the solid black line.

Figure 9

Parallel Track



In response to high numbers of students failing Algebra 1 in the ninth grade, school districts around the country have begun to provide two periods of Algebra 1. This strategy is known as a “double dose” (Nomi & Allensworth, 2009). The purpose for these double-dose courses is to allow students more time with the material and deliver more support and remediation when needed. Double dose has been used mostly for Algebra 1 courses, because failing Algebra 1 has been identified as a predictor for students dropping out of high school

(Allensworth & Easton, 2007; Bottoms, 2008). Because of this, districts have invested in providing students more support in Algebra 1 through double dosing so they may be successful.

One suburban and one urban district from the sample offer a double dose of Algebra 1, while Vincent, another urban district, offers double-dose courses for Algebra 1, Geometry, and Algebra 2. None of the rural districts used this strategy when responding, but the mathematics chair of one rural district did mention he had brought the idea of offering a double dose of Algebra 1 to the administration. He did not find support for this idea because of lack of resources and scheduling issues that would occur if implemented. Here we see how the difference in resources between rural schools and suburban and urban schools can determine differences in course offerings.

In addition to double-dose courses, some of the courses in these parallel tracks might not cover the same range or depth of the material as the courses on the traditional track. For example, two districts offer a type of geometry course that I refer to as geometry "lite." Theses lite courses do not cover all the concepts a traditional geometry class would cover. The high school principal of one of the districts explained there were concepts cut from the traditional geometry course to make up the topics of this geometry lite course. The idea behind this is that students are receiving the important material they need for Algebra 2. However, this course leads to an Algebra 2 course that is also different from the traditional Algebra 2 course.

Three districts offer different levels of Algebra 2. There tends to be honors, regular, and lite Algebra 2. Not all of the content in the honors or regular Algebra 2 courses is covered in a lite Algebra 2. The variety of Algebra 2 courses means students are not receiving the same Algebra 2 content and are not being equally prepared. Many of the mathematics leaders spoke about the equity the courses in the parallel track offer as they level up the course work for students. Students now have courses on their transcript that follow and appear like the traditional sequence, even though with a deeper look there is a difference.

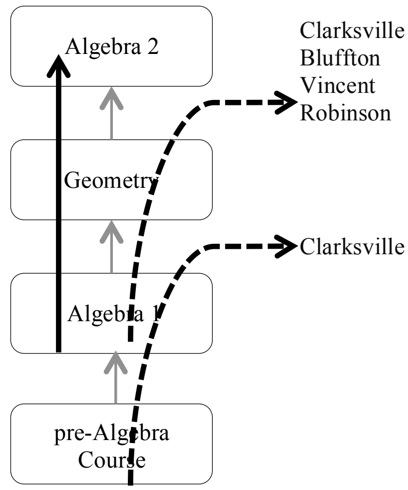
Spur From the Track

A "spur route" is a term used when a road branches off a main or important road and does not reconnect with that main road. Spur routes were created in four districts by offering diverging and computer science courses. These spurs took students off the traditional track and for the most part did not intend for students to return to the traditional sequence.

Some courses that mathematics leaders created or continued to offer provided different course options for students to take instead of Algebra 2. I refer to these courses as "diverging courses," because they are meant to diverge students away from Algebra 2. In Figure 10, the traditional sequence is shown with the solid black line and the spur routes created by diverging courses are shown by the dotted lines. There are two spurs shown because in Clarksville, where mathematics leaders also backed up the track, a student may start in the pre-Algebra course and then take a diverging course after Algebra 1, or a student can start in Algebra 1 and take a diverging course after Geometry to earn their three credits.

Figure 10

Spur From the Track



These diverging courses were created because of the concern and fear mathematics leaders had about students being able to successfully complete Algebra 2. During interviews, Algebra 2 came up frequently when discussing a student's third course. A majority of the mathematics teachers spoke about how hard Algebra 2 is, the concern that the state policy basically means a student would need to complete Algebra 2, or some spoke about Algebra 2 not being needed for those non-college bound students. These concerns and fears led mathematics leaders to offer diverging courses like Consumer Math, Introduction to Statistics, or dual-credit courses in partnership with local technical colleges. These courses allowed students another option other than Algebra 2 for their third mathematics credit.

Two districts also decided to offer computer science courses. The state policy was specific about allowing computer science courses to be considered as a student's third mathematics credit, as long as the district decided that as well. By counting computer science courses as the third mathematics credit, these districts have also created spurs.

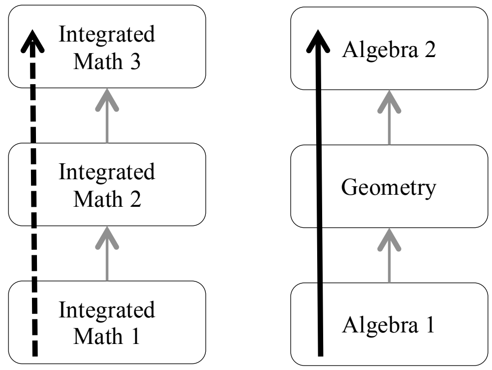
These spurs take students off the traditional route or track so they can complete three credits of mathematics without having to take Algebra 2. Some spurs from the traditional track allow students to return to the traditional sequence, but this was not always the intention when creating these courses. Only one district spoke about how this addressed equity; actually the mathematics leader spoke to how he believed this did not promote inequity. Across the districts, Algebra 2 appeared to be understood as a course only some students needed. Therefore, by not having all students take it, there was no issue of inequity occurring, as districts believed they were meeting the needs of individual students.

Bypass Track

In response to the third-credit requirement, the suburban district of Bluffton started offering three integrated mathematics courses in addition to the traditional courses they previously offered. Integrated mathematics courses blend topics of algebra, geometry, and statistics together in three or four courses. Bluffton offers an integrated mathematics sequence made up of Integrated Math 1, Integrated Math 2, and Integrated Math 3 as well as the traditional mathematics sequence of Algebra 1, Geometry, and Algebra 2. By keeping the traditional sequence, the integrated courses have created a bypass track as seen in Figure 11. Students are able to take the integrated mathematics sequence and skip some of the material and rigor that is part of the traditional sequence. The idea of the bypass track is to meet students' needs and their different learning styles, thereby addressing equity in terms of providing for students "where they are." Bluffton intends for the integrated courses to be near equivalent to the traditional sequence and provide different on-ramps and exit points depending on the student's needs.

Figure 11

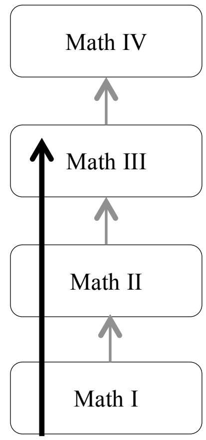
Bypass Track



Offering both the integrated and traditional sequence is not common. Most districts choose one or the other. So I want to make clear that just because a district offers Integrated Math does not mean a bypass track emerges. Recall that Cedar School District moved to offering only integrated classes along with AP Statistics, AP Calculus, and Tech Math in response to the Common Core. By only offering integrated courses, Cedar has a single track like Figure 12 but with spurs off to their AP courses and Tech Math. Bluffton talked about offering different exits for students, but they did this by creating different starting points as well as multiple courses along an exit ramp. Cedar created one on-ramp for students with different exit ramps. Although Cedar's decision to offer integrated courses is not connected to the increase in the mathematics requirement, how they offer integrated mathematics and the impact it has on course sequencing is important to show because of the difference in comparison to Bluffton.

Figure 12

Single Track



Conclusion

All seven districts responded to the state policy by changing their requirement from two to three credits. This was a necessary response, as they needed to remain in compliance with the state policy to be able to award their students high school diplomas. Only one district responded by just changing their requirement and keeping their course offerings and sequences intact. Every other district responded in terms of course offerings and, in turn, course sequencing. Based on the course offering decisions by mathematics leaders, there were four reconfigurations of course sequences that occurred. Mathematics leaders had specific rationales for each of these reconfigurations based on the course offerings as filtered through their beliefs about mathematics, beliefs about students, and how they made sense of equity. In the next chapter, the responses and rationale of the mathematics leaders in the six districts will be presented in more detail.

Chapter 4: Course Offering and Course Sequencing Responses

This chapter presents the responses by mathematics leaders in more detail. The chapter is broken up into sections of the four reconfigurations of course sequencing introduced in the previous chapter. In each section, specifics about course offering responses and the rationale of mathematics leaders are presented. This chapter provides a deeper understanding of how mathematics leaders made decisions based on their beliefs about mathematics, students, and equity.

Back Up the Track

In four districts, mathematics leaders chose to offer pre-Algebra courses, which in turn backed up the traditional track of mathematics courses. The mathematics leaders in two of these districts reintroduced pre-Algebra courses that had previously been eliminated prior to the state policy change. In the other two districts, mathematics leaders reconfigured the pre-Algebra courses they had offered in the past.

Reintroduce pre-Algebra

Clarksville and Bluffton had offered pre-Algebra courses in the past but had eliminated them years prior to the state policy, so that all ninth-grade students were taking Algebra 1. This is often done to address equity through “leveling up” by eliminating low-level courses (Burris & Garrity, 2008). Clarksville had previously eliminated a course called Math 9, and Bluffton had eliminated their Applied Math 1 and Applied Math 2 courses that students could take before Algebra 1. As part of their response to the state policy, mathematics leaders in both districts decided to reintroduce these courses.

Clarksville mathematics leaders first responded to the third-credit policy by bringing back Math 9. The mathematics department chair explained a potential sequence without Math 9:

> They had Algebra, Geometry, and the Consumer Math would have been considered the three easiest course loads to get the 3 credits. And we just knew there's we have students that you know can't. I just simply won't be able to do that. So I think we brought it back.

The sequence Clarksville already had in place allowed a student to be able to complete their three credits without having to reach Algebra 2, which is the assumed third credit. Because the sequence does not include Algebra 2, the chair labeled it the easiest. However, based on how he views those three mathematics courses and his students, the department chair felt that some students did not even have the ability to get through a mathematics sequence that did not include Algebra 2. Here, the department chair's beliefs about mathematics and beliefs about students come together for him to conclude Math 9 needs to be offered once again.

The mathematics department at Clarksville is made up of two mathematics teachers who have been teaching together for over fifteen years. When responding to the third-credit policy, these two mathematics teachers served as the mathematics leaders in the district. When asked about the decision to reintroduce Math 9, the other mathematics teacher recalled:

> So when this happened I remember saying right away well, we're going to have a problem with those bottom kids, and we need to probably bring back Math 9 or otherwise they have to pass Algebra, Geometry, and whatever else. That is going to be a big struggle for some of those kids…it just makes the algebra quality better where you're not throwing all these kids that aren't ready for algebra that was kind of my other argument with it that I am spending all my time with kids that aren't ready we are bringing down the whole group.

Like the department chair, the mathematics teacher's statement reveals his beliefs about students and beliefs about mathematics. He has arranged both mathematics and students into categories based on his beliefs about students' ability and capacity to do certain levels mathematics. Instead of students needing to pass "Algebra, Geometry, and whatever else," now students need to complete Math 9, Algebra, and whatever else. So, by bringing back Math 9, Clarksville mathematics leaders created sequences where students do not have to take Algebra 2 or Geometry to earn three credits of mathematics.

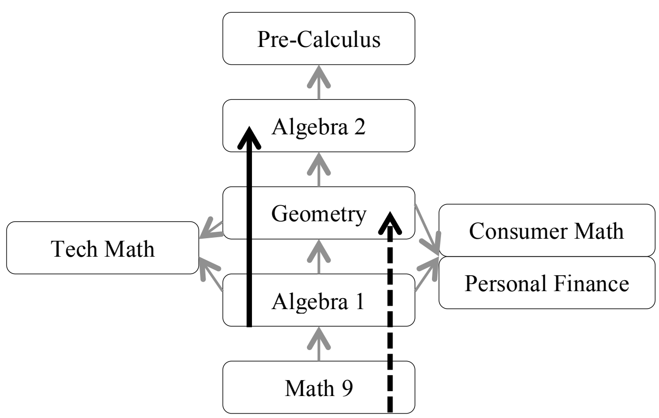
The mathematics teacher also mentions that the Algebra quality will be better because those students not ready for Algebra 1 will be in Math 9. This concern about the Algebra 1 quality appeared in other districts as well. By providing Math 9 or other pre-Algebra courses, mathematics leaders limit the range of ability and knowledge of the students that arrive in the Algebra 1 classroom. They believe this will protect the rigor of the content and expectations set in Algebra 1, like this mathematics teacher suggests. Although, pre-Algebra courses like Math 9 are building students' skills, it is important to note that in the above quote the mathematics teacher first speaks about protecting Algebra 1 and then discusses students that are seen as not ready for Algebra 1 slowing down those that are seen as ready. It is almost as if offering Math 9 is about protecting the mathematics first and then about supporting students.

The mathematics teacher's last statement is important to focus on as well. He states, "it just makes the algebra quality better where you're not throwing all these kids that aren't ready for algebra that was kind of my other argument with it that I am spending all my time with kids that aren't ready we are bringing down the whole group." First, the use of "throwing" elicits an image of harming a student or lack of consideration of the student. It shows that the teacher believes having all ninth graders in Algebra 1 is wrong and not best for those students "that aren't ready." At the same time, having all ninth graders in Algebra is also portrayed as bad for those students that have been deemed ready or seen as "math people." The math teacher talks about "bringing down the whole group," because not all students are ready for Algebra 1. Here bringing back Math 9 is not just about giving those students considered not ready for Algebra 1 a course to take or even protecting the algebra quality, but rather it is about not distracting from the learning of those students that do not struggle with mathematics.

By bringing back Math 9, Clarksville backed up the start of the track from Algebra 1 to Math 9. Now students are be able to take Math 9, Algebra 1, and Geometry to complete their three mathematics credits. Or a student can also take different courses after Algebra 1, so they do not have to take Geometry; these courses will be discussed in the spur from the track section. Figure 13 shows the traditional sequence or track of Algebra 1, Geometry, and Algebra 2 as the solid black line and the now backed-up track of Math 9, Algebra 1, and Geometry as the dotted line.

Figure 13

Backing-Up the Track in Clarksville



Like Clarksville, the School District of Bluffton had previously decided to eliminate the low-level mathematics courses before Algebra and level up so all ninth graders took Algebra 1 or higher. They tried this for two years and ultimately decided to bring back Applied Math 1 and Applied Math 2 in the 2014-2015 school year, the year after the state policy was enacted. The two years of all ninth graders in Algebra 1 resulted in a large increase in the failure rate. The associate principal explained,

> I think we learned a great lesson is that just that structural change doesn't improve. We can say all kids are taking Algebra, but we didn't do enough to address the instruction in that Algebra class to meet the needs of so many different learners that would typically go to Applied Math.

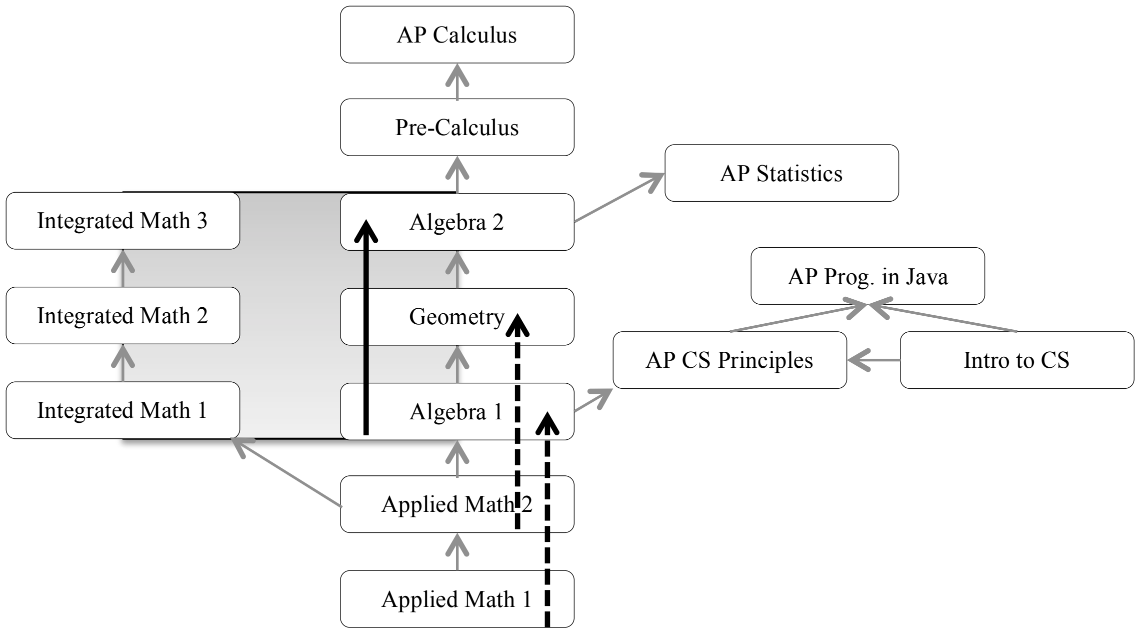
So Bluffton reintroduced these two pre-Algebra courses.

Like the Clarksville mathematics teacher, the Bluffton associate principal mentions the range of learners that were present in the Algebra 1 courses with the elimination of the pre-Algebra courses. However, he talks about their mistake of not addressing instruction in the Algebra 1 classes to meet the needs of the students. "Meeting the needs" is a phrase that came up throughout interviews across all districts. Here the associate principal is suggesting that leveling up was not enough to address equity, but they also needed to focus on meeting the needs of students at the same time. However, rather than focus on instruction, the mathematics leaders decided to bring back the pre-Algebra courses to meet the needs of the students; no instructional changes were discussed.

By reintroducing these courses, the traditional track is backed up. This allows for students to complete the credit requirement without Algebra 2 or even Geometry. Figure 14 shows the traditional track as the solid black line and the two backed-up tracks as the dotted lines with the reintroduction of the pre-Algebra courses.

Figure 14

Backing-Up the Track in Bluffton



The reintroduction of a pre-Algebra course in Clarksville came from the mathematics leaders' beliefs about mathematics and beliefs about their students' abilities, while in Bluffton the reintroduction was a way to meet the needs of students. Given that Algebra 1 is the established norm for ninth graders and even eighth-graders, pre-Algebra courses can be understood as low-level, and some mathematics educators consider pre-Algebra courses to be unsuitable for ninth graders. None of the mathematics leaders in Clarksville or Bluffton expressed concerns or personal conflict with offering these courses. This differs from the other two districts that offer pre-Algebra courses, as those mathematics leaders spoke more about grappling with the issues of pre-Algebra and equity as they reconfigured their pre-Algebra offerings.

Reconfigure pre-Algebra

The mathematics leaders of Two Harbors and Vincent reconfigured their pre-Algebra offerings for equity reasons when responding to the state policy. Although there were mathematics leaders that took issue with the previous pre-Algebra offerings on grounds of equity, ultimately both districts continued to offer a pre-Algebra course.

Before the state policy change, Two Harbors High School offered the standard Algebra 1, Geometry, and Algebra 2 courses. They also offered an Algebra 1 course spread out over two years. A student would take Algebra 1A their ninth-grade year, which covered the first half of Algebra 1 material. Then in tenth grade, the student would take Algebra 1B, which would complete the rest of the Algebra 1 material. This would earn them two mathematics credits for completing the content of Algebra 1 over two years. There was also a Consumer Math course offered. The counselor described the class as "just about equivalent to pre-algebra." This course was intended for students during their eleventh- or twelfth-grade year.

These two courses were eliminated at the time of the response to the state policy, and a new course called Principles of Algebra was implemented. This was driven by one of the two high school mathematics teachers. The teacher explained, "I was teaching this twentieth-century nonsense class called Consumer's Math. Which was basically personal finances, which we already have a class for that. It was a Band-Aid." He later elaborated, "Usually it was a Band-Aid that kids came in later in their school life just to get them graduate a grad credit for graduation credit. So seniors and juniors." He spoke of this course as a "Band-Aid," suggesting it only covered up and did not address the real issue. The issue was that students were not prepared for higher-level mathematics and were placed into Consumer Math, an easy course, to simply earn credit.

The mathematics teacher explained why he wanted to eliminate it: "I graduated in 09, and I'm a math ed major, and it went against basically everything I have learned about math education and education." His beliefs about mathematics and specifically mathematics education did not align with offering Consumer Math, because it is low level and does not progress students in mathematics. His solution was eliminating the course and introducing Principles of Algebra that would build up students' skills so that they could succeed in mathematics.

The addition of Principles of Algebra came from support the teacher received from the district's CESA[9] mathematics advisor. The advisor suggested the curriculum Transition to Algebra, and the director of instruction was on board to try something new. The teacher first described the course, "Principles of Algebra is focused entirely on giving kids an intuitive sense of Algebra when they are in Algebra. Kind of like sending people to study abroad in Mexico when they are taking a Spanish class." He goes on to say that Principles of Algebra is "designed to be taught concurrently with Algebra 1 to bring kids their eight practice standards it's based on. It gets their habits of mind tuned up for Algebra 1." This course provides students with the chance to build skills while taking Algebra 1 instead of a pre-Algebra course and then Algebra 1 the following year.

The mathematics teacher brought up external factors that influence students' lives and school performance. He explained:

> We are in the third most impoverished county. Right. So, there's a whole lot of neglectful and traumatic experiences kids are going through at home and outside of home…. But these kids they're not they don't have the patience to you know work their you know their cognitive do their cognitive load kind of stuff. Be careful and pay attention to details and so forth and attend to precision. Look for structure. And so you know the I see it the better we can give them an intuitive sense of what algebra does where they don't have to

[9] CESA stands for Cooperative Education Service Agency. There are twelve CESAs around Wisconsin that were created to connect school districts with one another and connect school districts with the state for support and guidance (CESA, 2020).

> think about that they'll have less have to put less effort into what they are doing in Algebra 1.

Here the teacher discusses challenges students face in their lives outside of school, and he does speak to some of what he believes are results of poverty and trauma that can often be viewed as deficits and result in teachers providing "Band-Aid" courses like Consumer Math. However, he has chosen a course, although low-level, to support students so that they can be successful. He has chosen to meet the needs of his students so that they can be successful in Algebra 1 in ninth grade, instead of waiting until tenth grade. Within the mathematics field of power, the low income students this teacher refers to may have their habitus judged negatively because they are perceived to lack of cognitive skills to be successful in mathematics. But rather than accept that, he has used Principles of Algebra to push on that field of power to allow students from poverty access earlier and a chance for learning and success.

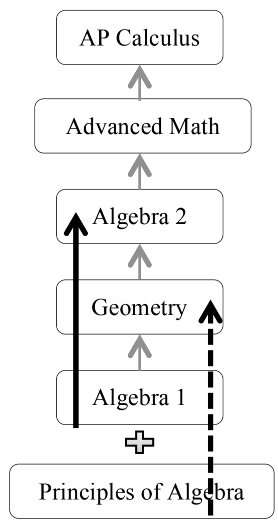
The mathematics teacher spoke about hardships students faced based on their socioeconomic class and trauma experiences and how that has impacted their behavior and learning, which is often labeled as deficit thinking. At the same time, the mathematics teacher seems to also be consistently pushing on any negative beliefs he has about his students because he later says, "There's no morons in this school. There's nothing but geniuses walking in this school. Humans are geniuses by nature. That is what we do." He believes his students are able to learn and do the work and be successful, but he acknowledges they need more support by taking a course like Principles of Algebra.

Although students are taking Principles of Algebra and Algebra 1 at the same time and Algebra 1 is not being delayed like in Clarksville and Bluffton, the track in Two Harbors has been backed up. Principles of Algebra counts as one mathematics credit, so students taking

Principles of Algebra concurrently with Algebra 1 will receive two mathematics credits during their ninth-grade year and will only need to complete Geometry to fulfill their third-credit requirements. Figure 15 illustrates how the track has been backed up in Two Harbors with the reconfiguration of pre-Algebra from Consumer Math to Principles of Algebra taken concurrently with Algebra 1 for a student to receive two mathematics credits in one year.

Figure 15

Backing-Up the Track in Two Harbors



The mathematics leaders in Vincent have also grappled with the ethics of offering pre-Algebra courses. Long before the third-credit policy, Vincent School District had a Transitional Math course and two mathematics courses: Applied Algebra 1 and Applied Algebra 2, which covered the concepts of Algebra 1 over two years. A year before the state policy was passed, these pre-Algebra courses were eliminated in an effort by one of the former high school principals to create more equity in the district. This former principal at South High School eliminated the three courses as part of equity work to leveling up so that all ninth graders took Algebra 1 or higher. His effort to level up defines equity as providing students with the same course of Algebra 1 for all ninth graders and supporting them through the course.

At North High School, the principal followed and eliminated the Transitional Math and the Applied Algebra courses but kept a course before Algebra 1 called Pre-Algebra 1. The North principal spoke about the different philosophies between him and leaders at South. He explained:

> I'm trying to get those kids to be career and college ready after high school. It's just. I understand from a you know we're an AVID[10] school, and we're also we're trying to get better like a lot of schools are with social justice, social equity, and one of the arguments on the other side for example is even that kid that is coming in as a freshmen and this goes back to that Pre-Algebra vs. Algebra. You know you you know you put them in the Pre-Algebra as a freshman now you have tracked that kid forever. And you've already put them behind the eight-ball, put them behind their peers. And I believe that to a certain extent…But but that kid that is at a fourth- or fifth-grade level at math. To throw them into an Algebra 1 course and in the name of social justice I don't believe in it.

The North principal recognized the arguments against offering Pre-Algebra 1, but his view of equity allowed him to support his school offering it. He believed equity to be focused on meeting the needs of students. Here, it means meeting the needs of students that are grade levels behind by providing a course that can cover those topics.

Like the Clarksville mathematics teacher, the North principal also brought up the action of "throwing" students into Algebra 1 courses as not equitable, or, as he stated, "To throw them into an Algebra 1 course and in the name of social justice I don't believe in it." Again, this creates the image of a harmful act to illustrate his belief that it is not right to have all ninth

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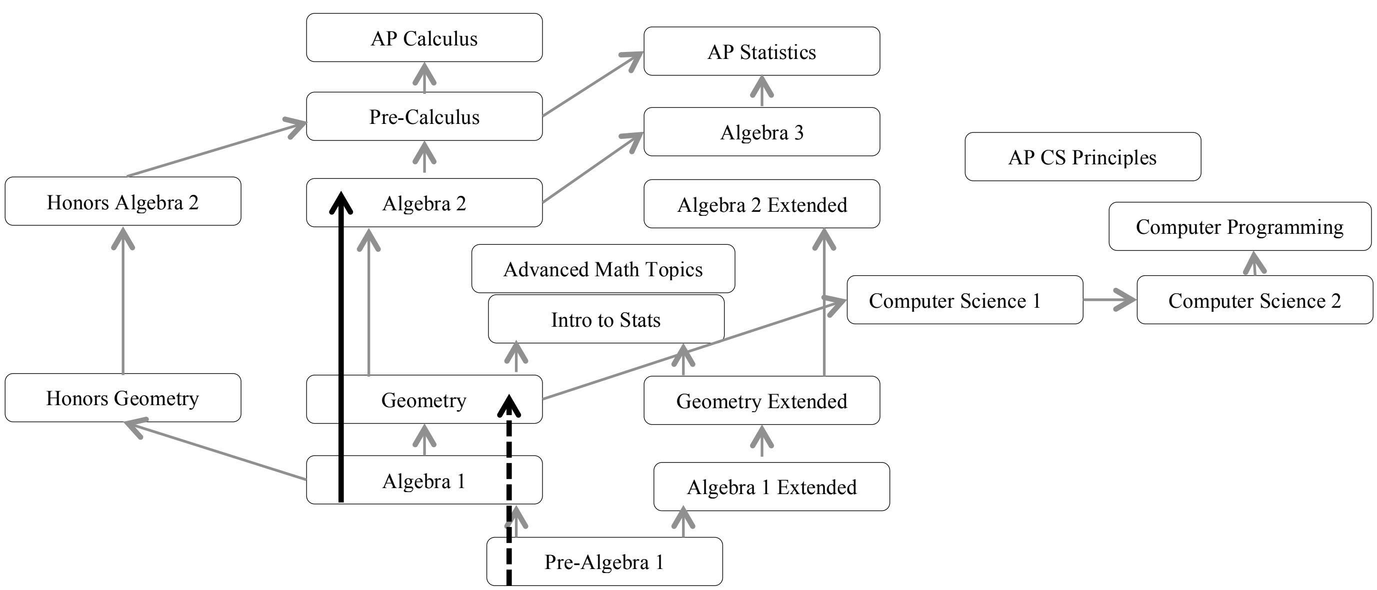
[10] AVID stands for Advancement Via Individual Determination. It is a nonprofit organization that provides support to schools and students of color, students of low-income, and first-generation college students. Schools use the AVID curriculum in an elective course for students to focus on study skills, academic strategies, and time management (AVID, 2020).

graders in Algebra 1. So, his decision to offer Pre-Algebra 1 was in the name of equity, at least his own understanding of equity in terms of mathematics.

Although the former principal at South eliminated all the pre-Algebra courses at South High School, Vincent North backed up the traditional track for all Vincent students by keeping this Pre-Algebra 1 course. Since North kept Pre-Algebra 1, this means the district offers the course. Therefore, the district mathematics coordinator, who is also an associate principal at South High School, explained that if necessary, South could count an online course of Pre-Algebra 1 because the district offers the course. So students could complete their three credits of mathematics by taking Pre-Algebra 1, Algebra 1, and Geometry without reaching Algebra 2 as students in a traditional track would. Figure 16 shows the traditional track with the solid black line and backed-up track as the dotted line.

Figure 16

Backing-Up the Track in Vincent



Although at the time of response there were different philosophies between the two schools when it came to offering Pre-Algebra 1, there has been wavering in mathematics leaders' equity philosophy after the former South principal left. The South mathematics chair shared, “Actually we just had a mathematics department meeting yesterday about explaining what you know what we even talked about bringing back the Pre-Algebra course again because I know (Vincent North) does have a Pre-Algebra.” The strong commitment to no low-level classes appears to have departed with the former South principal.

The reconfiguration of pre-Algebra courses that occurred in Two Harbors and Vincent during the response to the state policy arose from the mathematics leaders’ beliefs about mathematics and their framing of equity. Both the mathematics teacher in Two Harbors and the North principal in Vincent wanted to better prepare students for Algebra. They both did this through their pre-Algebra courses, as their beliefs about mathematics and framing of equity led them to the conclusion that this was the best response. Although pre-Algebra courses will provide students the skills they may be missing, it perpetuates the field of power and continues to keep students with habitus that does not fit the mathematics field of power from success. Even though Principles of Algebra is a pre-Algebra course, by offering having students take it in tandem with Algebra 1 Two Harbors mathematics leaders have provided access to students’ whose habitus may misalign with the field of power.

The reconfiguration of pre-Algebra was the only response by Two Harbors. For Clarksville, Bluffton, and Vincent, backing up the track was not the only way their course sequencing changed as mathematics leaders responded to the state policy through course offerings. The next section presents how Vincent, Lakeway, and Robinson created parallel tracks with their course offerings.

Parallel Track

Three of the districts had or established courses that created parallel tracks in their course sequencing. Vincent School District created a parallel track by offering a sequence of all double-dose courses. The other two districts created their parallel track by offering both double-dose courses and lite courses. These parallel tracks were created to provide more options for students for Algebra 1 and Geometry, so that they could access Algebra 2.

Double-Dose Sequence

The strategy of "double dose" (Nomi & Allensworth, 2009) has become more popular, as these courses allow students more time to receive material multiple ways or receive more support and remediation when needed. Students take the course over two blocks, meaning they do lose an elective.

As part of the equity work introduced by the former South principal, Vincent added double-dose courses of Algebra 1, Geometry, and Algebra 2. They call the courses Algebra 1 Extended, Geometry Extended, and Algebra 2 Extended. The former principal explained:

> The additional thing here is that when we put in this math department all freshmen were going to take Algebra we created a double period Algebra class and a double period Geometry class and a double period Algebra 2 class.

He did this because he was very adamant to include Algebra 2 as a double-dose course, because he wanted all students to complete Algebra 2 knowing they needed it to be college ready and would see the content on the ACT. Students at both South and North high schools are offered these double-dose courses.

By creating the double-dose option for Algebra 2, Vincent now offers three different types of Algebra 2: Algebra 2 Extended, Algebra 2, and Honors Algebra 2. When asked if he thought the rigor of Algebra 2 had changed since the third-credit policy, the Algebra 2 teacher at South responded:

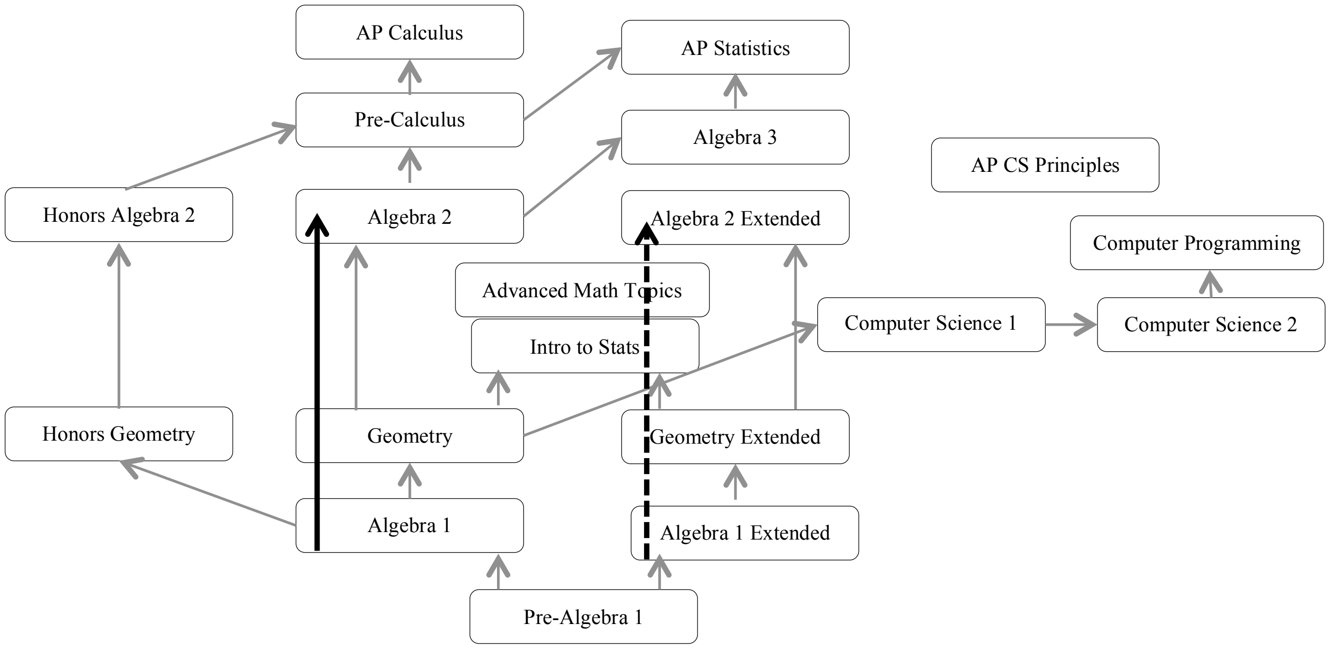
> I would say it's a different dynamic of population coming into class. I would say the rigor that I had 5 years ago is different than it is now. I think because now that every student has to pass and get that third credit. I think some of the rigor has gone down somewhat compared to what it should. Especially for if it's a student that is taking it their senior year or junior year something like that and more like senior year.

When asked if the rigor of Honors Algebra 2 had changed, he said it had not. So, each type of Algebra 2 course now varies in rigor, providing different content and knowledge to each course type.

With these double-dose courses being offered, a parallel track was created as shown in Figure 17. In these courses, double-dose course students are receiving the content slower and not necessarily at the same rigor as those students in the single block of Algebra 1, Geometry, and Algebra 2. The three different levels of Algebra 2 are visible in Figure 17, and the South Algebra 2 teacher shared that the rigor is different among the three.

Figure 17

Parallel Track in Vincent With Double-Dose Courses



The decision to create this parallel track by introducing a sequence of double-dose courses appeared to be solely driven by the former South principal. Although the former principal would have introduced the double-dose courses unilaterally, other mathematics leaders did agree with the creation of these courses. This decision comes from their beliefs about mathematics, beliefs about students, and beliefs about equity. Bringing together their beliefs about mathematics and students, mathematics leaders believed that with more time students that are slower learners would be able to succeed in the traditional sequence. With these double-dose courses, it was not about students not having the ability to succeed, which we have seen in other decisions by mathematics leaders, but rather it is a belief that students can succeed if given more time.

The former South principal's understanding of equity pushed him to have all ninth graders take Algebra 1 and support students through the course. The double-dose courses were his solution to supporting students that may struggle with mathematics through the traditional sequence. To continue offering a double-dose format through Geometry and Algebra 2 made sense for him, because he wanted all students to take Algebra 2. This was part of his understanding of equity as well. Not only were all students going to take Algebra 1, they were also going to complete Geometry and Algebra 2, which would prepare them for the ACT and make them eligible to apply to the University of Wisconsin four-year institutions. It was not enough for the former South principal to say that all students had the opportunity to complete Algebra 2; his understanding of equity meant all students would complete Algebra 2 with the support they needed.

Double-Dose and Lite Courses

Unlike Vincent, Robinson and Lakeway only offered Algebra 1 as a double-dose course. After that, students in these two districts would take versions of Geometry and Algebra 2 that did not have the same content or rigor as the traditional track. I refer to these courses as "lite courses." The parallel tracks in Robinson and Lakeway were made up of one double-dose course and two lite courses.

Robinson had previously had a double-dose course for Algebra 1. Students enrolled in the Algebra A/B would have Algebra every day for the entire year, while those enrolled in Algebra 1 would have class every other day for the entire year. But coinciding with the state policy, they eliminated the Algebra A/B course that students would take both their A and B days. The elimination of this course seemed to be more of an issue for the Memorial and River chairs. The Memorial chair explained:

> We don't have any more of the lower level classes. It's. It hasn't helped us, because some kids just really struggle in Algebra, because they're not ready for it yet. Maybe they will be eventually, but when they come in and have low math skills just throwing them into Algebra and expecting them to do just as fine as the kid that is super advanced and in the

> same class there.

Here the mathematics chair invokes the same image of throwing students into an Algebra class just like the mathematics teacher in Clarksville and the Vincent North principal. Using this image attempts to show that not offering a pre-Algebra course and having all ninth graders take Algebra 1 is wrong and causes students harm.

The River mathematics chair also echoed the concern about the range of students in the Algebra 1 courses. She shared that a lot of material has been cut, and rigor has decreased. Addressing the range of students in the class she said:

> Because when the range is so huge it's really idealistic to say like we'll give these kids an extra challenge, and these kids will get this, and these will remediate a little bit. But the reality is that you kind of dumb it down to meet the lower echelon because you also have to be aware of your failure rates.

These quotes by the Memorial and River chairs address the frustration of having all ninth graders in Algebra 1, but they do not talk about it with an equity lens like the Vincent North principal when discussing Pre-Algebra.

Based on these two quotes, we see the beliefs these teachers have about mathematics and students. The Memorial chair talks about students not being ready for Algebra 1 or "maybe they eventually will," implying that some students will never be ready and do not have the ability to succeed at Algebra 1. The River chair talks more about teaching to a range of abilities and how differentiation in the classroom cannot happen. What these mathematics chairs describe is the lowering of the expectations for students by taking the curriculum and "dumb[ing] it down to meet the lower echelon."

Both the Memorial and River mathematics chairs are frustrated by the elimination of the lower-level courses and wish the district would approve offering a Pre-Algebra course. They have brought up the course for years and have not had any support from the district. The River chair explained why she thought the district did not want to offer the course. She said:

> And that's where I think they don't like the idea of Pre-Algebra, because it feels like we're like catering to the lowest common denominator, but I was like these kids also need to see success. And they've not understood math for the last three years. If they can all of a sudden see some success that is a huge deal. That is a very important thing for them. That will build up skills and build up you know comfort in math, which they don't clearly have right now. Like that's to me that's a way to get more equity than we currently have now.

Here the River mathematics chair echoes the equity argument the Vincent North principal makes when justifying offering Pre-Algebra 1 in his high school. These mathematics leaders see offering pre-Algebra as addressing equity in the sense that they are providing a class to support some students as they build skills to be prepared for Algebra the next year. The River mathematics chair continued:

> But I think convincing people of that is difficult, because they see it as us adding low-level classes. And there's also you know a race component to it too, where they're like 'Well it's just going to be the Black kids in the low-level classes or a good portion.' Which I get is a problem. But math is very colorblind in that it's we made an Algebra Readiness Test for when they come into when they go to eighth grade we test the middle school teachers just really basic stuff. If you can understand this, cool then you're probably here, if you don't, you're probably here. I have no idea what this name is on this paper. I don't even know who they are. But that's what it is. So that's another I think

> difficult component. Which I'm sure there is an inequity before they get to high school, which has made them kind of sit where they are. It's tough.

Here the mathematics chair refers to the well-known fact in the field that low-level mathematics courses are often overrepresented by students of color, specifically Black students. She then goes on to refer to the myth that mathematics is color-evasive and a neutral subject. By doing this, she is subscribing the overrepresentation of Black students in low-level courses to the individual students and not to racial bias procedures and structures in the school that result in the overrepresentation of Black students in these types of courses. By believing the myth that mathematics is color-evasive and a neutral subject, the field of power remains intact and more easily accessible for the white, middle class, male students it is built for, while excluding those students in Robinson who are not.

The Memorial mathematics chair was not as explicit when race was brought up, but when asked why integrated courses that were offered and eliminated years before the state policy change, she explained:

> It was because I'm not sure who it was if it was our superintendent or whatnot. But they felt like there were more African Americans and other minority groups in there and less white people. So they felt like. And it was based on MAP scores, so if you were between I don't remember what the score breakdowns were. But if you were between 150 and 160 then you belonged in integrate. These numbers are totally made up. 170-180 you belonged in Algebra A.

She acknowledges the overrepresentation of Black students in the low-level courses but quickly pivots to talking about the use of MAP scores to place students to explain away the overrepresentation. Using the MAP scores to explain how placement worked with the low-level courses alludes to the idea of mathematics as a neutral field and the color-evasive myth. Attributing the overrepresentation to MAP scores does not acknowledge how race impacts students' experience in mathematics or the well-documented racial bias of standardized tests.

Unlike the Memorial and River mathematics chairs, the Washington mathematics chair has not advocated for a pre-Algebra course. She feels like being able to reteach and preteach while students take Algebra 1 is more effective. Before, reteaching and preteaching would happen in the Algebra A/B course. The Washington mathematics chair never talked about any frustrations with the elimination of the Algebra A/B course, because she found a way to replace it through the use of the district's initiative of adding a Math Lab course.

As a response to eliminating the Algebra A/B course, the district announced a Math Lab course to be taken alongside Algebra 1. The director of academics explained, "So there was the creation of an Algebra Lab class at each of the schools for kind of a safety net." Offering Math Lab is a district-wide initiative, but how it is implemented is different from school to school.

At Washington, there is a Math Lab that is attached to a freshman Algebra 1 course. The Washington chair works with the counselors to hand schedule students into Math Lab so that they are with the same teacher and students for both Algebra 1 and Math Lab. They are scheduled for Algebra 1 on their A day and Math Lab on their B day. She explained:

> So it wasn't like we taught Algebra on an A day and do remediation on B days. We taught Algebra the whole time with remediation built in. So the kids didn't know whether they knew if they were doing Algebra 1 or the Math Lab. Because just to them it was Algebra every day.

By implementing Math Lab like this, she found a way to keep the structure of Algebra A/B, essentially providing a double dose of Algebra 1, and has not experienced the same frustrations as Memorial and River.

Being able to hand schedule students allows this implementation of Math Lab to succeed. The Washington mathematics chair has established good relationships with counselors, secretaries, and principals in the school, so that they trust her and the ideas she has, like hand scheduling. She said:

> Our building in general tends to solve problems rather than complain about problems. And I've built relationships with counselors and our secretaries and with the person that enters all the grade changes. And nobody is inconvenienced by helping kids more than they normally do. But because the scheduling alone, you know it takes time, but once it's done it's done, then it's much better throughout the year.

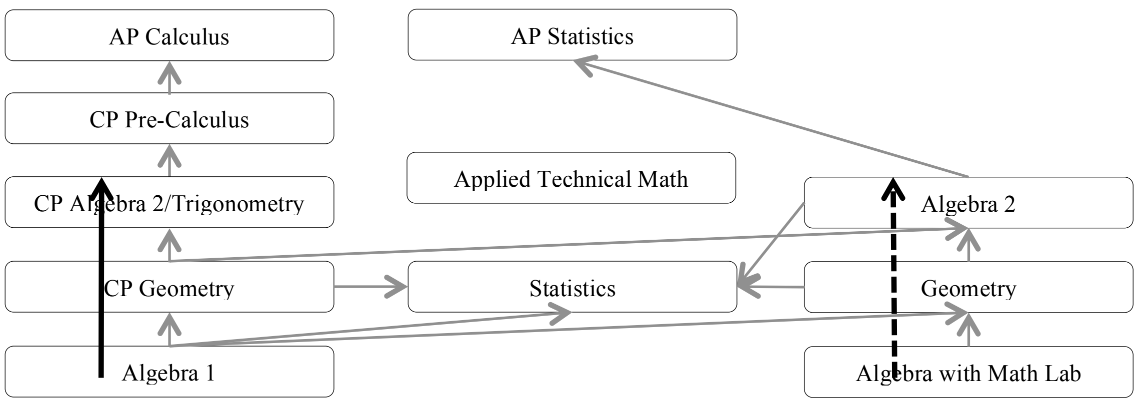
She alludes to the high schools functioning and addressing problems differently. In fact, Math Lab at Memorial and River do not operate like it does at Washington.

At Memorial and River, they chose to keep the Math Lab and Algebra classes separate, meaning students were not with the same teacher or classmates in Math Lab and Algebra. So, there is little continuity between the Math Lab and Algebra courses. By not having students with the same teacher and classmates in their Math Lab and Algebra 1 courses, Math Lab at River and Memorial operates more as a mathematics study hall rather than as a double dose of Algebra 1. Robinson students who take Algebra 1 with Math Lab go onto to take Geometry, not CP (College Prep) Geometry. Taking Math Lab places students on a different track than the traditional track. In Robinson, the traditional track is the CP track because it is the only track that leads to Pre-Calculus. This parallel track takes students through Algebra 1 with Math Lab, then

Geometry, and then onto Algebra 2, while students in the traditional track would take CP Algebra 2-Trig. Figure 18 shows the traditional track through CP courses with the solid black line, while the parallel track created by Algebra with Math Lab and the variety of Algebra 2 courses is shown in the dotted line.

Figure 18

Parallel Track in Robinson



The mathematics teacher from Washington spoke about the difference between Algebra 2-Trig and Algebra 2. She said:

> Are they actually getting Algebra 2 is a really good question. And I think that in terms of Algebra 2 even for our general ed students the differences between Algebra 2 and Trig. Your Algebra 2-Trig, you know your advanced Algebra 2 versus your general Algebra 2, I think a lot of it looks very similar to Algebra 1 and even the standards when you are looking at common core stuff, like there is so much overlap between what really is Algebra 1 versus what's Algebra 2.

This teacher freely speaks about the difference in content and rigor in Algebra 2 versus Algebra 2-Trig. Describing the Algebra 2 course as similar to the Algebra 1 course is alarming but fits Adelman's (1999) findings of Algebra 2 courses in schools with predominately low-SES families resembling Algebra 1 courses in schools with predominately high-SES families. Students in this parallel track are not receiving even close to the same material and rigor as students in the traditional track. Students in parallel tracks appear to be taking the same courses as students in the traditional track, as they are reaching Algebra 2, or least a course labeled Algebra 2. We see in Robinson, and next in Lakeway, that these parallel tracks are not equivalent to the traditional track.

The parallel track in Lakeway is similar to the one in Robinson, but the mathematics leaders of Lakeway were very purposeful in deciding the types of courses they offered in the parallel track. Coinciding with the state policy, Lakeway School District had begun its own equity work. They had been focusing on research done in Montgomery County that led to the goal of all students completing Algebra 2. The director of instruction explained:

> So the every getting everybody to Algebra 2 was a focus, because we had been looking at the research out of Montgomery Country in Maryland, and the college ready indicators are built on those. And one of those was completion of Algebra 2 by eleventh grade was a college success indicator. So that is why we wanted to get everyone to Algebra 2. Simultaneously we had conversations about the fact that students need to academically be prepared to get to college. That they don't have to choose a four-year college to be successful. But the choice shouldn't be made for them due to academic failure or our failure to offer them rigorous course work.

Having all students complete Algebra 2 was a big change for the district. The graduating class of 2014 had 68% of the cohort completing Algebra 2 by eleventh grade. To bring that to 100% would take a lot of work both in structure and teacher mindset.

There were several teachers that expressed anxiety about this push for all students to take Algebra 2 by eleventh grade. The director of instruction explained:

> So, their anxiety was that they weren't going to be successful, that they were going to fail…. When they talked about it. And by they I mean the math teachers and special education teachers when they would talk about it they would talk about making the students feel like they couldn't do it. There was no one saying we won't do it. There was no one saying this wasn't right for kids. They were all just anxious that they would be unsuccessful and they would damage the child's confidence by having them experience a failure. And I argued that aren't we already damaging their confidence by saying we don't think they can? And so at that point there was no question we were going to, it was how are we going to make sure that every kid is successful so that they build confidence in math.

The director was right to point out the damage that was already being done. Although teachers were not explicitly saying students could not do it, their anxiety about students being unsuccessful and experiencing failure does show their beliefs about students and their ability to be successful at mathematics, specifically students' ability to complete the course sequence of Algebra 1, Geometry, and Algebra 2.

Some teachers who expressed anxiety said students needed more time with the material to learn. There were many discussions around the time students needed to grasp the Algebra 1 material. The counselor recalled:

> Because I distinctly remember being in a conference room and one of the teachers saying 'They can get it. It just takes them longer. We need more time. We need to teach it three ways instead of one way. And they can get it.'

The director of instruction echoed this, "The discussion was that students in those courses were there because they had gaps in their previous learning and therefore the faster pace if they had to go back and reteach concepts was too much." As a result of these many conversations, Lakeway mathematics leaders eliminated the Algebra Concepts course, where students had been completing Algebra 1 material over three semesters. This was providing students with more time, but it was also holding them back from completing Algebra 2 by their junior year. So the mathematics leaders who included the director of instruction, high school principal, mathematics chair, and a high school counselor, created an Algebra 100 and Math Extensions course.

Students identified as needing more support through Algebra 1 would enroll in Algebra 100 and Math Extensions concurrently. Math Extensions provided an extra class period to work on the concepts they were learning in their Algebra 100 course. The director of instruction viewed this double dose of algebra as a concession:

> So I conceded and we have a course at the freshmen level only called Math Extensions. And essentially students in that Algebra course have two periods for Algebra that allow them to do some preteaching of prerequisites concepts followed by the Algebra lesson for the day. So the same teacher teaches the same Math Extensions as Algebra.

Notice the director did not use the Algebra 100 name. Based on the continued work of leveling up, the director of instruction explained a recent new change:

> That's one of the few things that we eliminated across all content areas two years ago. The remedial level. And that's why the Algebra 100 title changed to Algebra because they are doing all the Algebra. And that is the question I asked when we leveled up on all of them. So two years ago I asked, 'What is the difference in your opinion between the concepts and the standards taught in Algebra 100 and the content and standards taught in Algebra.' And the answer was 'We give Algebra 100 easier numbers that come out better on their tests.' And I said, 'Well then nothing is different. They are the same course, and

why would we label it something that it's not?'

Changing the name of the course to Algebra to match the regular track Algebra does eliminate a stigma, but it does not eliminate the fact that the course is still different from Algebra 1 and that it is still tracking. The director of instruction's beliefs about mathematics and equity brought her to the conclusion that Algebra 1 and Algebra 100 were the same courses, when really they are different. By giving students easier numbers, the rigor and understanding is different between the two courses. Providing students with problems that have easier numbers and come out better on tests creates different expectations for those students. It also does not prepare those students for mathematics problems they will see in the future that do not work out perfectly.

The course name was changed, and now instead of Algebra 100 the flow chart for the district shows the course as Algebra plus Extensions, still distinct from Algebra 1. This double-dose option of Algebra plus Extensions is the beginning of a parallel track in the Lakeway course sequencing. Students in Algebra plus Extensions do not have the opportunity to move up to Honors Geometry like those students in Algebra 1. When looking at just the course titles, leveling was removed from the Algebra 1 courses, but the reality is that Algebra plus Extensions is the first course in a different track.

Previously, Lakeway offered a Geometry Concepts course that was a semester long. Students who were in the Algebra Concepts sequence and had completed the Algebra 1 content over three semesters took this course to complete their two credits. This Geometry Concepts course is no longer offered but was transformed into the now-offered Geometry 100 course. Students who complete Algebra plus Extensions complete a yearlong Geometry 100 course. The mathematics chair described it, "So with that targ with that group that is identified as needing some extra help we have a what's called we call it Geometry 100. But it's just a slower paced

Geometry class." Students who take Algebra plus Extensions move on to Geometry 100 as their second course in the parallel track. The principal described the course:

> What they did was they weeded the curriculum a little bit and thought about what is really important for kids as they move into Algebra 2 and then some of the senior year electives. So they went deeper not broader in the class compared to the regular Geometry.

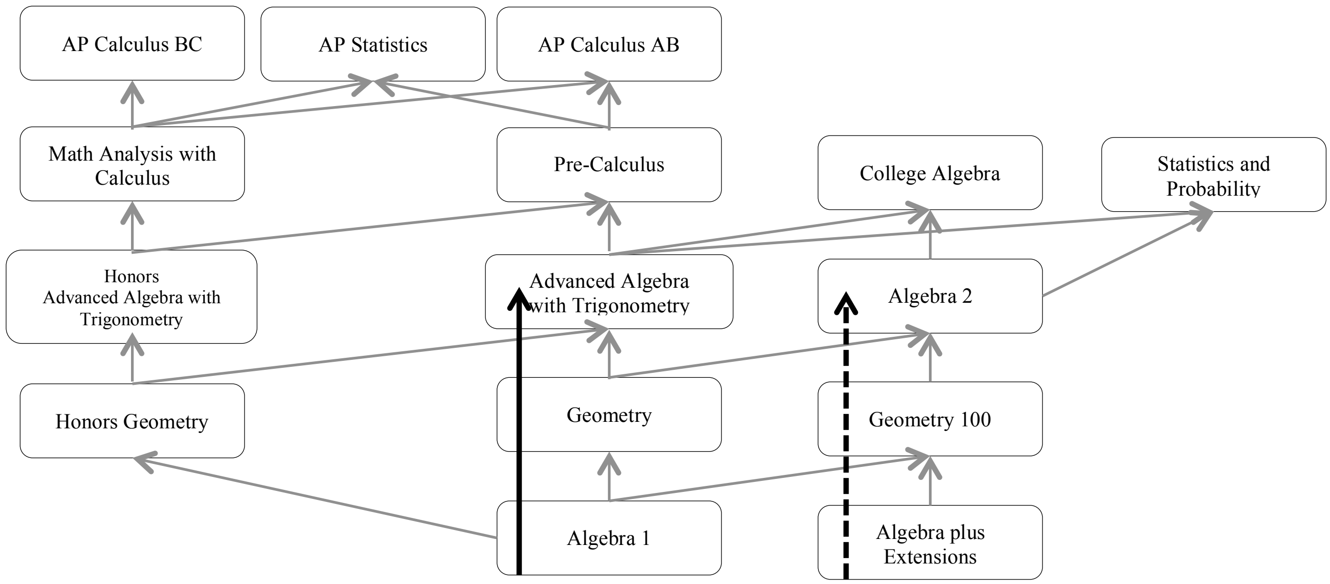
The weeding of the curriculum left the ACT standards students would need but cut some content that was not considered important. The principal said, "Took some of the things out that Algebra oh sorry Geometry teachers had been doing for years that might not have been that important. And you know those can be sketchy conversations." The mathematics chair provided an example of a difference between Geometry 100 and Geometry:

> Proof is a big killer for a lot of kids and so in Geometry might ask a student to put together the you know the whole proof. The shoot I haven't taught Geometry in a while. The statements and the reasons. The statement and the reasons for it. Whereas in Geo Geometry 100 there might be a like a word bank or a list of like they have to match. So the proof is kind of there they have to know they have to put it in the right order to make it work that way. Things like that.

So although students are completing a Geometry course, it is more of a geometry lite course, as they are not exposed to the same content and have different expectations than those students in the "regular" Geometry course. The next course in the parallel track after Geometry 100 for students to take is Algebra 2. The parallel track can be seen in Figure 19.

Figure 19

Parallel Track in Lakeway With Double-Dose and Lite Courses



Lakeway had already been offering three different Algebra 2 courses: Algebra 2, Advanced Algebra with Trigonometry, and Honors Advanced Algebra with Trigonometry. The mathematics facilitator explained the difference between Algebra 2 and Advanced Algebra with Trigonometry, "So right now the classes are working on like a Trig unit so in Advanced Algebra Trig we'll talk about degrees and radians and unit circle like that. In Algebra 2 we will just focus on just stay with degrees." He went on to explain more:

> There might be some other applications like maybe in Algebra 2 we do the basic right triangle trig and in Advanced Algebra Trig you'll do some more some fresh in my mind we do angular speed and linear speed. Other applications that extend the kids a little bit further. That Algebra 2 focus.

So Algebra 2 could be described as an Algebra 2 lite, while Advanced Algebra and Trigonometry would be a "standard" Algebra 2 course. This variety of Algebra 2 courses establishes different expectations and preparation for students based on what course they are in. The mathematics leaders' goal is to have all students complete an Algebra 2 course, and by offering a variety of Algebra 2 courses, they are able to offer different levels of rigor for students they believe will not be able to succeed.

In addition to offering three different levels of Algebra 2, Lakeway math leaders agreed to create an Algebra 2 section that was taught "off semester." The counselor explained:

> If they fail semester one of Algebra 2 because everything is credited by semester. We have a teacher who volunteered, god bless his soul, to take all the semester one Algebra 2 failures which is usually around a dozen or so. And he redoes semester one of Algebra 2 during the second semester. So time wise, you are in semester two, content wise you're in semester one. You're redoing it so you can earn the credit. Then that same group of people is earmarked for his first semester one-time semester two content class. So essentially I fail semester one I can redo semester one the following. If I happen to fail semester two I can jump in with that group and get it. It's it's time versus content and he's I think batting 1000 the past two years.

The creation of this section was driven by the teacher that now teaches the section. This provides students an extra opportunity to complete Algebra 2, starting right away the second semester of their junior year rather than having to wait until senior year.

The "off semester" Algebra 2 section does have some rigor and course policy differences from the other three Algebra 2 courses. So essentially, Lakeway offers four types of Algebra 2 for students, two of them being Algebra 2 lite. The mathematics facilitator explained the "off semester" Algebra 2:

> We have a teacher working on that just to get a little bit slower place. We don't maybe hit some of the different you know the homework is maybe a little lighter. I don't know. You probably know what I mean by that. Instead of assigning the C level problems the harder problems we might stick with the medium level problems. So they still have that

> opportunity to be successful in there and get that Algebra 2 credit.

Although the same content may be covered, the rigor of that content is different from each of the other three Algebra 2 courses. The other difference is some of the course policies in the "off semester" course. The mathematics facilitator said:

> You just have some other things in place. Like he tells the kids. In regular traditional Algebra 2 they can't use their notes on a test. Where he puts the incentive in place that you know if you're taking good notes in class and writing examples I'm going to let you have your notes out during your test. Something like that. During a test it's a smaller group so when you turn in your test the first time I do a quick look he does a quick look he might spot some obvious issues with a couple problems. He'll hand it back to them and give them a sort of a second round of those problems. Just some individual things like that.

These course policies help students be successful in the course but create different expectations among all the different types of Algebra 2 courses. These different policies come from the mathematics leaders' and teachers' beliefs about students not being able to succeed at the same level of rigor as students in the other Algebra 2 courses.

With offering Algebra plus Extensions, Geometry 100, and Algebra 2, Lakeway has created a parallel track to the traditional track. It is parallel, as it creates the illusion that students are taking the same courses as the traditional track, but it is clearly a different track with different expectations and rigor. As long as students are completing a course labeled Algebra 2, the goal for the district has been met. The content and extent and depth of mastery do not matter as much as students completing an Algebra 2 course. In other words, as long as students complete that credential of an Algebra 2 course, the goal has been met.

Spur From the Track

The new state policy passed by the state legislature increasing the mathematics requirement to three credits stated:

> The school board shall award a pupil up to one mathematics credit for successfully completing in the high school grades a course in computer sciences that the department has determined qualifies as computer sciences according to criteria established by the department.

Two districts utilized this part of the state policy and began to offer computer science courses for students to complete their third credit of mathematics. In addition, one of these districts, along with two others, created additional courses that diverged students from Algebra 2. Offering computer science courses and diverging courses created a spur in the traditional track.

Computer Science

Although the state policy explicitly allowed computer science courses to count as a third credit, only Bluffton and Vincent implemented this portion of the policy. Bluffton mathematics leaders were aware of and thinking about the state policy early on. The former mathematics coordinator was the most familiar with the policy. He said, “The changes for us, most people did not understand the flexibility that came with those three credits.” The overall plan for Bluffton was to integrate their mathematics classes more. The former mathematics coordinator explained:

> So now we are moving towards a more integrated pathway. As an option, but that doesn’t prohibit movement back to any other pathway. And more third-course options that are. Are. I want to say more exploratory. But they are more application based or possibly computer science.

Bluffton mathematics leaders were focused on making their mathematics offerings more integrated. They wanted to bring together the traditionally siloed mathematics and computer science courses to give students a more complete understanding of mathematics by integrating the subject areas. Offering computer science courses as a mathematics credit was the first step in achieving this.

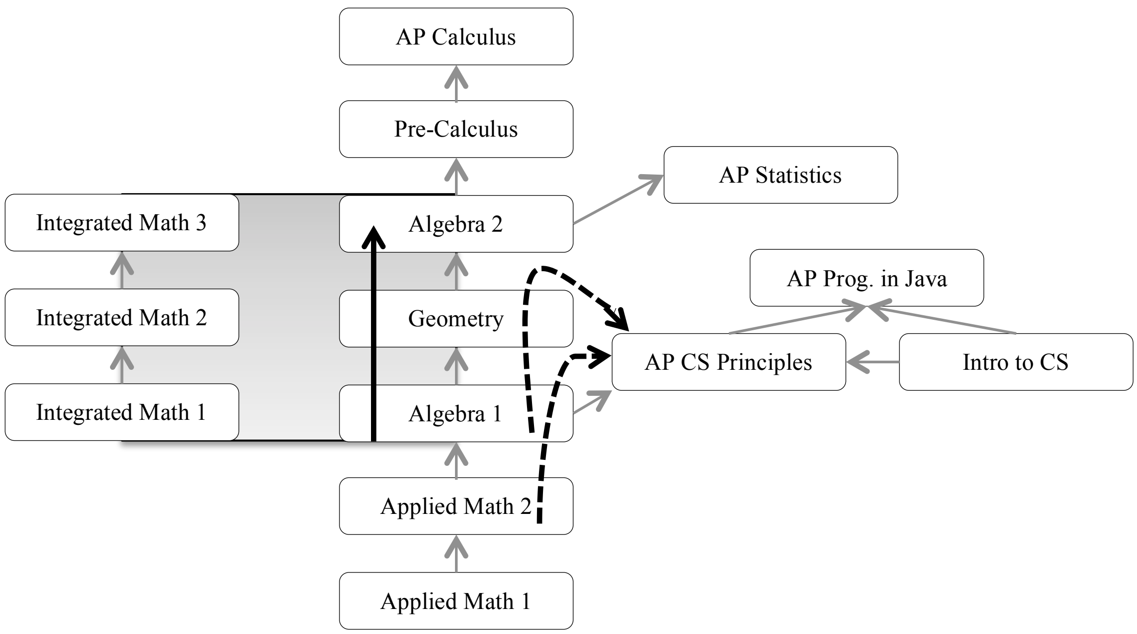
Deciding to offer computer science courses as mathematics credits was a combination of the Bluffton mathematics leaders' beliefs around mathematics and following what the state policy allowed. The mathematics leaders, specifically the mathematics teachers and coordinator, wanted to challenge the traditional way of delivering mathematics in the form of Algebra 1, Geometry, and Algebra 2. With the language in the state policy, they were able to do that by offering computer science as mathematics.

At the same time, they believed equity was being addressed, as they provided more options to students. The mathematics teacher explained, "Kids could even take the new options with the computer science classes that are offered too. Like. We're trying to have there be more options instead of just one way that doesn't fit all." They wanted to provide more options for students to learn concepts and complete their three credits. Offering computer science was not their explicit focus, as they addressed equity through more course options. It seemed more like a bonus on top the other work they were focused on, which will be discussed in a later section.

Bluffton includes their computer science courses in their mathematics course offerings section as well as their mathematics course sequencing. One of the AP computer science courses can count as a mathematics credit as long as it is a student's third mathematics credit. This requires students to take at least two credits of traditionally accepted mathematics. In doing this, Bluffton has created spurs in the track away from both Geometry and Algebra 2. Figure 20 shows the spurs created by counting computer science as a third mathematics credit.

Figure 20

Spur from the Track With Computer Science Courses in Bluffton



Bluffton was not the only district that took advantage of the state policy allowing for computer science to count as a third mathematics credit; its neighboring urban district of Vincent did the same. Previously, computer science courses were considered elective credit in Vincent School District. By the 2017-2018 school year, the elective designation was no longer used when computer science courses were listed under mathematics course offerings in the course guide. So, it appears the district is counting computer science courses as a third mathematics credit, however the information provided by the South mathematics chair complicates that. The South mathematics chair said:

> Well, I'd like to see I mean. We offer some computer science, but it's not really gotten super rolling yet. So I would like to see our district if kid if a student takes AP Computer Science Principles have that count as one of their math credits because there is a lot of

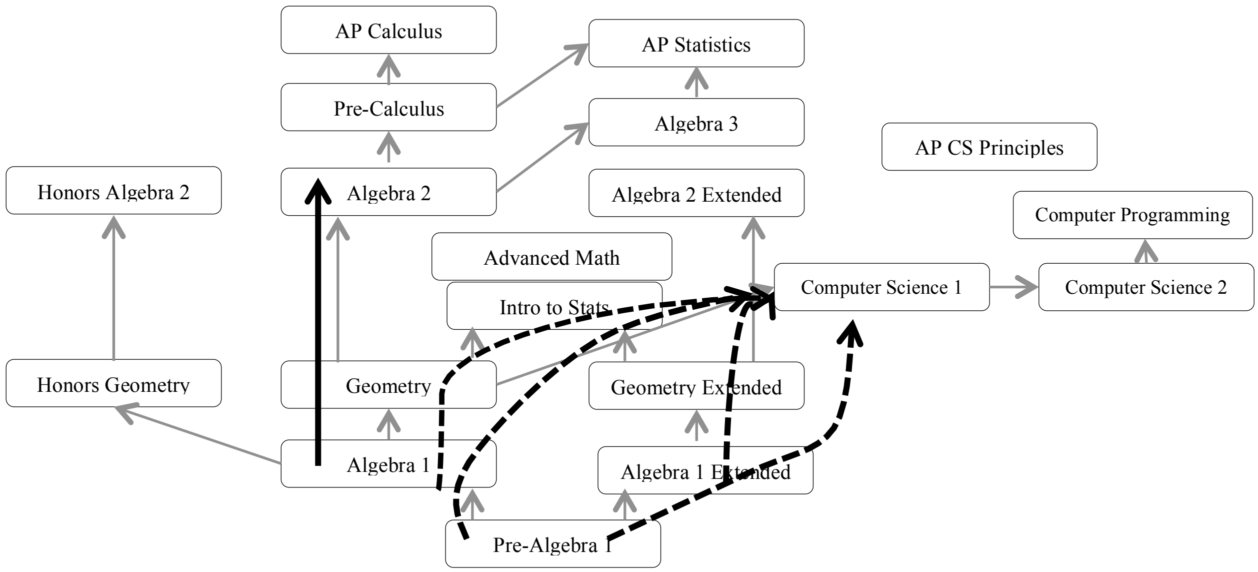
> problem solving, computational thinking, math you know some programming all that stuff that you know follows what you want out of an authentic you know math course work to have as well. So. I know that's been talked about at the state level and I think it is actually fully implemented or some courses there I can't remember the last status of that is. But have that as part of the conversation to count toward that third-credit requirement.

The South mathematics chair's beliefs about mathematics and what concepts and learning should count for mathematics encourages him to believe that computer science should count as a mathematics credit. The problem solving and computational thinking that a student receives in a computer science class, he believes, is furthering students' mathematical learning and therefore should earn them mathematics credit.

Like Bluffton, offering computer science courses to count for a third credit creates a spur in the track away from Algebra 2 or Geometry, based on the track students are taking. Below in Figure 21, the traditional track is shown as the solid black line, and the spurs in the track created by offering computer science are shown with the dotted line.

Figure 21

Spurs From the Track With Computer Science Courses in Vincent



The language of the state policy and their beliefs of mathematics led the mathematics leaders in Bluffton and Vincent to offer computer science courses as a third credit of mathematics. The policy language aligned with the mathematics leaders' beliefs of what is part of mathematics learning—specifically problem solving and computational thinking. For Bluffton mathematics leaders, offering computer science as a mathematics credit addressed equity, as it provided more options for students. Although equity was not discussed as part of offering computer science in Vincent, equity was a large part of the discussion with the addition of diverging courses.

Diverging Courses

In direct response to both the equity work that eliminated low-level courses and the third-credit requirement, Vincent created two diverging courses: Introduction to Statistics and Advanced Math Topics. Both classes are semester-long courses, and students can take both to earn their third credit of mathematics. The North principal described the Advanced Math Topics course as, "And what it really is it's solidifying the Algebra 1 skills and some of the more essential Geometry standards. And then we actually do get into a little bit of the standards from

Algebra 2 also." The course is intended to be a bridge to Algebra 2 for students that come out of Geometry and are not quite ready for Algebra 2.

These courses were created specifically because of the third-credit policy. The mathematics coordinator said, "This gives us some other classes that we can use to meet their mathematics requirements for graduation without having to get through Algebra 2." The South Algebra 2 teacher also said, "When you get up to Algebra 2 the topics are much more advanced. And we're finding out a lot of students are struggling with that and getting that third credit." By eliminating the low-level pre-Algebra courses, South students would need to complete Algebra 2 to earn three credits. With the creation of these diverging courses, students can avoid completing Algebra 2.

Like with the pre-Algebra course, leaders at North and South initially had different philosophies around how equity was met by offering these courses. The North principal explained:

> The argument always comes with Advanced Math Topics. What I hear from the other side is 'Oh you're giving them a dummy down class just to get them another half a credit of math instead of challenging them and getting them into Algebra 2 right away.' My point to be honest with you would be the same as my argument with Pre-Algebra. If that kid has some pretty glaring holes within their Algebra 1 and Geometry foundations, I truly believe that Advanced Math Topics is a bridge to help them solidify those holes and get them ready so they can take Algebra 2 as a senior and then they can be more ready for college. I do not see it as promoting inequity. But I do get that argument. If I were to get an argument from the other side that would be it. You know you're playing. You could say that in any of the other core areas, but okay so instead of challenging the kid and

> working with interventions and trying to have them have high goals and expectations you are going to have a dummy down course to avoid that. That is absolutely not what I believe that course is for.

The North principal says the Advanced Math Topics course is not "promoting inequity," but that does not mean it is necessarily promoting equity. Like the offering of Pre-Algebra 1, the North principal sees equity as meeting the needs of students where they are. He states that he does not believe the course is a "dummy down course," although there is potential that it can be used that way. This potential use is why the South principal fought not to offer the course.

The former principal at South fought against the diverging courses being offered from the very beginning. He tells his story:

> I was very adamant that students were going to take Algebra 2 because it really coincided with the ACT success, and as a state we were going to ACT testing for everyone. And I got backed doored at a math meeting by a couple of my teachers where they did not believe all kids should take Algebra 2, couldn't take Algebra 2. And so what happened is that they want to come in with a basic Stats class and an ACT prep math class in lieu of kids who didn't who they thought weren't ready to take Algebra 2.

The South principal believed teachers were afraid of students taking Algebra 2. When asked if he meant fear for the students or fear to teach the students, he responded:

> It's both. Because they fear black and brown kids being in their classes. They fear students with disabilities being in their classes, because they did not have the capacity number 1 to teach all kids because A they didn't want to, and B they didn't have the skill set.

The conversation about a fear of students taking Algebra 2 is common throughout the districts, but here is the first time race and disability were brought up. The lack of discussion around race in the rural and suburban districts has perpetuated the myth of mathematics as a neutral field. By bringing race into the conversation, the former South principal calls out what has been silent. His doing this is part of his own reflection on a school equity audit he conducted where he collected data on his school and district. With an equity audit, the goal is to see proportional representation of every demographic in every classroom, courses, activity, or experience within the school (Frattura & Capper, 2007). The equity audit he performed showed the racial inequities and inequities for students with disabilities in his school. After having conducted an equity audit, a team of school or district leaders set goals based on the data. Frattura and Capper (2007) suggest the first goal is to have 100% of students without severe cognitive differences score advanced on reading and mathematics standardized tests (Frattura & Capper, 2007). Other goals are to identify those spaces where students are either overrepresented or underrepresented and make the space proportionally represented. So, if 5% of students in Algebra 2 are Latinx students but 15% of the school population is Latinx, then mathematics leaders and school leaders need to work to have 15% of the students in Algebra 2 to be Latinx students.

How the former South principal framed equity is based on his understanding of the purpose of the equity audit and his own education around equity. He framed equity around “all students.” He said, “Our mission statement was this we prepare all kids for postsecondary readiness.” This mission statement reflects the difference between the South and North high school. The former South principal also explained:

> Historically, North has always been the downtrodden school. It always had the higher students from lower income families. I used to teach at the middle school with my wife

> that feeds into it. Over half of the kids were from low-income families 25 years ago. Still are today. Across at South. It's always been a "college prep" school. That is not the case anymore. But there is always a difference in expectations.

North High School, which has historically had more students from low-income backgrounds, does not have the "college prep" reputation and coincidently also had a leader who was a strong supporter of the diverging courses. Whereas the "college prep" South High School, had the leader that knew he needed and wanted to prepare all students for postsecondary options. Here we see how the socioeconomic status and class of students in a school can impact the courses offered to students in the school.

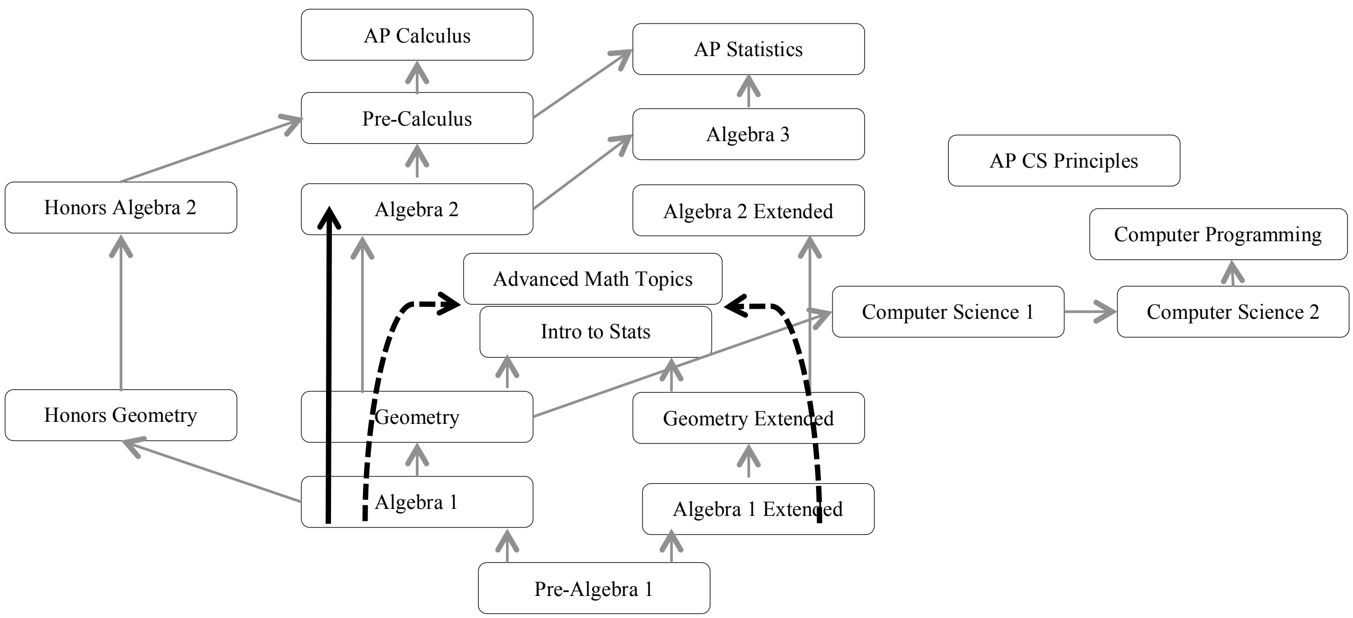
The former South principal was committed to having all students take Algebra 2. With Algebra 2, they would be prepared for postsecondary options, as they would be eligible to apply to the University of Wisconsin four-year institutions. The South principal ended up going to the superintendent and informing the superintendent that Advanced Math Topics and Introduction to Statistics would not be offered at South High School. The superintendent did not argue with him.

After the 2015-2016 school year, the South principal left the school district, and Introduction to Statistics and Advanced Math Topics began to be offered at South. However, the courses did not run for the first couple years. When this was brought up to the former South principal, he said, "In other words there weren't enough students to sign up for it. Which now given that quote think about that. That's a testament to the fact that the kids believed they can take Algebra 2."

Introduction to Statistics first ran at South High School during the 2017-2018 school year, and Advanced Math Topics ran for the first time in 2019-2020. This closely correlates with the first cohort of students that did not have the former South principal. Students in this cohort were seniors during the 2019-2020 school year. Now that these courses are offered and students are enrolling in them at both high schools, they create spurs in the track. In Figure 22, the traditional track can be seen with the solid black line, while the spurs created by these diverging courses are shown with the dotted line.

Figure 22

Spurs From the Track With Diverging Courses in Vincent



Vincent was not the only district that created spurs in their track with the addition of diverging courses. Clarksville mathematics leaders created spurs by introducing and restructuring three diverging courses. Clarksville added a Technical Math course to their offerings during the 2019-2020 school year. This is a yearlong, dual-credit course partnered with the local technical college. When asked about the content of the course, the mathematics department chair explained:

> As far as content it is. At its most basic levels, it's middle school level content. A lot of number sense. Working with percentages. Basic applications. And like. It's basic algebra that isn't really considered Algebra 1 anymore. It's considered middle school. And then

> the most rigorous stuff in the course is Geometry. There's trigonometry in towards the end of the course.

Besides describing the content here, there was not much more discussion about this course. The drive behind offering it seemed to be the dual-credit that students could earn at the local technical college.

Offering Technical Math fit with the trend of more Clarksville students attending tech and trade schools after graduation. Both the teachers and counselor mentioned this trend. The mathematics teacher said, "I also think it just fits our demographics here better too." The mathematics chair followed up:

> Our community is not a not a high level of education. Very blue collar, factory workforce. Factory workforce, rural farming workforce. Outside of the school, the hospital, clinic there really isn't anything as far as high level education employment in the area…So yeah we struggle with our socioeconomic background a little bit when it comes to things like the ACT.

Here the mathematics chair connects the socioeconomic background of Clarksville students with the low ACT scores they receive. However, there is Algebra 2 content on the ACT, so by both backing up the track and spurring the track away from Algebra 2, the mathematics leaders in Clarksville have made it so that students do not need to be exposed to Algebra 2 content to earn three mathematics credits. So, it is not just the impact of the socioeconomic status of students but also the sequence and tracking structure Clarksville has created that impact the ACT scores of Clarksville students.

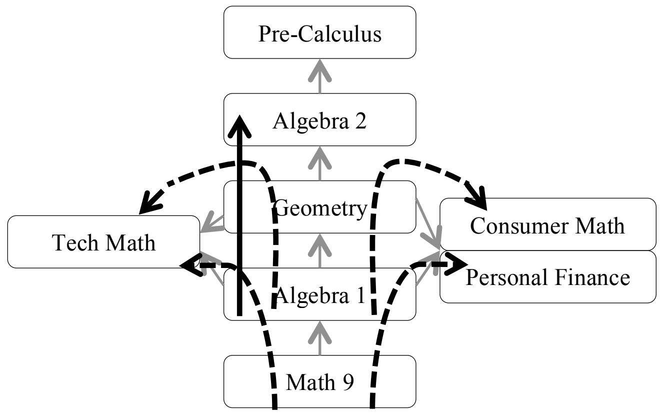
To be able to offer Technical Math, the district had to change the yearlong Consumer Math course to a semester-long, half-credit of mathematics. Additionally, they reclassified their

Personal Finance course that was formerly a business credit to make it a semester-long course worth a half credit of mathematics. So now students have the option of diverging from the track away from Algebra 2 by taking Technical Math or Consumer Math along with Personal Finance after Algebra 1 or Geometry.

Recall that the mathematics department chair said, “They had Algebra, Geometry, and the Consumer Math would have been considered the three easiest course loads to get the 3 credits. And we just knew there’s we have students that you know can’t.” Both of the Clarksville mathematics teachers had concerns about some students successfully completing Geometry. These concerns come from beliefs about mathematics and the level of difficulty of each course. The concern appears because of their beliefs about their students and what students are going to be capable of. So, with the addition of Technical Math and including Personal Finance as half a mathematics credit, Clarksville mathematics leaders have created options so that students do not need to complete Geometry or Algebra 2 to earn their three credits of mathematics. These diverging courses create spurs from the traditional track. There are spurs away from both Geometry and Algebra 2. Figure 23 shows the four possible spurs from the traditional track available to students in Clarksville. Algebra 1 is a prerequisite for Consumer Math and Technical Math, so it is not possible for a student to take a sequence of Math 9, Technical Math, Consumer Math, and Personal Finance.

Figure 23

Spur From the Track in Clarksville



Like Clarksville, Robinson School District already had a diverging course in place that would help with the concerns of students completing Algebra 2. When asked about the third credit and the sequence, the River mathematics chair said, “So I mean the main thought at first was Algebra 2 makes sense. But the concern is I don’t know if students can pass Algebra 2.” This concern and belief was common among the teachers interviewed. Because of this concern, each of the three mathematics chairs talked about the increase in students taking Statistics and this spur in the track becoming more popular. The Memorial chair said:

> The stress. I mean we are dealing with it right now. Statistics is a class that a lot of the kids take to just try and get the third credit. They didn’t have luck in Algebra 2, they will try Statistics.

Here she talks about Statistics being an option after students are unsuccessful in Algebra 2, whereas at Washington, the chair urges students to take Algebra 2 and Statistics at the same time so they have better chances of earning their third credit during their junior year. At River, the chair talked about Statistics as a substitute for Algebra 2:

> And I think as a result of that Stats became a really viable option for people. Generally speaking, our Stats classes are probably a little bit easier than Algebra 2. So, it became a go-to option for that third credit. The struggle of course being that you know if they’re

> going off to a four-year college a lot of them don't like Stats as your third credit for whatever reason.

So, although taking Statistics is encouraged differently at each high school, it is used as a safety net or alternative to Algebra 2 throughout Robinson. Students can earn a third credit by taking Statistics and diverge away from Algebra 2. However, like the River chair mentions, they still will not be eligible to apply for admission at many four-year colleges.

The push to offer more Statistics sections as a diverging course came from the beliefs teachers had about mathematics and their students. They believe that many students do not have the ability to be successful in Algebra 2 and that this mathematics is not necessary for all students. The Washington mathematics teacher spoke about her philosophical struggle around Algebra 2:

> Just the fact that Algebra 2 is very abstract. There's not a ton of real-world applications for Algebra 2 and so looking at the population that I have in there and saying 'Is Algebra 2 actually worth kids not getting a high school diploma over?' has been a struggle for me. Just because looking at it in terms of life 'Are you ever going to have to do synthetic division? No.' Never again even you know like these kids aren't going to be math majors in college even if you know. But even if they are, they will learn to do synthetic division later. So, it's just one of those things where I'm looking at the quality of life is so much better if you have a high school diploma and is Algebra 2 worth keeping kids from that? Is my greatest struggle.

She later said:

> But for kids that are not mathematically minded and for kids that have struggled through like struggled their way through Algebra and Geometry, I'm looking at Algebra 2 saying

> like, 'Is this worth it?' Like I think in terms of a trajectory for getting onto Calculus and getting onto all those other higher-level math, Algebra 2 is great. But in terms of this like third credit of math like I feel like there has to be something we can offer that is better.

Responding to the state policy with diverging courses that created spurs away from Algebra 2 appeared as a result of leaders' beliefs about mathematics and beliefs about students. Teachers believed Algebra 2 to be a difficult course that not everyone needs and that some students do not have the ability to complete the course. These beliefs supported the need for additional options for these students in the form of diverging courses.

The response to the third credit has been ongoing, and the district has introduced two new dual-enrollment courses to be implemented during the 2019-2020 school year. The director of academics explained that the new Applied Technical Math course is , "hands on, it covers the basic math Algebra, Trigonometry related to technical fields. It's very rigorous. It has an introduction to statistics." The other course, College Technical Math, will be implemented during the 2020-2021 school year and is a continuation of the Applied Technical Math course.

When the district introduced these courses to the mathematics departments, there was some confusion. The River chair talked about the discrepancy in how the class was sold to them and what the class actually is. She said:

> We had a speaker from (the Technical College) come in and talk about it. We were sold from central office on the concept that it was essentially a pre-Algebra skills course. When we showed up at the meeting and saw the material, we were like there is no way this is pre-Algebra. It did start with fractions and decimals, but it went to law of sines and law of cosines.

The law of sines and law of cosines are concepts traditionally covered in geometry and trigonometry courses. The misunderstanding about what the course really was led to further confusion about who should be enrolled in the course. Because it was first sold as a pre-Algebra course, the River chair said, “So initially they wanted it for freshmen. They were like, freshmen who are struggling with math because it’s hands on; it’s a different approach.” Once the teachers learned about the course, they had to decide once again for which students the course would be a good fit. Determining who should be in the course would be dependent on mathematics leaders’ understanding of the course based on their mathematics knowledge and their beliefs about students and their abilities.

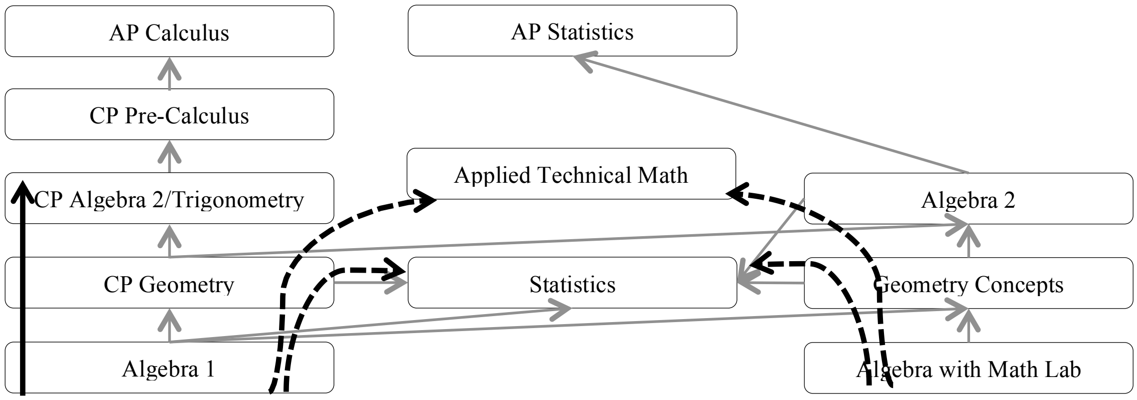
At the end of the 2018-2019 school year, mathematics chairs were still trying to figure out who should take the course in the fall. The Memorial chair said:

> I see it being a more of a second or third year. Like they struggled through Algebra it wasn’t their thing, because they weren’t ready for it or whatever… But then it can also be that third year after Geometry if Stats and Algebra 2 are just not their thing because it is going to be more application based. So, it might just be that last thing some kids need to take.

So, the Applied Technical Math course became another diverging course away from Algebra 2, like Statistics, for those students teachers did not believe would be able to succeed at Algebra 2. The Applied Technical Math and Statistics courses created spurs from the traditional track in the course sequencing. Figure 24 shows these spurs.

Figure 24

Spurs From the Track in Robinson



The number of sections at each high school was initially very different. The Washington chair said, “So they are suggesting kids that are really lost in their purposes of mathematics that they take that because. But we have to be careful. We have three sections of 20 kids. (River) has 200 kids signed up for that course.” This meant River was planning for ten sections while Washington was planning for three. The Memorial chair said they were planning for eight sections.

The difference in enrollment numbers seemed to be the understanding or misunderstanding of who the class is meant for and counselors’ role in enrolling students. The River chair explained why she thought they had so many sections: “So we’re supposed to try it out but our counselors. We’re supposed to have one or two sections next year, we have ten. I think because counselors were like ‘Dual-credit, we’ll put anyone who failed in this class.’” Here the River chair places some of the responsibility for the large enrollment numbers on the counselors and their misunderstanding of the course or lack of mathematics background to understand the course.

With such a wide range of student ability levels that was going to be in these courses, there were concerns about completing all the material in the Applied Technical Math course. The River chair shared a conversation she had with her scheduling principal. She explained:

But even in this course right it’s a (Technical College) course, so the rule that we have to

> follow is that we have to do 85% of the material from (Technical College). I was talking to my principal, our scheduling principal we had a meeting and I just said 'Hey I see that we have ten sections. That's crazy.' He was like 'I know.' I was like 'No, I don't think you understand. We have to get through 85% of the course, it's a dual-credit course. I can't slow down the material, because I need to get through 85% of it.' And he was like 'Oh.' And I was like 'So, you have kids that have never passed Algebra 1 in here, and then you have kids have passed like my kid that got an A on the final today is signed up for it and Geometry. You have a range, a huge range in here. And we are supposed to do it year one with one or two courses to really figure out who should belong in the course. But with ten sections that's crazy.' And he goes 'Well, what if we. Do you know how many kids are going to do dual-credit? Because you don't have to; you can choose to do it or not.' And I was like 'I have no idea. No I don't know.' And he was like 'What if we made just one section dual-credit and they have to get through 85% of the material. And everyone else doesn't do the dual-credit, and so you don't have to get through as much material.' And I was like '(scheduling principal), that's unethical. If we said we're taking your course, your materials, and your requirement is that we teach 85% of it, we're teaching 85%. I'm not okay with just being like, well they don't get the credit anyways so it's fine.' And he was like 'Yeah, I mean I see what you're saying.' And I was like 'But do you? Cause I feel like we're not communicating here.' So he's going to drop some of the course and move some kids to Stats instead but that will be. It will have seven sections of it.

The scheduling principal is suggesting to literally compromise ethics to ensure students earn their third credit. The scheduling principal is so focused in on getting students the third credit that he is not concerned with the content or learning for the students. In this way, the response is being filtered through a belief that content and learning can be withheld from some students so they can receive a third credit.

Mathematics leaders' beliefs about mathematics and beliefs about students, specifically the concerns around Algebra 2 and the beliefs that some students did not need Algebra 2 or did not have the ability to complete Algebra 2 propelled the introduction of diverging courses in these districts. These beliefs pushed mathematics leaders to create these courses to provide alternative options for students to complete their three credits. Although more options can be viewed as addressing equity to meet different students' needs, these diverging courses take students away from Algebra 2, constraining students' opportunity to be able to apply to four-year institutions.

Creating more options for students can be overwhelming for students to navigate, especially students whose habitus does not align with the mathematics field of power. So while providing students more options can be helpful to address different needs, it also creates a structure that perpetuates the field of power being held for some. It allows students of color and students of low income to remain excluded, while a district can hide behind "student choice" as the reason students whose habitus misaligns with the field of power remain stratified in their mathematics courses.

Bypass the Track

The main response of mathematics leaders in the School District of Bluffton was the creation of three integrated mathematics courses. What makes the decision of the Bluffton mathematics leaders different from those in Cedar is that Bluffton kept the traditional pathway as well. The decision to create integrated courses while keeping the traditional sequence created a bypass track.

When responding to the state policy, the Bluffton mathematics leaders' focus was giving students more options to complete their three credits of mathematics. The mathematics teacher said, "We're trying to have there be more options instead of just one way that doesn't fit all." That one-size-fits-all idea is the traditional sequence of Algebra 1, Geometry, and Algebra 2. The mathematics chair refers to this sequence as a "little pole of death." He said:

> I call this the little pole of death. For a lot of kids to force them through the same pathway, yes, we want to get those same concepts, but do they have to do it the exact same way? And so it's giving kids choice, and that's what more kids need more than anything now.

The mathematics chair saw the "pole of death" as inequitable. By providing more options to students, he saw this as addressing equity. He said:

> First off, there is no one size fits all. If you want to talk about equity, you can't do one size fits all. So, this gives students an opportunity to say I need more time. I am still going to be able to progress with my peers. I'm still going to be getting the same concepts and same understandings. So, we're incorporating with these two different pathways actually integrated pathways between the two a chance for equity to show up.

Like the mathematics chair says here, the other mathematics leaders saw the integrated pathway as students progressing along with their peers who were in the traditional path; they were attempting to make the pathways equivalent.

The new pathway was implemented at the start of the 2018-2019 school year and was made up of three integrated courses. The former mathematics coordinator explained their thinking:

> We tried to make it so that it wasn't just adding another expectation. A tier in the ladder. We tried to find things that allowed them to go horizontally with where they were at. Yet pull from the ladder down to them the essentials that we think are there and spend more time with those essentials. So that's we really tried to look at it through an equity lens.

The mathematics coordinator mentioned responding through an equity lens when creating the three integrated courses and the pathway. Equity is understood here as meeting students where they are and not as providing the same rigor and curriculum for all students.

In the previous quote, the mathematics coordinator said they wanted students to be able to move horizontally, meaning the courses would need to be considered equivalent. The mathematics teacher explained, "We tried to design the integrated one curriculum to line up somewhat with the Algebra 1 curriculum." The mathematics chair echoed:

> And once we get it step up. Ultimately, we want to see that these guys are comparable. Right now, because it's this weird transition and it being the first year, we don't have that ability yet. But we want it to be so that there's some good compromise that a student that comes from either of these courses can go to Geometry or Integrated 2.

They wanted to offer mathematics at different levels and in different ways to provide for students regardless of their current level. The former mathematics coordinator said, "And that that's equity lens. Giving them inroads, access that makes sense. What are those points of entry where everyone can engage in the math?" The mathematics leaders attempted to address equity at the entry points, but with multiple entry points comes the danger of tracking students.

To keep the variety of entry points from creating tracked sequences, the math leaders have attempted to create fluidity between sequences. The associate principal spoke to the fluidity of the sequences but also talked about the potential for it to be seen as tracking. He said:

> I think it can easily be viewed as tracking. That is a concern of mine. So we need to work harder on setting parameters on the sizes and parameters on why are they being recommended and why are they choosing. And really, it's choice. That was. When these were approved under our new director of instruction and curriculum council and building leadership, I guess we said they have to be able to go back and forth. You can't be sentenced to integrated track.

The decision to make sure the sequences were fluid came from district- and school-level leadership. At first, this was not how the mathematics teacher leaders presented the sequences, but now there is consensus that students should not be stuck in a track. The mathematics chair explained:

> What we wanted to build it so it was a chance to cross between. We don't want it to be a fixed pathway. That is the last thing we want. If that ends up what ends up happening we are going to revamp it quickly. Because what we want to have is the students to find where they need to be.

By ensuring the pathways are fluid, Bluffton mathematics leaders hoped that students would have more power to determine what pathway and what courses they should be taking. Bluffton mathematics leaders valued being able to provide and allow for student choice—not only the choice of entry point but also the choice of an exit ramp.

The mathematics chair talked about creating different exit ramps that fit students and what they want. He said:

> Like I said with the idea of the exit, can we get a better exit plan or better options for that fourth credit to get students what they want. Maybe not necessarily everyone going to Calculus. We want to keep that. Because I think we have great kids that are incredible, ones that understand math we want them to still have that opportunity. So we don't want to slow down their progress. But we want to make sure that the kids that need a little bit different option can swing back or they say you know what I like this better. And find the exit that they need.

With the integrated pathway, students now have several exit ramps to choose from depending on what they feel they need or are interested in. The mathematics leaders see having multiple exit ramps as equitable for students, because they are providing more options for students rather than having them take the same courses.

In the above quote, the mathematics chair talks about those students that would go on to take Calculus their senior year. The mathematics leaders wanted to offer that course for students because they did not want to slow down the progress of those students considered high achieving. This is seen across the districts as honors courses and honors tracks were not changed or impacted by the response to the state policy. The focus of responses by district mathematics leaders across the study is on those students considered low achieving.

The concern for students considered low achieving was their ability to complete Algebra 2. On "the pole of death" the mathematics chair talks about, Algebra 2 would be a student's third credit. Requiring students to pass Algebra 2 to earn their third credit concerned Bluffton mathematics leaders. The mathematics chair said, "We were already seeing students struggle in Algebra 1 and struggling additionally in Geometry, and the fear was looking at Algebra 2 that was going to be too big of a hurdle." This concern led the former mathematics coordinator to say, “So the first step was offering a third option that was not your college pathway Algebra 2 type course.” The mathematics chair echoed this, saying, “But we also saw a lot of students that didn’t necessarily need as much of the rigor that Algebra 2 gave. Most students. Most people will never need to know how to factor a quadratic.” So the result was creating a new pathway where students would not have to follow the “little pole of death” and therefore not have to complete Algebra 2. Like the mathematics chair, other mathematics leaders in Bluffton did not believe that all students needed the content and knowledge in Algebra 2.

Bluffton mathematics leaders’ beliefs about mathematics and students’ abilities regarding Algebra 2 were similar to the beliefs of the mathematics leaders in the other districts in the study. Mathematics leaders believed Algebra 2 was difficult and believed some students were not capable of completing the course. Together, this pushed mathematics leaders to create alternatives to Algebra 2 so that students do not have to complete Algebra 2. The challenge is that Algebra 2 is needed to apply to the four-year University of Wisconsin schools, and its content is needed to be prepared for Pre-Calculus.

Figure 25

Bypass the Traditional Track in Bluffton

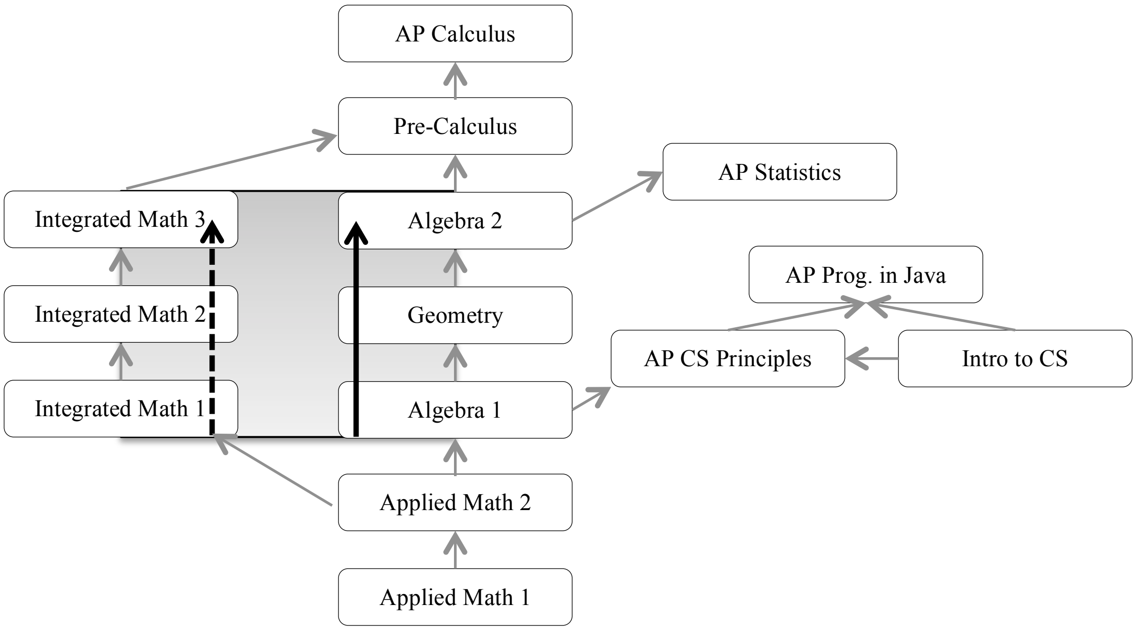


Figure 25 shows the traditional track with the solid black line and the bypass track as the dotted line. The gray box indicates that students can flow between those courses in the box. Figure 25 looks similar to those of parallel tracks in the previous section, but this bypass track does not take students through the traditional courses. The track bypasses this curriculum. They are parallel in the sense they have the intention to prepare students for Pre-Calculus, but for now this is just an intention. The implementation of the integrated courses is still early in Bluffton, so it is not yet known if students who complete the bypass track will be prepared for Pre-Calculus.

The mathematics chair brought up a concern about the transition from Integrated Math 3 to Pre-Calculus. He said:

> As far as the fourth credit, ideally we would like to say both of these have the same exit points toward Pre-Calc if they want. How we're going to get there, that's still what we are trying to do. Because right now it's not quite up to where they need to be in Pre-Calculus. And we want it to be the point as a kid chooses either pathway they want to progress to higher mathematics we want that to happen…Ultimately that's our goal. Are

> we there yet? Not yet entirely. But we want to make it so they're not again last thing we want to do is any of these pathways as a dead end.

According to the course guide, the prerequisite for Pre-Calculus is Algebra 2. So as the mathematics chair mentioned, they do not have the integrated pathway leading into Pre-Calculus yet. There is more work to do to make this integrated track a true bypass track, because right now it is a spur away from all the traditional courses, as it does not actually lead back to Pre-Calculus.

Conclusion

Mathematics leaders responded to the state policy by making course offering changes that impacted the course sequencing options for students. The changes in course sequencing in each of the districts altered the traditional track of mathematics courses by either backing up the track, creating a parallel track, spurring from the track, or bypassing the traditional track. The mathematics leaders in every district responded to the state policy that ultimately perpetuated the inequitable system of tracking.

Mathematics leaders' rationales for their changes reflected their beliefs about mathematics, beliefs about students, and understanding of equity in mathematics. Beliefs about mathematics appeared in mathematics leaders' responses in terms of what courses they viewed as difficult, what courses or content mathematics leaders thought students needed, and what counted as mathematics. These beliefs about mathematics merged with beliefs about students to create new courses that would provide alternative tracks for students to complete their three mathematics credits. Mathematics leaders' beliefs about students were concentrated on the readiness and ability of students. The readiness and ability of students was discussed specifically in terms of Algebra 1 and Algebra 2.

Deciding what courses to offer students that were viewed as not ready or viewed as not having the ability for Algebra 1 and Algebra 2 brought up issues of equity for many mathematics leaders. Mathematics leaders throughout the study viewed equity differently. Different course offering responses were made based on mathematics leaders' understanding of equity. Although many responses were made with equity in mind, they perpetuated the inequitable system of tracking.

Chapter 5: Discussion, Implications, and Conclusion

To understand how mathematics leaders responded to the state policy requiring three credits of mathematics for high school graduation, I conducted a study across seven school districts in Wisconsin. In this study I sought to understand mathematics leaders' responses, their rationale for making them, and the implications of these decisions for students' educational opportunities. There are studies that examine how leaders and teachers respond to policy changes focused on mathematics instruction. However, this study addresses a gap in the literature by examining mathematics leaders' sensemaking processes in response to a policy that impacts the structure of mathematics education, including course sequencing and mathematics structures, rather than focusing primarily on mathematics instruction. It also provides a missing discussion around the impact of mathematics structures on opportunities and shows how students are impacted before they even enter a mathematics classroom. In this chapter, I discuss the study's theoretical and practice-based implications and suggest policy recommendations.

Discussion

In this study, I found that mathematics leaders responded to increased credit requirements in mathematics by adapting and adding courses that in turn impacted the course sequencing and the mathematics tracking structure in four ways: they backed up the track, created a parallel track, spurred from the track, and bypassed the track. Mathematics leaders' rationale for these responses came from their beliefs about mathematics, their beliefs about students, and their understanding of equity in mathematics. These new reconfigurations either kept students from needing to complete Algebra 2 or created structures so that students would complete Algebra 2 by the eleventh grade. This section will discuss what these findings tell us about the focus on

Algebra 2; mathematics leaders; equity and color-evasiveness, class-evasiveness, and gender-evasiveness in mathematics.

Focus on Algebra 2

In the previous chapter, we saw that six districts responded to the new state policy in terms of course offerings. In turn, this impacted the course sequencing and mathematics tracks available to students. All course offering responses came from mathematics leaders' concern about Algebra 2. No mathematics leader had an issue with students taking three credits of mathematics; in fact many said they thought students should be required to have four credits. They believed the additional credit of mathematics would better prepare students for college and careers and create more equity in mathematics. Although they believed this, they still had a great deal of concern about students successfully completing Algebra 2. Because of this concern, mathematics leaders' responses were focused on Algebra 2 and created tracks so that students would not need to complete Algebra 2 unless they chose to do so. Without completing Algebra 2, students' opportunities are constrained, and inequity is perpetuated.

Responses about Algebra 2. Mathematics leaders' concerns about responding to the state policy were never about the three credits but what that third credit was going to be. Each of the reconfigurations to the mathematics track resulted from mathematics leaders' concern about Algebra 2. These reconfigurations either made it possible for students to complete three credits without Algebra 2 or made sure students completed a course labeled Algebra 2.

By backing up the track and spurring from the track, mathematics leaders created paths so that students would not have to complete Algebra 2 to earn their third credit. The reconfiguration and reintroduction of pre-Algebra courses delayed the start of Algebra 1 or provided two mathematics credits in ninth grade, like in Two Harbors School District. These responses allowed students to be able to earn three credits without taking Algebra 2. The mathematics leaders who backed up the track were concerned about students successfully completing Algebra 2 or stated they knew they had students who would not be able to complete “Algebra, Geometry, and whatever else” (Clarksville teacher). Statements about students’ inability to be successful at Algebra 2 were often followed by statements about how not all students needed Algebra 2.

This was also true for the discussions about computer science courses and new diverging courses added in districts. These courses allowed those students seen as not able to complete or not needing Algebra 2 to complete three credits of mathematics without Algebra 2.

These pre-Algebra, computer science, and diverging courses give students the ability to avoid Algebra 2. These responses by the mathematics leaders put the onus on students when really it should reside with the mathematics leaders and schools. The former South principal said, “The rest of them were scared. The rest of them had deficit ideology. They didn’t believe all the kids should take Algebra 2.” So, at first the mathematics leaders knew the onus was on them to have students complete Algebra 2, and this made them nervous, scared, anxious, and concerned. By making changes to the course offerings and in turn the tracks, the onus transferred from them to the students. They were no longer responsible for getting students successfully through Algebra 2.

These feelings of nervousness, fear, and anxiety were not only felt in the districts where mathematics leaders backed up the track or made spurs in the track. Those mathematics leaders in the districts that created parallel tracks and a bypass track felt this way as well. Lakeway was intentional about all students taking Algebra 2, as the new state policy aligned with their own goal of all students completing Algebra 2 by the end of eleventh grade. The director of instruction in Lakeway said, “So there was stress and anxiety that they were afraid to fail. And they were afraid that they would struggle to get all kids there.” To address the mathematics teachers’ stress and anxiety, mathematics leaders responded by creating a double dose of Algebra 1, which eased their concern about reaching students on the front end. For the concerns on the back end when students reached Algebra 2, the creation of the off-semester Algebra 2 helped. This meant there were now four different types of Algebra 2 courses with different levels of rigor and different course policies that would allow a student to be successful in an Algebra 2-labeled course.

Like Lakeway, Vincent also had a variety of Algebra 2 courses with their parallel track of double-dose courses. Although the intention of these parallel tracks was to get students through Algebra 2, students are completing different types of Algebra 2. This is similar to the bypass track in Bluffton, because of the use and acceptance of integrated mathematics sequences as equivalent to the traditional sequence. So, when Bluffton students are completing Integrated Math 3, Bluffton mathematics leaders see this as students completing a course equivalent to Algebra 2. But are these courses equivalent?

Opportunity and Algebra 2. Similar to how the mathematics leaders’ response to the state policy focused on Algebra 2, understanding the implications of these responses on students’ opportunity also focuses on Algebra 2. For almost all of the University of Wisconsin four-year colleges, Algebra 2 is listed as a requirement. In Table 3, the number of mathematics credits and courses required for application by each four-year UW campus are shown. UW-Green Bay does not list course requirements, and UW-Stevens Point only lists courses they do not count as credit. Notice that Pre-Algebra is not counted as a mathematics credit for application. In fact, for those campuses that do list course requirements, none of them include Pre-Algebra. So those students that took a backed-up track would not be eligible for application with their three credits.

Table 3

Mathematics Credit and Course Requirement for Application at UW Four-Year Schools

Campus	**Mathematics Credit and Course Requirement to Apply**	
UW-Eau Claire	3 credits	algebra, Geometry, **Algebra 2 or advanced algebra**
UW-Green Bay	3 credits	(nothing listed)
UW-Milwaukee	3 credits	**college prep at or above algebra**
UW-Oshkosh	3 credits	Algebra, Geometry, **Algebra 2**
UW-Platteville	3 credits	algebra, geometry, and ***higher***
UW-Stevens Point	3 credits minimum 4 credits recommended	Not Business Math, Computer Math, Consumer Math, General Math, Pre-Algebra, Statistics, Applied Math as math credits.
UW-Whitewater	3 credits	Algebra 1, Geometry, **Algebra 2 or equivalent**
UW-La Crosse	3 credits minimum 4 credits average accepted applicant	Algebra 1, Geometry, **Advanced Algebra**
UW-Parkside	3 credits	Algebra, geometry, ***advanced math***
UW-River Falls	3 credits	algebra, geometry, and ***higher***
UW-Superior	3 credits	algebra, geometry, and ***higher***
UW-Stout	3 credits	Algebra 1, Geometry, **Algebra 2** or Integrated Math 1, 2, **3**
UW-Madison	4 credits recommended	algebra, geometry, and ***advanced math*** or integrated sequence. Not statistics, business math, and computer classes.

Eleven of the thirteen campuses list course requirements. When considering advanced algebra as Algebra 2, over half of these campuses are explicit about requiring Algebra 2 to apply. The other five use the terminology of “advanced math” or “higher” to indicate what students’ three credits should be. This leaves a little more ambiguity as to what that third course needs to be. So, there is a chance that Introduction to Statistics and Advanced Math Topics could be considered together as a third credit by the universities, but it is not clear. The final decision will be up to the admissions offices when they receive the high school's course offerings. However, when I contacted the admission offices of these universities, a majority of them recommended taking Algebra 2. One admissions officer said it was always safe to go with Algebra 2.

Completing Algebra 2 is part of college readiness standards and why Lakeway wanted all students to complete Algebra 2. The Lakeway director of instruction said:

> Simultaneously, we had conversations about the fact that students need to academically be prepared to get to college. That they don't have to choose a four-year college to be successful. But the choice shouldn't be made for them due to academic failure or our failure to offer them rigorous course work. It should be that they made that choice that it's not the right match for them.

Like she stated, the point is not that every student must go to a four-year college, but they must have the opportunity. Districts that allow students to complete three credits of mathematics without Algebra 2 are not fully preparing students for the opportunity to apply to four-year colleges in Wisconsin.

In Appendix E, the potential course sequences for students in each district are provided. Each sequence is labeled "No Credential," "Potential Credential," or "Credential," depending on if they meet the credential of completing Algebra 2. Those sequences labeled "Potential Credential" may be considered, but it is not clear. For example, the sequence in Bluffton of Algebra 1, Integrated Math 2, and Integrated Math 3 mixes both the traditional and integrated mathematics courses. Colleges accept integrated sequences, but most school districts do not offer the traditional sequence courses alongside the integrated sequences. So, when colleges are accepting the integrated sequence, it is because the school does not offer the traditional sequence.

There is the potential for the college not to accept the integrated courses from Bluffton, because the district still offers the traditional courses and might ask why a student did not take those courses. Bluffton also has some sequences labeled “Not Likely Sequence,” because the likelihood of a student taking that sequence is slim.

In Table 4, the number of no-credential and credential sequences are shown from before and after the response to the state policy. For this table, no credential is considered those labeled “No Credential” and “Not Likely Sequence.” Those sequences considered credentialed in the table are those labeled “Credential” and “Potential Credential” in Appendix E. With the course offering changes and the reconfigurations of the tracks, there are some noticeable changes from before and after the mathematics leaders’ responses.

Table 4

No Credential and Credential Sequences by District

	Two Harbors		**Clarksville**		**Lakeway**		**Bluffton**		**Vincent**		**Robinson**	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
No Credential **(no credential & not likely sequence)**	4 80%	1 50%	2 67%	6 86%	2 33%	0 0%	0 0%	15 68%	3 60%	4 58%	2 40%	6 60%
Credential Sequences **(credential & potential credential)**	1 20%	1 50%	1 33%	1 14%	4* 67%	6* 100%	2* 100%	7* 32%	2* 40%	3* 42%	3* 60%	4* 40%
*Differing types of Algebra 2 Credential												

Two Harbors, Lakeway, and Vincent increased their percentage of sequences that end with an Algebra 2 credential. Lakeway had the largest increase, because of their determination to have all students complete Algebra 2 by the end of eleventh grade, which would be the end of a sequence. Although it was a very slight increase, Vincent did increase with the help of the parallel track of double-dose courses. For Clarksville, Bluffton, and Robinson, their percentage of sequences that end with an Algebra 2 credential decreased. Bluffton's situation is important to note, because the mathematics leaders discussed how equity was being served by creating more options for students. It is perfectly illustrated here that more options do not equate to more opportunities when it comes to earning the Algebra 2 credential.

Many of the mathematics leaders discussed giving students more options for courses, specifically third-credit courses. Providing students with more options and choice can be beneficial as students explore their interests. However, by providing options away from Algebra 2, mathematics leaders have constrained the opportunities students have after high school. By not earning that credential of Algebra 2, students are left without the option of a four-year college when they graduate.

In Table 4, the credential sequences for Lakeway, Bluffton, Vincent, and Robinson all have asterisks to indicate that the district offers a variety of Algebra 2 courses. Again, more options can be valuable for students, and more options for students to be able to complete Algebra 2 are very valuable. With more options of Algebra 2, a student has more opportunity to complete and earn the credential of Algebra 2 and be able to apply to a four-year University of Wisconsin school. However, college admissions offices may distinguish between the different varieties of Algebra 2 a school offers. So even though a Lakeway student took Algebra 2, they may not be as strong of a candidate compared to a Lakeway student who took Advanced Algebra and Trigonometry.

In addition to distinguishing candidate strength, the variety of Algebra 2 courses does not prepare students with the same content. So, a student that takes Vincent's Algebra 2 Extended is receiving the credential needed to apply to four-year UW schools, but they will not be as prepared for the next level of mathematics as a Vincent student in Honors Algebra 2. The content presented in Algebra 2 Extended is not the same depth, breadth, or rigor as the content in Honors Algebra 2. Algebra 2 Extended keeps knowledge from students and leaves them unprepared for the next level.

Mathematics Leaders

For this study, I had initially loosely defined a mathematics leader as a person that is part of decisions around mathematics education in a district or school. I was intentional in keeping it open, as there is no formal definition of a mathematics leader in K12 education. Leaders and their leadership are studied, but those studies are often conducted at the district or school level and cover an array of issues. There is not a lot of focus on curriculum-specific leaders, so I allowed the definition of mathematics leaders to emerge through data collection. Mathematics teachers and mathematics chairs were consistently some of the mathematics leaders that responded to the state policy, but a variety of other leaders were also part of the response. Who these leaders are and their relationship with mathematics impacted the responses to the state policy.

Who Are the Mathematics Leaders? The mathematics leaders interviewed for this study included directors of curriculum and instruction, mathematics coordinators, principals, mathematics department chairs, mathematics teachers, and some counselors. It varied by district if the director of curriculum and instruction or principal were involved in the response, or if the district even had a mathematics coordinator. What was consistent across districts was the involvement of mathematics chairs and mathematics teachers.

We can often think of leaders as those with leadership titles, like a principal or even a department chair. But the mathematics teachers and the department chairs, who are also teachers, provided a lot of the leadership during the response to the third-credit requirement change. Leadership by teachers is often discussed in terms of their classroom and classroom management, but responding to the state policy showed leadership at the school and district level that is often not considered when thinking about teachers.

The department chair or mathematics teachers did not lead the responses in all the districts. In Lakeway and Vincent, there was a larger presence of traditionally defined district- and school-level leaders during the response. The response in Lakeway was led by a team made up of the director of instruction, high school principal, mathematics chair, and counselor. There were meetings with teachers where teachers provided their ideas and feedback, but the response lay in the hands of the four-person team.

In Vincent, the former South principal exercised his own leadership and made many decisions unilaterally. However, some of these decisions were in conflict with ideas that were teacher-driven, like the creation of the Introduction to Statistics and Advanced Math Topics classes. Although the former South principal exercised his leadership more unilaterally, the North principal supported the teacher-driven ideas. These differences in actions and beliefs between the two principals were similar among other mathematics leaders as well. The mathematical background, lack of mathematical background, and beliefs of mathematics leaders influenced the responses in every district.

Expertise and Beliefs. The responses by mathematics leaders to the state policy were influenced by how they made sense of the policy and what it meant for their district, school, and students. Their sensemaking during the response relied on their mathematical expertise, their beliefs about mathematics, beliefs about students, and their understanding of equity.

There was variety among mathematics leaders in terms of the mathematical or lack of mathematical expertise each possessed. Expertise tied closely with the beliefs held about mathematics and resulted in different responses among leaders. The former South principal did not have mathematical expertise, while the North principal did, as he was the mathematics coordinator at the time of response. The differences seen between their decisions about pre-Algebra, Introduction to Statistics, and Advanced Math Topics connected to their differences in mathematical expertise and beliefs about mathematics. The former South principal saw little issue with having all ninth graders take Algebra 1 and not Pre-Algebra. He also saw Introduction to Statistics and Advanced Math Topics as unnecessary and inequitable alternatives to Algebra 2, whereas the North principal with the mathematical expertise approved of the three classes for the purpose of bridging gaps and filling in skills that students did not have.

Those mathematics leaders with mathematical expertise talked more about the content of courses and had shared beliefs about the difficulty of some mathematics courses, especially Algebra 2. Their mathematical expertise influenced their beliefs and impacted what they saw as reasonable responses to the state policy. Those that saw Algebra 2 as too difficult a course for students to complete created courses so that the sequence and track a student took would not require them to complete Algebra 2. Those that pushed to have all students take Algebra 2, like the mathematics leaders in Lakeway and the former South principal in Vincent, did not have mathematical expertise, so they did not have to reconcile or hurdle the same beliefs about Algebra 2 that those mathematics leaders with mathematical expertise did.

The connection of mathematical expertise and beliefs about mathematics was not the only difference between mathematics leaders, but their mathematical expertise also connected with how they understood equity. Those with mathematical expertise, like the mathematics coordinator and mathematics chair in Bluffton and the North principal in Vincent, saw equity in mathematics as meeting the needs of students where they are now. Whereas those leaders without mathematical expertise, like the Lakeway director of instruction and former South principal in Vincent, saw equity as leveling up. Whether mathematics leaders understood equity to mean meeting the needs of students where they are now or equity as leveling up, all mathematics leaders saw their responses as addressing equity in some way.

Equity Interpretations

Equity was framed differently across the districts. Some mathematics leaders felt they were addressing equity by providing many course options for students to choose from. Others saw equity as providing courses like Pre-Algebra so students could build their skills before taking Algebra 1. There were also mathematics leaders who pushed to have all ninth graders take Algebra 1 in the name of equity. This way, students would be able to take Algebra 2 during eleventh grade and be eligible to apply to a four-year college. Reviewing these different understandings of equity and the decisions mathematics leaders made from their understanding, I have developed four interpretations of equity and how each interpretation functions. I have also developed two additional interpretations from my analysis of the mathematics leaders' responses to the third-credit policy. All of the interpretations are shown in Table 5 alongside the theoretical view of equity they correspond to. Recall the different views of equity as equal process, equal access, or equal outcomes (Crenshaw, 1988; Post, 2004; Rousseau & Tate, 2003). Equal process refers to treatment or what a student experiences, where equal access provides the equal opportunity for students. So equal process can mean students taking the same course, while equal access can mean there are no barriers for students to take whatever course they choose.

Table 5

Equity Interpretations and Theoretical Views of Equity

Equity Interpretations	**Theoretical Views of Equity in Mathematics**
Equity is providing student choice, which means having options for students	Equity as equal access
Equity is accessibility, which means offering courses according to a student's ability	Equity as equal access
Equity is leveling up, which means same courses	Equity as equal process
Equity is academic credential, which means ensuring all students qualify to apply to college	Equity as equal outcome
Equity is same quality, which means offering rigorous courses	Equity as equal access
Equity is academic preparation, which means having all students ready for college	Equity as equal outcome

The first interpretation is *equity is providing student choice, which means having options for students*. Many mathematics leaders talked about how providing more options for students was equity. The Bluffton mathematics chair said, "So we're incorporating with these two different pathways actually integrated pathways between the two, a chance for equity to show up." The Bluffton mathematics teacher reiterated this by saying, "We're trying to have there be more options instead of just one way that doesn't fit all." Bluffton mathematics leaders did not see having one route for students as equitable. Bluffton mathematics leaders believed these additional, integrated course options provided students more opportunity, and therefore their district was creating equity. This interpretation of equity is part of the traditional understanding of equity as equal access (Post, 2004). With all students having access to all these different course options, mathematics leaders believed they were achieving equity. It is not about what courses students are taking but that students have the opportunity and option to take all these available courses; it is up to the students to choose to do so.

The next interpretation is *equity is accessibility, which means offering courses according to a student's ability.* This interpretation of equity comes from the responses of mathematics leaders to offer courses like pre-Algebra courses in Two Harbors, Clarksville, Bluffton, and Vincent. The Vincent North principal spoke about students that were grade levels behind by the ninth grade, and that he did not believe, "To throw them into an Algebra 1 course and in the name of social justice." He saw the Pre-Algebra course as an opportunity to meet students' needs and build their skills to bring them up grade levels so that they would be prepared for Algebra 1.

The Bluffton mathematics coordinator also understood equity through this interpretation. He said, "And that that's equity lens. Giving them inroads, access that makes sense. What are those points of entry where everyone can engage in the math?" Here, the points of entry are courses for students that meet them at their skill and ability level. By introducing their integrated pathway and offering their Applied Math courses again, Bluffton now had at least four entry points for their ninth-grade students based on ability.

This interpretation of *equity is accessibility* follows the equal access view of equity (Post, 2004). Students have equal access to courses and content that meet their skill and ability level. No student is being thrown into a course they are not suited for. They have equal access to learn from their current mathematics knowledge level, with a better chance to experience success in mathematics and prepare for the next course.

The third interpretation is *equity is leveling up, which means same courses.* This understanding of equity appeared from Lakeway School District mathematics leaders and from the former Vincent South principal and follows one of the traditional views of equity as equal process (Gutiérrez, 2012; Rousseau & Tate, 2003). If all students were taking the same courses, then they were moving through the same process and receiving equal treatment in course-taking.

These mathematics leaders believed leveling up to have all ninth graders in Algebra 1 ensured their students were taking the same courses, thus ensuring equity in their district. Lakeway also had the goal for all students to take Algebra 2 by the end of eleventh grade. This also serves the traditional view of equity as equal process, as they had all their students taking Algebra 2 by leveling up.

Leveling up to have all students take Algebra 2 also reflects the traditional view of equity of outcomes (Crenshaw, 1988; Rousseau & Tate, 2003). By having all their students complete Algebra 2, Lakeway ensured their students had equal outcomes in terms of having the opportunity to apply to four-year colleges at the end of high school. From this we get a fourth interpretation of equity: *equity is academic credential, which means ensuring all students qualify to apply to college.* Lakeway mathematics leaders were very intentional in their goal around Algebra 2, because for them equity was making sure all students had the opportunity to apply to a four-year college if they wanted to. The mathematics leaders did not want the barrier to a student applying to a four-year college to be their high school mathematics courses.

These first four interpretations emerged from the interviews with the mathematics leaders. As you can see with the third and fourth interpretations, one response can fall under multiple interpretations of equity. Lakeway's response to have students complete Algebra 2 by the end of eleventh grade can be understood as addressing equity through leveling up and academic credentialing. Some of these interpretations also come into conflict with one another. The interpretations of *equity is leveling up* and *equity is accessibility* conflict. Leveling up means students taking the same courses, while accessibility means students taking different courses to meet their specific needs. Although these interpretations are all separate, they can coexist in the same district or even the same school building.

The final two interpretations emerged from my analysis of the mathematics leaders' responses. The fifth interpretation is *equity is same quality, which means offering rigorous courses*. This interpretation comes from a commonly held understanding that high-quality and rigorous curriculum will promote equity in mathematics (NCTM, 2020) and follows the view of equity as equal access. This interpretation of equity follows that students have equal access to rigorous courses. The director of instruction in Lakeway mentioned providing rigorous courses, but no mathematics leaders specifically focused on rigorous courses. However, Lakeway along with Vincent and Robinson provided courses of differing rigor to students. Offering Geometry lite and Algebra 2 lite courses does not provide the same high-quality and rigorous curriculum and courses to students and does not serve the equity interpretation defined by the National Council of Teachers of Mathematics (NCTM).

The last interpretation is *equity is academic preparation, which means having all students ready for college.* This interpretation is different from the academic credential definition, because a student can have the credential but not necessarily be prepared. For example, a Lakeway student could have Algebra 2 on their transcript thus having the academic credential, but they might have taken one of the Algebra 2 lite courses and have not learned the same material as a student in another Algebra 2 course. In this case, the student is not prepared to the same extent as the other student. A student can be eligible for college but not necessarily ready for college. This interpretation follows equity of outcomes, like the academic credentialing interpretation, but it focuses on a different type of outcome. This interpretation focuses on the knowledge outcome, what a student knows and is prepared for at the end of their high school mathematics career.

Each of these equity interpretations have value and the actions taken according to each interpretation do address equity in some way. However, each also leaves room for inequity to be perpetuated. This is why some of these interpretations are in conflict with one another, as one addresses equity in one way but not another. Additionally, the responses taken by the mathematics leaders according to their equity interpretation were all within a system of tracking. We have established tracking perpetuates inequity, so no matter the equity interpretation any action taken within a tracked system will continue to perpetuate inequity. The conflict between these equity interpretations and the continued use of tracking indicates a deeper discussion that needs to be had in mathematics education around equity. As equity conversations continue throughout the country, it is necessary for the field of mathematics education to grapple with the commitment to tracking that continues to perpetuate inequity. As we commit to mathematics equity and make changes within mathematics departments to address equity, we must confront how the tracking tradition, the foundation of our course offerings and course sequencing, limits the equity that can be achieved.

Rural, Suburban, and Urban Responses

Established literature shows there are differences in course offerings amongst urban, suburban, and rural school districts. This study supports this literature, while also building upon it in terms of how policy response can be different amongst districts. The reconfigurations and population of mathematics leaders in the districts varied based on urban, suburban, and rural classification.

The difference in track reconfigurations across district classifications was in part due to the resources available to districts. The urban districts of Vincent and Robinson and the suburban districts of Bluffton and Lakeway all responded by creating additional tracks. The parallel and bypass tracks in these districts were possible because they had the monetary and human resources to add additional courses. Two Harbors and Clarksville, the two rural districts, did not have the resources to create a new track as each only had two mathematics teachers in the department. Teachers were already teaching multiple courses to serve their students. The Clarksville mathematics chair mentioned he had tried to add an Algebra 1 double dose course but received push back from administration. He said, "It's a scheduling issue. It. To fit two hours into a freshmen schedule, to have the I guess teachers the staffing to provide that course." Although Clarksville was able to add Tech Math, the resources to add courses that would create parallel or bypass track did not exist.

The lack of resources in the rural district may have also contributed to these districts not being able to consider equity the way the suburban and urban districts did. The suburban and urban districts wanted to provide more options for students or more courses to meet students' needs, but for these rural districts with limited monetary and human resources this was not possible. The Clarksville chair wanted to offer a double dose course to provide students the additional support they needed to be successful. He wanted to keep the leveling up they had in place, while also offering a course according to students' ability. Here we can see him combining two of the equity interpretations, but not being able to act on them because of the constraint on resources in the district. This points to the additional complexity of necessary resources needed to work toward equity.

The spurs in the track in Bluffton, a suburban district, were created by counting computer science courses as a third mathematics credit, it was a rural and the urban districts that created spurs with diverging courses. In Clarksville, by reconfiguring Consumer Math and categorizing Personal Finance as mathematics (taught by the business teacher who is also certified in mathematics), they then had the scheduling space to add Tech Math. Like Clarksville, Robinson added a dual-credit course, Applied Tech Math, in partnership with their local technical college in addition to continuing to offer their Statistics course. Vincent also offered a Statistics course in addition to their Advance Math Topics course.

There are not many similarities when you consider Clarksville and Robinson together, but what stands out is they both offer a dual-credit course with their local technical college and their percentage of students enrolling in post-secondary are 56% and 52% respectively. The other districts are higher (Vincent, Bluffton, and Lakeway) or lower (Two Harbors) than these two expect for Cedar (52%), which also offers a dual-credit technical mathematics course in partnership with their local technical college. This points to a possible connection between the offering of dual-credit technical mathematics courses and the type of student the mathematics leaders believe they serve based on past post-secondary enrollment numbers. We know the discrepancies of teachers' beliefs of students' potential based on students' race and class, yet these three districts differ in racial and class demographics. This is not to say that mathematics leaders in these districts do not have beliefs of students based on a student's race and class. Rather, responses may be filtered through beliefs of students based on their race and class no matter the racial and class demographics of a district.

There were also noticeable differences in who were the mathematics leaders involved in the policy response. In the rural districts there were a small number of people involved in the policy response, mostly the mathematics teachers. In both Clarksville and Two Harbors, the directors of curriculum and instruction passed my interview inquiry on to either mathematics teachers or the counselor. For suburban districts, the response was discussed often amongst of team of leaders. Although I interviewed more people in the urban districts, it appeared that there were a small number of people making decisions and it was very much siloed by high school. The high schools in Vincent had similar yet different responses, which was also seen amongst the high schools in Robinson. All this suggests that there may be a difference in who is part of districts' responses to policy based on their rural, suburban, and urban classification.

Race, Class, and Gender Intersection with Mathematics

The responses by school districts in this study did not explicitly address the intersection of race, class, and gender with mathematics and the inequities seen along these lines. What was seen was the perpetuation of the field of power of mathematics being held for students with habitus that aligns with white, middle class, and male privilege. Responses in terms of course offerings and sequencing were made based on assumptions about who students were and their future prospects according to their socioeconomic or racial demographics. Additionally, the lack of meaningful conversation around racial, class, and gender inequities in mathematics only perpetuates the myth that mathematics is neutral and will only continue to create inequitable mathematics structures and opportunities.

Field of Power and Habitus. Operating as if mathematics is a neutral field perpetuated the misalignment of the students' habitus and the field of power established by course offerings and course sequencing. In Clarksville, by backing up the track and creating spurs, the mathematics leaders did not need to address supporting students successfully through Algebra 2 as the third-credit. When I asked about the Tech Math course that created a spur and technical college enrollment numbers, the mathematics teacher explained, "I also think it just fits our demographics here better too." The mathematics chair went on to add:

> Our community is not a not a high level of education. Very blue collar, factory workforce. Factory workforce, rural farming workforce. Outside of the school, the

> hospital, clinic there really isn't anything as far as high level education employment in the area…So yeah we struggle with our socioeconomic background a little bit when it comes to things like the ACT.

From this exchange, the socioeconomic demographics influenced the addition of Tech Math as it is a dual-credit course with the technical college that more and more Clarksville students were enrolling in. Additionally, the socioeconomic demographics have influenced the other spur of Consumer Math and Personal Finance and backing up the track with Math 9. By doing this, students do not need to reach Algebra 2, which has content that appears on the ACT.

ACT scores appear on a school and district's report card, so a fair assumption would be that districts would want students to be exposed to Algebra 2 so they can better perform on the ACT. However, that is not the case in Clarksville. The mathematics teacher said:

> My opinion and I'm assuming he kind of agrees with me there's no point for a lot of our kids to take the ACT…The ACT from what I understand is to show 4 year college if you are ready for it. And a lot of kids that's not their plan at all.

Because the Clarksville community is "very blue collar, factory workforce" and many students go on to technical college, therefore from the teacher's perspective there is no need for all students to take the ACT. Which can also mean, there is no real need for students to take Algebra 2 and that is why the track has been backed up and spurs have been created.

All these decisions and beliefs rest on the socioeconomic demographics of Clarksville. Anyon (1981) shows the different mathematical knowledge that is present at different schools based on social class. Clarksville illustrates Anyon's research as Clarksville students are not being exposed or encouraged to push their mathematics thinking to prepare and take more advanced courses because of their social class and their assumed future in the blue collar, factory, and farming workforce.

In Clarksville, mathematics as a field of power has remained as a space for students of certain social class and a space where others are excluded and not encouraged. The habitus of students from a blue collar, factory, and farming community do not align with the mathematics field of power established and perpetuated in Clarksville. For a student to reach Algebra 2 and therefore be eligible to apply to a four-year college, both the teacher and student would have to perceive student as able to attend a four-year college.

In Two Harbors, the mathematics teacher's consideration of students' socioeconomic background and access to mathematics knowledge challenged the misalignment of students' habitus and the field of power ever so slightly. The mathematics teacher explained:

> We are in the 3rd most impoverished county. Right. So there's a whole lot of neglectful and traumatic experiences kids are going through at home and outside of home. So that causes them various things…But these kids they're not they don't have the patience to you know work their their you know their cognitive do their cognitive load kind of stuff. Be careful and pay attention to details and so forth and attend to precision. Look for structure. And so you know the I see it the better we can give them an intuitive sense of what algebra does where they don't have to think about that they'll have less have to put less effort into what they are doing in Algebra 1.

Here the mathematics teacher addresses the socioeconomic environment Two Harbors' students experience. He then relates this to their behavior and knowledge, which we can see as deficit thinking. But then the teacher goes on, "“There's no morons in this school. There's nothing but geniuses walking in this school. Humans are geniuses by nature. That is what we do." This mathematics teacher knows his students have the ability, but need the support to reach their potential and interact with mathematics.

The mathematics teacher sees Principles of Algebra as an immersion course. He said, "Principles of Algebra is focused entirely on giving kids an intuitive sense of Algebra when they are in Algebra. Kind of like sending people to study abroad in Mexico when they are taking a Spanish class." By offering Principles of Algebra, the mathematics teacher is not necessarily challenging the field of power, but is providing access for students whose habitus might not align with the field of power. He knows each student has the potential, while recognizing their background and habitus might make it challenging to be successful in the field of power that is established. Although we may hope to see a challenge to the field of power, using Principles of Algebra as a vehicle of access for students whose habitus is misaligned does challenge the field of power that is meant for exclusively white, middle class, men.

The suburban and urban districts have kept the field of power intact by providing many course offerings for students. Offering many different courses is one of the equity interpretations of providing student choice, however this leaves the onus on students to choose the path they will take through mathematics when their habitus misaligns with the field of power. Having a plethora of course options for students can provide student choice, but it can also perpetuate the stratification we know to exist in tracking and mathematics education.

Robinson has the most diverse student population both racially and socioeconomically. They also do not have an honors track. That could be applauded as leveled courses stratify students. However, they still offer a regular track and a parallel track of double-dose and lite courses for students, so it could be viewed as Robinson district not believing its students can succeed at that level. This supports previous research that found in schools that serve predominantly low-SES families and students of color the courses offered are less advanced and contain less content than those courses in schools that serve high-SES families and white students (Attewell & Domina, 2008; Finn et al., 2001Lee, Smith, & Croninger, 1997). Because the habitus of a large majority of the students in Robinson misaligns with the field of power of mathematics education, Robinson does not even offer the higher level courses.

Bluffton, on the other hand, serves the largest percentage of white students amongst the urban and suburban schools and has a low percentage of students who qualify for free and reduced meals, a marker for socioeconomic status. Like Robinson, Bluffton also does not offer honors courses. Bluffton offers a traditional track and a bypass track with different content and methods of learning. Both tracks are meant to prepare students for four-year college options, but the traditional track is still held as the track for students going into STEM fields. Although Bluffton wants to ensure students are prepared for college, their structure still tells students there is different mathematics for different students. Bluffton's course offerings and course sequencing tries to address equity by providing options for students, yet these options can stratify students whose habitus does not align with the field of power. The options can also overwhelm students as they navigate the system, forcing students to stay on the path the field of power says that belong. Providing so many course options creates complexities and can perpetuate the field of power being preserved for white, middle class, men.

Robinson and Bluffton are two very different districts when looking at their racial and socioeconomic demographics yet there are some similarities in the course offerings and course sequencing they provide their students. Research shows that course offerings can differ by school according to the students the school serves (Attewell & Domina, 2008; Finn et al., 2001Lee, Smith, & Croninger, 1997), yet both have the resources to create structures to stratify their students. Bluffton and Robinson show that school districts serving a small percentage or large percentage of students who do not fit the white, middle class, male standard of mathematics have and continue to create structures that allow for stratification to be perpetuated so that the field of power remains as it always has been.

Color-Evasive, Class-Evasive, and Gender-Evasive. Many of the mathematics leaders felt as though they were addressing equity through their responses to the third-credit policy. However, many discussions around equity lacked meaningful conversation about race, class, and gender.

Mathematics leaders at Vincent South were the only ones to mention inequities based on race, class, and disability seen in their mathematics courses. These inequities were brought to light through the equity report conducted by the former South principal. The changes the former South principal made were in direct response to these inequities. Since the time he has left the school, it is unclear if the racial, class, and disability inequities have remained a focus of work, as the mathematics leaders still there only mentioned the work in relation to the former principal.

Race was brought up in Robinson School District as well but in a very different way than in Vincent. Two of the mathematics chairs in Robinson brought up race in ways that suggested mathematics is color-evasive, as they explained away overrepresentation of Black students in low-level courses. In fact, one mathematics chair explicitly said, “math is very colorblind.” Both accepted the common myth that mathematics is a neutral field and does not have racist structures or racist practices embedded within it. None of the mathematics leaders from the other districts brought up race in interviews. Although not explicit like those from Robinson, these mathematics leaders perpetuate the myth that mathematics is color-evasive by not talking about the intersection of race and mathematics.

Mathematics leaders were asked, “With equity in education being a focus around the country, from your perspective, tell me which of these changes are enhancing mathematical opportunities for all students and why.” Racial inequities are some of the most popular topics when discussing equity in education; it seems odd that no participant brought up race when answering this question. Race and mathematics conversations can and should be had in every district. No district is exempt from the discussion, no matter the racial demographics. There must be discussions of racial inequities and the intersection of race and mathematics. Only then can equity be properly addressed in every school district.

In addition to Vincent, class was also brought up in Two Harbors and Clarksville but more as an explanation of student performance and not as a focus of inequities. Like the mentioning of race and lack of discussions of race and mathematics, mathematics leaders left socioeconomic status out when discussing equity. Like Lubienski (2002) suggests, there needs to be equity work focused on uncovering the cultural assumptions of students from low-income backgrounds and through a lens of structural barriers to challenge the assumption that it is a student’s socioeconomic background that explains their performance.

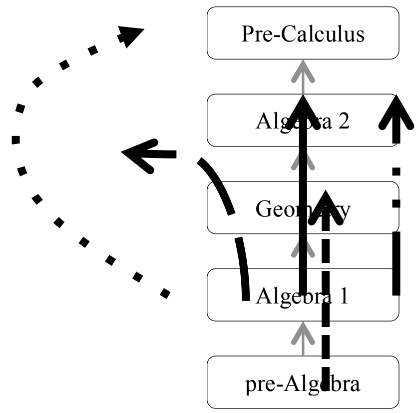
Although race and class were not brought up a lot, they were mentioned. In contrast, no mathematics leader brought up gender in interviews. Research (DiME, 2007; Johnson & Martinez, 1999) has found that when people avoid discussions of race in mathematics they rely on discussions of culture, family values and involvement, poverty, or student behavior. While there was some use of proxies such as poverty when discussing students, mathematics leaders relied on proxies of student performance and students’ futures. There was more discussion of those students “who are not ready for” or “will not need.” By using these general proxies, together with the explicit claim of color-evasiveness and the lack of explicit discussion of race, class, and gender, the discussions of equity have operated under the assumption that mathematics is a neutral field.

Mathematics leaders left mathematics as color-evasive, class-evasive, and gender-evasive when discussing equity. With a majority of mathematics leaders, equity was discussed in terms of meeting needs of students or leveling up. Framing equity in this way allowed them to keep race, class, and gender out of the conversation with almost an “all students matter” framing, even though the students they are talking about are historically students of color and students of low-income background in the lower-level courses. Mathematics leaders recognized there were inequities, because they responded with foci of meeting students’ needs and leveling up, but the specific inequities connected to race, class, and gender were not discussed. Without explicitly addressing the racial, socioeconomic, and gender inequities throughout mathematics, can equity really be achieved?

The responses by mathematics leaders and their focuses on meeting needs of students and leveling up can initially be seen as positive. However, all these responses have occurred in ways that perpetuate the inequitable system of tracking. The responses by mathematics leaders to the state policy reconfigured the traditional track by backing it up, making a parallel track, spurring from it, and bypassing the track. Figure 26 shows the four new tracks that were created from the traditional track. The solid black line is the traditional track while the dotted lines are the reconfigurations. These reconfigurations arrive from the responses mathematics leaders made in terms of course offerings that they believed brought equity.

Figure 26

Four Reconfigurations of the Traditional Track



We know that the system of tracking is inequitable, as it places students in courses of different depth and rigor of content and expectations. The lower tracks are generally overrepresented by students of color and students of low income. The system perpetuates and reproduces the inequities of society. The responses by the mathematics leaders did not challenge the tracking system; their responses reinforced this system. Mathematics leaders recognize that tracking is inequitable and negative for students but believe their responses to be equitable within a structure that has been proven to be inequitable. This leaves us with the question of how do we produce equity within an inequitable system like tracking?

It is possible for policies and implementation of policy to challenge the social and cultural inequities embedded in society and work toward equity in schools. The responses found in this study do not do that. They are responses that react to inequities, but they do not do enough to challenge and eliminate the inequities. To shift the normalized practices of mathematics, we need a focused effort on equity to identify and eliminate how racial, class, and gender bias operates with and within the structures of mathematics education to keep students from mathematical success and the opportunities to which they have a right.

Implications

Implications for Policy

The state policy increasing the graduation requirement was intended to expose students to more mathematics so that they would be better prepared for college and career opportunities after high school. However, like Chaney et al. (1997) stated, “One cannot assume that students take courses within a specified sequence and that an additional year of course work will advance them in that sequence. Students may take courses that do not advance them at all.” We see in this study that sequences and tracks were created that did not advance students and instead kept them from taking Algebra 2, a process that is inconsistent with the intention of the policy. With this is mind; policy-makers need to pay close attention to the implementation process.

Policy-makers should consider providing clearer directives in their policies. In this case, this state policy was not specific regarding how districts should implement the third-credit requirement. With a clearer directive, perhaps we would not have seen responses that kept students from Algebra 2. Policy-makers should consider requiring specific courses as part of the graduation requirement. Right now, the Wisconsin policy does not require specific courses to meet the third-credit requirement. In contrast to Wisconsin, many states require Algebra 1 and Geometry, while several also require Algebra 2 (Achieve.org, 2016). Wisconsin policy-makers should consider aligning graduation requirements with application requirements to four-year University of Wisconsin schools. Some may be rightfully concerned about how aligned graduation requirements might negatively impact graduation rates. A policy change alone is not the answer. Policy change must be accompanied by instructional support for teachers so they may reach all students in the classroom.

Another way policy-makers can bridge to the implementation process is by having more discussions with school districts and mathematics leaders about the policies being passed. In these discussions, the intention of the policy can be clearly shared, and district leaders can receive clarification. The intention of a policy is not always stated in the policy, which is the case with this one. Nowhere in the policy is the intention of students being better prepared for college and career shared. By providing opportunities for discussions between policy-makers and district and mathematics leaders, intentions can be better explained, and misunderstandings that can occur between the policymaking and implementation process can be minimized. These discussions also provide policy-makers a chance to influence the sensemaking of district and mathematics leaders as those leaders begin to understand the policy and formulate initial reactions. These discussions can also give mathematics leaders the opportunity to discuss the policy with other mathematics leaders outside of their district and share ideas about possible responses.

Implications for Practice

This study has shown how course offerings impact course sequences by adding additional tracks that do not enhance opportunity for students. With this in mind, there are several implications for practice. District and high school mathematics leaders should review their course offerings and course sequences to map their course sequence and identify the tracks present in their structure. Educators and mathematics educators often avoid using the term “tracks” or “tracking,” but the structures they have created are just that. While evaluating these tracks, integrated mathematics courses and sequences like Cedar implemented should be considered. Integrated mathematics sequences bring the topics of Algebra 1, Geometry, and Algebra 2 together rather than keeping them siloed. These integrated courses and sequence minimize tracking when they are the only option.

While reviewing course offerings and course sequences, district and mathematics leaders should map out the possible sequences students can take. Then with those possible sequences, identify which provide students with the credential of Algebra 2 so that they may apply to a four-year college. Mathematics leaders discuss all the options students have with the many course offerings and how they provide students with choice; without Algebra 2, students will have fewer options and less choice for their future.

District and high school mathematics leaders should review the content, rigor, and expectations in their Algebra 2 courses. Like the variety of Algebra 2 courses seen in this study, there is a large range of rigor and different content provided across Algebra 2 courses. Students should exit any Algebra 2 course and be prepared for Pre-Calculus. Completing Algebra 2 is more than the credential to apply to a four-year college; a student must be prepared for the next level course. Additionally, because Algebra 2 is a requirement to apply to four-year colleges, district and high school mathematics leaders should have more discussions with higher education institutions about what students are expected to have mastered when applying and attending four-year colleges. Students may have completed Algebra 2, but mastering the knowledge needed for the next level might be different.

Mathematics leaders should also consider the structures of course offerings and sequencing alongside instruction. Like the associate principal from Bluffton said, “I think we learned a great lesson is that just that structural change doesn’t improve. We can say all kids are taking Algebra, but we didn’t do enough to address the instruction in that Algebra class to meet the needs of so many different learners that would typically go to Applied Math.” Initiatives to provide equity based on courses offered to students also need to address the instruction happening in those courses. By addressing both structures and instruction, a district can level up and meet the need of students through instruction. By addressing instruction along with inequitable structures, there is a better chance for districts and mathematics leaders’ equity work to succeed. In Bluffton, the district failed to properly address instruction at the same time as changing structures for more equity. This led to the reintroduction of pre-Algebra courses.

Finally, some districts and high schools are working on changing deficit thinking, racist, and classist beliefs about students. This work needs to be done specifically around beliefs about mathematics together with beliefs about students. Mathematics is often held as different from other subject areas and said to be color-evasive. Professional development and independent work by teachers needs to be done to establish that mathematics is not a neutral field. Discussions need to be had about how deficit-thinking, racist, and classist beliefs about students together with beliefs about mathematics create systems and structures that are inequitable for students in schools.

Implications for Theory

This study used a conceptual framework that included sensemaking, tracking, and equity to understanding the responses of mathematics leaders to the state policy and the implications of the responses on students' opportunities. This study contributes to the established literature of these three areas of study.

Sensemaking. The findings from this study contribute to the literature on sensemaking, as it provides insight into how other actors besides mathematics classroom teachers make sense of state policy. The findings support previous literature that states actors make sense using their expertise and preexisting knowledge.

There were varieties of mathematics leaders involved in the sensemaking process in each district. Each of these mathematics leaders had different levels of expertise and preexisting knowledge that they utilized to ultimately respond to the policy. There was a difference in response between the two principals in Vincent. Both had different expertise and preexisting knowledge that influenced how they responded to the third-credit policy. The North principal had expertise in mathematics education, as he had been a mathematics teacher and mathematics coordinator in the district. His expertise led him to understand pre-Algebra courses differently than the South principal, who did not have expertise in mathematics education. The South principal's expertise and preexisting knowledge pushed him to focus on leveling up, which led to his belief that offering pre-Algebra courses was not equitable.

Like in Vincent, other districts had mathematics leaders that did not necessarily have expertise in mathematics education. The various levels of expertise and knowledge around mathematics education resulted in conflicts and different responses within a district. It was not that mathematics leaders that had the same expertise responded identically, but there were similarities in their responses. Future research can further examine specifics around expertise and preexisting knowledge that impact how mathematics leaders make sense of policy.

Tracking. Tracking has been traditionally understood as low, regular, and honors level tracks. For mathematics, these tracks are based on the traditional sequence of Algebra 1, Geometry, Algebra 2, etc. So, we would see these courses in a regular track and not necessarily see all of them in a low-level track. This study shows how the tracks of today can look much different from these traditionally siloed tracks. There are still siloed tracks, like the parallel tracks seen in this study. However, we can also see tracks with spurs and bypasses that take students away from courses they need for future opportunities. The findings of this study show that tracking is more complex and does not always appear as typically thought.

The mathematics leaders in this study did not believe they were adding tracks in the way they ultimately did. The Bluffton mathematics leader thanked me when I used the word route instead of track, because they believed their department did not have tracks. The former principal at Vincent South saw his decisions as detracking, yet the creation of extended courses created a parallel track. Many of these district mathematics leaders created tracks despite their intention to detrack or create a fluid structure. Tracking is not always intentional, and this study shows it can be perpetuated by decisions that are intended to detrack.

Equity. Equity is a focus around the country, and the term is used in many initiatives and district decisions. Above, I identified multiple interpretations of equity expressed by mathematics leaders. These six interpretations can be used to understand and evaluate decisions and initiatives in mathematics education that intend to address equity. These interpretations support the established literature that states there are different ways to view equity and different methods of how it is achieved in mathematics education (Crenshaw, 1988; Gutiérrez, 2007; Lubienski and Gutiérrez, 2008; Post, 2004; Rousseau & Tate, 2003). These many views and interpretations can often conflict with one another. The conflict between some of these interpretations in this study calls for more attention to how the word equity is used and when it is used to justify decisions.

Implications for Research

This study has investigated how mathematics leaders respond to state policy changes and how their responses impact opportunities for students. Based on the findings presented here, there are several suggestions for future research in terms of methodology and research focus. This study used a case-study method to look at seven districts in Wisconsin and used interviews of mathematics leaders and documents as the data. Future research can utilize other data to provide more insight into this topic. This study intended to use demographic data on course-taking from the district to look for trends of what students were taking for their third credit based on gender, class, and race. Unfortunately, I was not able to collect that demographic, course-taking data. With demographic data on course-taking, we can more precisely understand if equity is being addressed by the track reconfigurations.

In this study, I was able to look at seven Wisconsin districts. Expanding this research to more school districts in Wisconsin could provide even more information about responses to the state policy increasing the mathematics credit requirement. Additionally, this research could be expanded across the country. Although Wisconsin is one of the last states in the country to increase the credit requirement to three, it would be valuable to expand this research to other states that have also recently increased to three, like Alaska, or to a state, like Texas, where Algebra 2 was required, and then the requirement was removed after public pushback. Investigating the sequences available to students to complete the credit requirement for graduation can tell us more about how credit requirements impact course offerings and tracking.

The findings of this study illuminate areas of research for greater focus. In the discussion, I presented six definitions of equity. I am sure these are not the only definitions and understandings of equity. So what is mathematics equity? It would be beneficial to conduct research around the definition and understanding of mathematics equity for different mathematics leaders. Connected to these equity definitions is the need for more up-to-date research on tracking, specifically how equity is addressed within this inequitable structure. Are there systems of tracking that do not create inequitable opportunity for students?

The structure in Bluffton illuminates a potential area of research. Bluffton's structure of having both integrated and traditional mathematics courses is not common. Investigating the content and rigor of all the courses, the course-taking patterns of students between tracks, and the trajectories of students after graduation would provide more information on the validity of offering these two tracks together.

Finally, this study defines opportunity as the opportunity to apply to a four-year University of Wisconsin school, which means having the credential of Algebra 2. These higher educational institutions set this credential, so the conversation about mathematics courses and requirements is really a K16 conversation. Investigating the connection or lack of connection between K12 and higher education in terms of mathematics would be beneficial to the field.

Conclusion

Increasing high school graduation requirements in mathematics is supposed to provide students with more mathematics so they are better prepared for the future. Wisconsin policy-makers believed that increasing the mathematics requirement from two to three credits would better prepare students for business, industry, or college. For students to be better prepared, they need more than the third credit; they need to be progressing in mathematics content. To understand how students' mathematical opportunities are impacted by the third-credit policy, this study first investigated how mathematics leaders responded to the new requirement of three credits of mathematics. From there, the implications of these responses on mathematical opportunities for students were examined. This was done by defining and examining the opportunity to reach Algebra 2, because with Algebra 2 students would have the opportunity to apply to University of Wisconsin four-year institutions. Based on this study, the mathematics leaders from six districts responded with new courses, which in turn reconfigured the traditional mathematics track to keep students from needing to reach Algebra 2 to complete the requirement of three credits of mathematics. Only one district, Lakeway, established courses where every sequence or track a student takes results in completing Algebra 2 in their third year.

The responses that resulted in tracks that did not include Algebra 2 resulted from fear, anxiety, and concern mathematics leaders had about Algebra 2. This fear created courses and structures that limit the opportunities students have after high school. We know the beliefs of teachers and both implicit and explicit bias can impact the experiences of students inside a mathematics classroom. But here we see that teachers' and leaders' beliefs and biases can impact the experiences of students in mathematics before they even reach the classroom. What happens inside a classroom is important when working towards equity, but understanding what classroom doors are open and closed to students is part of this equity work. What doors are open and closed to students impacts their opportunities throughout high school and after high school. This study begins to show how more focus needs to be given to the structures of course offerings and course sequencing in mathematics so that students' opportunities are not limited.

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Appendix A

Wisconsin Statute pre-December 2013

118.33 High school graduation standards; criteria for promotion

(1)**(a)** Except as provided in par. (d), a school board may not grant a high school diploma to any pupil unless the pupil has earned:

1. In the high school grades, at least 4 credits of English including writing composition, 3 credits of social studies including state and local government, 2 credits of mathematics, 2 credits of science and 1.5 credits of physical education.

There will be follow up questions specific to the participants' responses to the questions above.

Wisconsin Statute passed December 2013

118.33 High school graduation standards; criteria for promotion.

(1) (a) Except as provided in pars. (d), (e), (em), and (es), a school board may not grant a high school diploma to any pupil unless the pupil satisfies the requirement under sub. (1m)

…

c. At least 3 credits of mathematics. The school board shall award a pupil up to one mathematics credit for successfully completing in the high school grades a course in computer sciences that the department has determined qualifies as computer sciences according to criteria established by the department. The school board shall award a pupil up to one mathematics credit for successfully completing in the high school grades a career and technical education course that the school board determines satisfies a mathematics requirement, but may not award any credit for that course if the school board awards any credit for that same course under subd. 1. d.

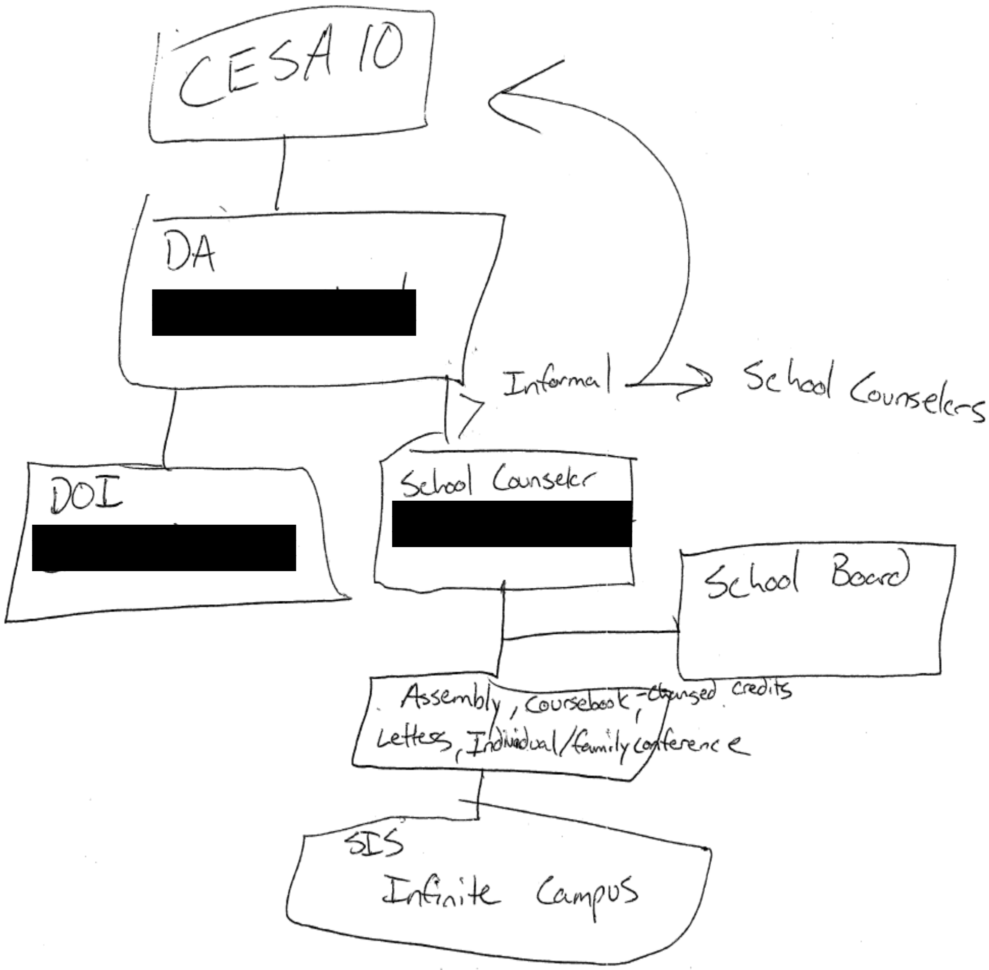
Appendix B

District Information by High School (WISEdash; US Census Bureau, 2017)

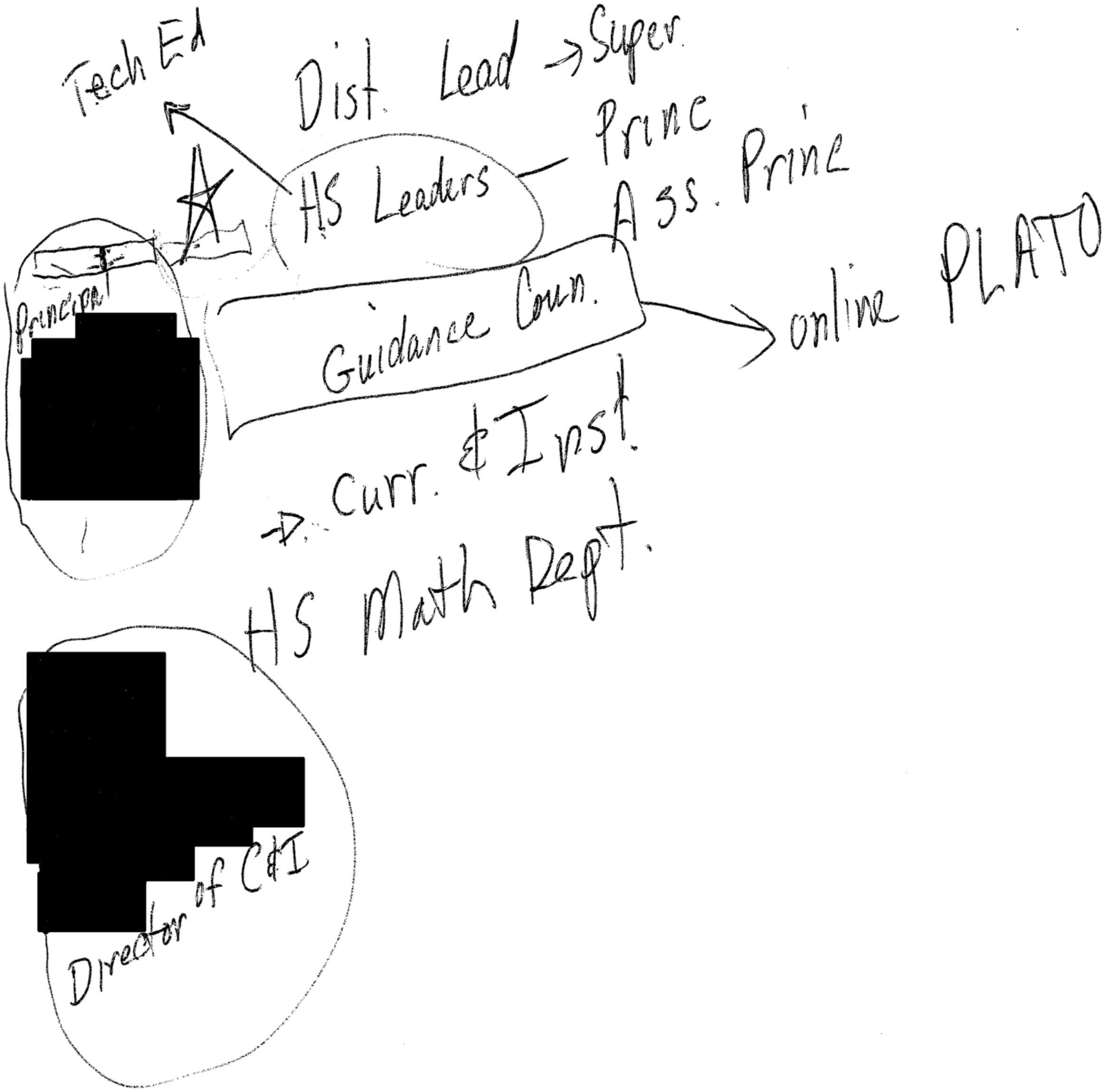
District High School	Type of District	Year of Change	Student Population (2018-2019)	Student Racial Demographics (2018-2019)		Free or Reduced-Price Meals (2018-2019)	Postsecondary Enrollment (2017-2018)	Average ACT Score (2017-2018)	Median Income+
Vincent South	Urban City-Small	2014-2015	1,077	American Indian: 0.8% Asian: 7% Black: 5.6% Hispanic: 4.7%	Pacific Islander: 0% White: 75.5% Multiracial: 6.4%	39.4%	Overall: 59% 2 year: 39% 4 year: 55%	20	$42,975
Vincent North	Urban City-Small	2014-2015	764	American Indian: 0.7% Asian: 10.9% Black: 4.2% Hispanic: 4.7%	Pacific Islander: 0% White: 68.7% Multiracial: 10.9%	50.8%	Overall: 65% 2 year: 35% 4 year: 58%	20.2	$42,975
Robinson Washington	Urban City-Small	2014-2015	1,783	American Indian: 0.2% Asian: 1.8% Black: 25.1% Hispanic: 24.7%	Pacific Islander: 0% White: 45.1% Multiracial: 3.3%	51%	Overall: 52% 2 year: 40% 4 year: 53%	17.8	$51,477
Robinson Memorial	Urban City-Small	2014-2015	1,324	American Indian: 0.5% Asian: 0.5% Black: 36.4% Hispanic: 31.7%	Pacific Islander: 0.1% White: 27% Multiracial: 3.6%	69%	Overall: 46% 2 year: 42% 4 year: 50%	16.3	$51,477
Robinson River	Urban City-Small	2014-2015	1,577	American Indian: 0.3% Asian: 0.7% Black: 23.7% Hispanic: 32%	Pacific Islander: 0.1% White: 40.6% Multiracial: 2.7%	61%	Overall: 50% 2 year: 43% 4 year: 48%	16.9	$51,477
Lakeway	Suburban Suburb-Large	2016-2017	887	American Indian: 0.9% Asian: 5.7% Black: 2.4% Hispanic: 12.2%	Pacific Islander: 0.2% White: 75.8% Multiracial: 2.8%	21%	Overall: 77% 2 year: 19% 4 year: 70%	22.7	$63,480
Bluffton	Suburban Suburb-Midsize	2016-2017	1,155	American Indian: 0.2% Asian: 7.4% Black: 1.3% Hispanic: 1%	Pacific Islander: 0.3% White: 88% Multiracial: 1.7%	26%	Overall: 62% 2 year: 39% 4 year: 51%	21.1	$71,361
Two Harbors	Rural Rural-Distant	2016-2017	134	American Indian: 3% Asian: 0% Black: 0% Hispanic: 5.2%	Pacific Islander: 0% White: 89.6% Multiracial: 2.2%	46%	Overall: 43% 2 year: 24% 4 year: 40%	18.4	$39,281
Clarksville	Rural Rural-Remote	2016-2017	430	American Indian: 1.6% Asian: 1.2% Black: 0.9% Hispanic: 4.9%	Pacific Islander: 0% White: 91.4% Multiracial: 0%	37%	Overall: 56% 2 year: 41% 4 year: 46%	19.5	$43,767
Cedar	Rural Town-Distant	2014-2015	783	American Indian: 18.3% Asian: 0.4% Black: 0.8% Hispanic: 4.2%	Pacific Islander: 0% White: 70.9% Multiracial: 5.5%	46%	Overall: 52% 2 year: 30% 4 year: 56%	19.2	$43,307

Appendix C

Network Map by Two Harbors Counselor



Network Map by Bluffton Mathematics Coordinator



Appendix D

Interview Protocol: Semi-Structured Interview Questions

Introduction

- Tell me how long you have been in the district and what roles you have served.

Interpretation

- Tell me what you understand the state policy change to mean. (Show written state policy from before and after change. Appendix A)

Design

- Draw a map of who was involved in responding to the policy requiring three credits of mathematics.
- Tell me about any meetings that were held to discuss the district's response to the policy change.
- Tell me about your involvement with implementing the policy.
- Tell me about your thoughts during the planning of a response by the district.

Implementation

- Tell me about any changes that were made in implementing the policy requiring three credits of mathematics and why.
    - Tell me about any changes to course offerings and why.
    - Tell me about any changes in course sequencing and why.
    - Tell me about any changes to the course placement process and why.
- Tell me about any challenges that have arisen from the third-credit requirement policy.

Enhance opportunities

- With equity in education being a focus around the country, from your perspective, tell me which of these changes are enhancing mathematical opportunities for all students and why.
- In responding to the state policy, tell me about any decisions, changes, or points of interest that we have not covered but you find important to the conversation?

Appendix E

Two Harbors
Before if three credits

Algebra 1A	+	Algebra 1B	+	Consumer Math	No Credential
Algebra 1A	+	Algebra 1B	+	Geometry	No Credential
Algebra 1	+	Consumer Math	+	Geometry	No Credential
Algebra 1	+	Geometry	+	Consumer Math	No Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential

After

Principles of Algebra	+	Algebra 1	+	Geometry	No Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential

Clarksville
Before if three credits

Algebra 1	+	Consumer Math	+	Geometry	No Credential
Algebra 1	+	Geometry	+	Consumer Math	No Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential

After

Math 9	+	Algebra 1	+	Tech Math			No Credential
Math 9	+	Algebra 1	+	Consumer Math	+	Personal Finance	No Credential
Math 9	+	Algebra 1	+	Geometry			No Credential
Algebra 1	+	Tech Math	+	Consumer Math	+	Personal Finance	No Credential
Algebra 1	+	Geometry	+	Tech Math			No Credential
Algebra 1	+	Geometry	+	Consumer Math	+	Personal Finance	No Credential
Algebra 1	+	Geometry	+	Algebra 2			Credential

Cedar

Math I	+	Math II	+	AP Statistics	No Credential
Math I	+	Math II	+	Math III	Credential

Lakeway
Before if three credits

Algebra Concepts	+	Algebra Concepts 2	+	Algebra Concepts 3	+	Geometry Concepts	+	Geometry	No Credential
Algebra 1	+	Algebra Concepts 2	+	Algebra Concepts 3	+	Geometry Concepts	+	Geometry	No Credential
Algebra 1	+	Geometry	+	Algebra 2					Credential
Algebra 1	+	Geometry	+	Advanced Algebra and Trigonometry					Credential
Algebra 1	+	Honors Geometry	+	Advanced Algebra and Trigonometry					Credential

After

Algebra w/Extensions	+	Geometry 100	+	Algebra 2	Credential

Algebra 1	+	Geometry 100	+	Algebra 2	Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential
Algebra 1	+	Geometry	+	Advanced Algebra and Trigonometry	Credential
Algebra 1	+	Honors Geometry	+	Advanced Algebra and Trigonometry	Credential
Algebra 1	+	Honors Geometry	+	Honors Advanced Algebra and Trigonometry	Credential

Bluffton
Before if three credits

Algebra 1	+	Geometry	+	Algebra 2/4	Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential

After

Applied Math 1	+	Applied Math 2	+	Algebra 1	No Credential
Applied Math 1	+	Applied Math 2	+	Integrated Math 1	No Credential
Applied Math 2	+	Algebra 1	+	Geometry	No Credential
Applied Math 2	+	Algebra 1	+	Integrated Math 1	No Credential
Applied Math 2	+	Algebra 1	+	AP Computer Science Principles	No Credential
Applied Math 2	+	Integrated Math 1	+	Integrated Math 2	No Credential
Applied Math 2	+	Integrated Math 1	+	Geometry	No Credential
Applied Math 2	+	Integrated Math 1	+	AP Computer Science Principles	No Credential
Integrated Math 1	+	Integrated Math 2	+	AP Statistics	No Credential
Algebra 1	+	Integrated Math 2	+	AP Statistics	No Credential
Algebra 1	+	Geometry	+	AP Computer Science Principles	No Credential
Algebra 1	+	Geometry	+	Integrated Math 2	Potential Credential
Algebra 1	+	Integrated Math 2	+	Integrated Math 3	Potential Credential
Algebra 1	+	Integrated Math 2	+	Algebra 2	Potential Credential
Integrated Math 1	+	Geometry	+	Algebra 2	Potential Credential
Integrated Math 1	+	Geometry	+	Integrated Math 2	Potential Credential
Integrated Math 1	+	Integrated Math 2	+	Integrated Math 3	Potential Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential
Integrated Math 1	+	Algebra 2	+	Integrated Math 3	Not a likely sequence
Integrated Math 1	+	Algebra 2	+	AP Statistics	Not a likely sequence
Integrated Math 1	+	Algebra 2	+	Pre-Calculus	Not a likely sequence
Applied Math 2	+	Integrated Math 1	+	Algebra 2	Not a likely sequence

Vincent
Before if three credits

Transitional Math	+	Applied Algebra 1	+	Applied Algebra 2	No Credential
Applied Algebra 1	+	Applied Algebra 2	+	Geometry	No Credential
Algebra 1	+	Algebra 1.5	+	Geometry	No Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential
Algebra 1	+	Honors Geometry	+	Honors Algebra 2	Credential

After

Pre-Algebra	+	Algebra 1	+	Geometry			No Credential
Pre-Algebra	+	Algebra 1 Extended	+	Geometry Extended			No Credential
Algebra 1 Extended	+	Geometry Extended	+	Intro to Stats	+	Advanced Math Topics	No Credential
Algebra 1	+	Geometry	+	Intro to Stats	+	Advanced Math Topics	No Credential
Algebra 1 Extended	+	Geometry Extended	+	Algebra 2 Extended			Credential
Algebra 1	+	Geometry	+	Algebra 2			Credential
Algebra 1	+	Honors Geometry	+	Honors Algebra 2			Credential

Robinson
Before if three credits

Algebra 1 A/B Block	+	Geometry			No Credential
Algebra 1	+	Geometry	+	Statistics	No Credential
Algebra 1	+	Geometry	+	Algebra 2	Credential
Algebra 1	+	CP Geometry	+	Algebra 2	Credential
Algebra 1	+	CP Geometry	+	CP Algebra 2/Trigonometry	Credential

After

Algebra 1 w/Lab	+	Geometry Concepts	+	Statistics	No Credential
Algebra 1 w/Lab	+	Geometry Concepts	+	Applied Technical Math	No Credential
Algebra 1	+	Geometry Concepts	+	Statistics	No Credential
Algebra 1	+	Geometry Concepts	+	Applied Technical Math	No Credential
Algebra 1	+	CP Geometry	+	Statistics	No Credential
Algebra 1	+	CP Geometry	+	Applied Technical Math	No Credential
Algebra 1 w/Lab	+	Geometry Concepts	+	Algebra 2	Credential
Algebra 1	+	Geometry Concepts	+	Algebra 2	Credential
Algebra 1	+	CP Geometry	+	Algebra 2	Credential
Algebra 1	+	CP Geometry	+	CP Algebra 2/Trigonometry	Credential